

Infrastructure 2012

SPOTLIGHT ON LEADERSHIP



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Cover: Containers sit in the Port of Singapore, the world's busiest port. International trade has helped fuel Singapore's growth.

(©Eightfish/Getty Images)



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Infrastructure is a long-term proposition, but decisions about what infrastructure to build and how to pay for it are being made every day. Leaders at all levels—and increasingly, even ordinary citizens—are weighing priorities, assessing resources, and figuring out how to get from here to there. In the new global economy, challenges abound, but the choices we make about infrastructure today will reverberate far into the future—this is why leadership is such an essential part of the infrastructure story.

Each year, the Urban Land Institute and Ernst & Young collaborate on an assessment of the state of global infrastructure. *Infrastructure 2012: Spotlight on Leadership* is the sixth in this series.

In this year's report, we highlight examples of infrastructure leadership, exploring how six U.S. regions are approaching infrastructure in the new economy. *Infrastructure 2012* also examines key trends influencing infrastructure globally and reviews the massive projects underway in the rapidly urbanizing and developing countries of China, India, and Brazil. These countries are engaged in infrastructure investment on a scale unthinkable in most developed countries, but continuing economic doldrums, labor constraints, and bureaucratic challenges are putting the brakes on Chinese, Indian, and Brazilian infrastructure aspirations. In Europe, nations are struggling to move forward with catalytic infrastructure investments in light of the global economic downturn and the European financial crisis.

In the United States, the faint signs of economic recovery, coupled with a growing recognition of the importance of infrastructure, have lifted the infrastructure mood, but stumbling blocks remain. In particular, no one seems willing to have the hard conversation about where federal funding—to refurbish existing infrastructure, to expand current networks, to build shiny new systems—will or should come from. The good news is that even as the prospect of large, new infusions of federal funding dims, regions searching for infrastructure investment are not giving up. They are developing their own visions of the future and pursuing funding and implementation largely on their own.

In mature, developed economies, including the United States and many countries in Europe, the era of massive, transformative infrastructure investments—the kind that shape national economies and drive markets for decades—may be over. In its place is an era of more fine-grained infrastructure investment, one where regional transit systems are being built or expanded, where pedestrian and bicycle networks are getting connected, and where land use is a key consideration. Now more than ever, new approaches and new kinds of leadership are needed to connect infrastructure to values and to make clear its benefits. It's a tall order, but one that *Infrastructure 2012* suggests is essential for our future.



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Aggressive government belt-tightening and financial market deleveraging restrain worldwide infrastructure investments for 2012 and probably the next five years. The need to invest the dollars that are available on projects that have the greatest effect on economic productivity, real estate demand, and global competitive position has never been more urgent. However, financial austerity and political fractures can stand in the way of better infrastructure decision making.

Mature economies—the United States, the United Kingdom, and nations in the European Union (EU)—struggle against widening funding gaps just as emerging-market countries, particularly India and Brazil, face increasing hurdles to meet aspirations for promoting growth. Even China hits speed bumps after an unequalled spending spree that has helped transform its economy into a global power.

In the United States, tightened budgets and daunting challenges begin to force government officials to rethink infrastructure approaches, especially at state and local levels where the already heavy funding burden is growing. They can no longer depend on generous handouts from a Congress embroiled in partisan battling over the depth of federal deficit reduction. Expensive, potentially game-changing plans for cutting-edge networks like high-speed rail (HSR) get sidelined, at least temporarily. The urge to spread money around to reach all constituencies ebbs, replaced by a focus on trying to attain better outcomes for every dollar allocated. Still, the absence of a national policy on transportation and freight infrastructure continues to hamper U.S. ability to compete globally.

The fiscal gloom means responsible local leaders must set strategic priorities and focus available funding on critical needs, particularly maintaining existing systems. They must find creative ways to fund major projects for necessary improvements or new systems by increasing or implementing user fees such as road tolls or raising taxes. More jurisdictions mount ballot measure drives to gain constituent approvals for sales tax hikes and bond issues, which often pass when framed as beneficial for future economic growth and property values.

In more metropolitan areas, highway, transit, and housing departments consider integrated land use solutions to reduce congestion, decrease travel times, and improve quality of life for the next generations. Some jurisdictions start to pool

resources for regional transportation and water planning rather than engage in increasingly unsustainable battles for dwindling federal funds. They realize they can do better by working in concert to achieve common objectives, rather than competing for tax dollars. A dose of necessary funding triage also concentrates resources on infill areas: extending infrastructure such as roads, sewer lines, and water mains to fringe areas can no longer be justified at the expense of shoring up business centers and places where populations and commerce converge.

State and local governments also step up efforts to engage private capital and expertise in partnerships to help ensure more cost-effective project design, construction, operations, and future maintenance. After early missteps, more states enact public/private partnership (PPP) enabling legislation and reach out to contractor-funder consortiums to achieve workable procurement practices that can deliver projects on time and on budget. Institutions, including pension funds, heighten interest in infrastructure investment—a growing pool of private capital becomes available to help finance properly structured government projects.

Although governments may have greater success in finding efficiencies by doing more with less, the overall state of the nation's infrastructure will continue to deteriorate unless the political will and funding to make the needed investments materializes. And—despite recent progress—that is still a tall order in the infrastructure world.

In Atlanta, trains connect the city and Hartsfield-Jackson Atlanta International Airport. (Photo courtesy of MARTA)





1 Setting Priorities

For 2012, new realities start to sink in, forcing changed assumptions and approaches for how to deal with vexing, cost-intensive infrastructure needs. Concerned about slippage in economic primacy after emerging from deep recession, some leaders in the United States finally begin to reawaken to the importance of infrastructure after years of underfunding.

Anxious Americans worry about ensuring future prosperity and slowly start to embrace the notion of upgrading infrastructure—especially when part of a political narrative for finding solutions and creating value. Put another way, can the United States afford not to invest in critical infrastructure? Support builds in favor of infrastructure, especially at local levels where constituents routinely support ballot measures for infrastructure projects that can shore up communities for the next generation. Nevertheless, a flood of money won't be directed into the infrastructure arena any time soon in the United States or anywhere else, given ongoing deleveraging and enforced austerity.

Other nations—both mature western economies and emerging markets—struggle to advance or hold their own in the extremely competitive global pecking order, in part by advancing infrastructure agendas. They recognize that infrastructure quality is an important differentiator in a globally competitive marketplace.

In the United States and abroad, infrastructure investment may be recognized as an effective mechanism for priming ailing economies and protecting jobs, one that is often preferable to the alternative of pumping public money into the economic system in other

A view of the Los Angeles skyline is framed by one of its many freeways. *(John Foxx/Getty Images)*

ways. But leaders face the dilemma of finding the resources to spend what is required on infrastructure to meet both current and future needs.

Making Choices

Everybody realizes most governments lack the necessary financial wherewithal to invest and borrow for backlogged infrastructure projects. Even China appears to decelerate recent over-the-top spending. “The big question is where will all the money come from” to deal with funding gaps in the umpteen trillions of dollars worldwide and at least \$2 trillion in the United States alone.

For officials and planners, the challenge simply boils down to doing more with less—concentrating funds on essential repairs, executing projects that can most affect future economic growth, and stoking sputtering employment engines. States and cities must figure out how to raise more revenues, in part through greater reliance on user fees and creative tax mechanisms and by taking the case to the voters. PPPs can help with efficiencies, building in life cycle cost considerations, and financing.

Not surprisingly, financial distress—both government indebtedness and diminution in personal wealth—helps focus all of us on what really matters for our social and economic well-being.

Infrastructure starts to matter more when every dollar, euro, or yuan counts.

Improved Outcomes

Ironically, fiscal constraints finally may compel some better results—figuring out what matters most, and what will get the best bang for the buck, becomes even more urgent. From a land use perspective, critics of subsidized sprawl finally gain serious traction after years of pointing out how the infrastructure cost equation never added up in extending suburban subdivisions toward exurban fringes. “When money is so tight, it becomes too difficult to rationalize building miles of roads and sewers into empty cow pastures.”

Countries with national infrastructure strategies, such as Australia, Canada, New Zealand, and the United Kingdom, probably have an advantage in parceling out limited funding to projects identified as top priorities serving the greatest good for economic growth and productivity. These game-changing initiatives could include building out multimodal transport systems from gateway cities; linking augmented freight-rail distribution between population centers, major ports, and international airports; constructing high-speed passenger-rail lines between key metropolitan areas; or implementing new energy systems and broadband technologies.

States Use a Variety of Revenue Sources for Transportation

Number of states using source in 2011



Source: National Conference of State Legislatures, *2011 Transportation Governance and Finance Report*.
Notes: 50 states, District of Columbia, and Puerto Rico. States vary in their use of each type of funding.

Local Leadership

Unfortunately, the United States is one of the few major economic powers lacking a national infrastructure policy direction: initiatives are left to percolate from local and state levels, often competing for resources. But in the current environ-

ment, at least, bottom-up “self-help” efforts will more likely attract funding from federal and private sources, especially when they help meet clearly defined economic and strategic objectives.

Although partisan bickering in Congress has prevented policy makers from reaching meaning-

Elevated rail tracks in downtown Chicago link historic buildings and new construction. *(Jeremy Woodhouse/Getty Images)*



ful consensus on infrastructure funding, and deficit cutters resist infrastructure spending, more leaders at least talk about repairing rusting bridges and replacing crumbling roadbeds. After not investing heavily on new systems for many years, the life cycles of existing infrastructure noticeably and more alarmingly run out of time and can no longer be ignored.

Greater Urgency

Although this pragmatic reorientation does not necessarily translate into finding more funds for infrastructure in underfilled federal coffers, many officials, again mostly at state and local levels, seek creative ways, including more private financing, to advance infrastructure programs, borrowing from models already developed and tested in Europe, Canada, and Australia. In particular, properly structured PPPs can create efficiencies and reduce costs over the entire life cycle of systems.

Local politicians also show newfound backbone; they take chances on raising tolls, train fares, and

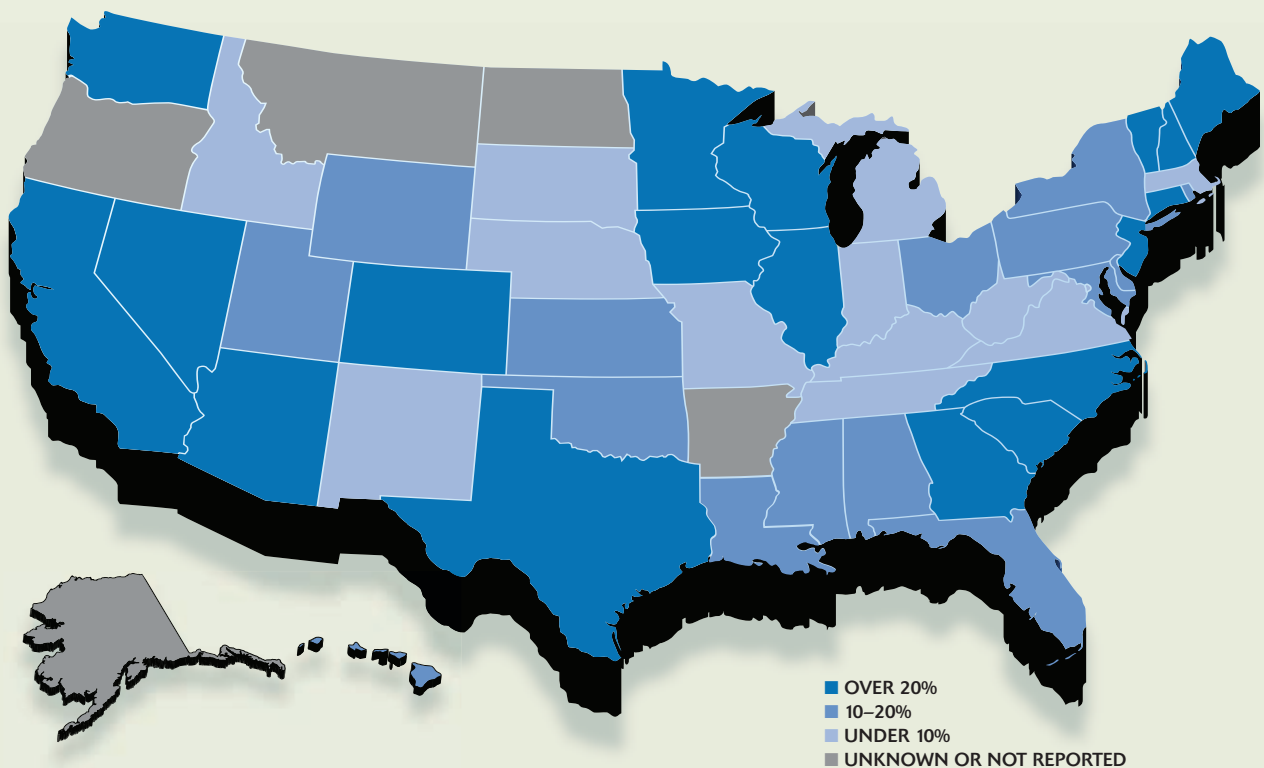
water district fees rather than risk the increasing possibility of breakdowns in existing systems. Maybe they discern that more of their hard-pressed constituents will be willing to pay if that means maintaining or enhancing service and providing tangible improvements for their areas. Anticipated voter ire turns somewhat more muted and less reflexively critical; people slowly and resignedly begin to accept the price for what we had come to take for granted—essential services such as roads, sewers, and water. Raising gas taxes remains viscerally unpopular to most politicians in the wide swaths of mostly car-dependent suburban and rural America, but that too may change out of necessity.

No Free Way and Working in Concert

In the emerging reformulated world order, users probably will be paying for anything new that gets built through some sort of fee or direct tax.

State Budgets Face Lean Times

Budget shortfalls as share of FY 2011 general fund expenditures



Source: Center on Budget and Policy Priorities.



Freeways have seen their day—any new highway or added expressway lane will almost certainly be tolled. Increasing dependence on user-fee-oriented models to pay for infrastructure could register dividends—changing behaviors to encourage greater productivity by more directly tying the costs of paying for building and maintaining systems to their benefits. It also raises questions about the regressive nature of some of these fees and the social equity costs of making already strapped Americans pay more for infrastructure.

Responsible government leaders appear more compelled to seek creative, integrated solutions that could realize a greater bang for their meager available bucks. “Any metro area that wants to be competitive in the future needs a multimodal transportation network,” says an interviewee. “In difficult times, there’s more give in the system; people set in their ways tend to be more willing to make adjustments, deliver service differently, and find better outcomes.”

Retrenchment Realities

But no one should kid themselves: “the needs are greater and the available funding sources are not.” For starters, U.S. HSR plans falter, the EU has no choice but to delay some connectivity projects, and China slows down rail and highway building.

“When you look at the total pot of money over the next five years, everyone will be spending less,” and that means less will get done. The effects of fiscal strain likely will become more evident: patching potholes takes longer, subway systems incur service cutbacks, and expected sewer line replacements get deferred. Officials must juggle limited resources.

Still, difficult times may reap formative advances—as a start, attitudes are transforming. And that is no small change in the infrastructure world.

The Intercounty Connector, which opened in 2011, is a major new toll highway linking Maryland’s Washington, D.C., suburbs. The road’s tolls are variably priced and payable by remote transponder.
(Photo courtesy of the Intercounty Connector Project)





2 Global Update

The **global economic recession** affects infrastructure strategies across continents. Not only must overwrought governments in nations with mature economies deleverage and implement austerity regimens, but emerging-market countries are also scaling back plans and reassessing what is possible in challenging times.

Europe, like the United States, struggles to bolster once modern, now deteriorating, decades-old systems and retreats from investing on major improvements after leapfrogging the United States on HSR as well as other signature transport projects. Against greater obstacles, Eurozone countries attempt to hold fast to their commitments for reducing carbon emissions and enacting green sustainability initiatives.

China, India, and Brazil continue to push ahead in building “from scratch” state-of-the-art new systems, making progress in trying to meet the needs of their expanding economies. Investments in advanced networks stand in stark contrast to the United States, but they also hit financial hurdles, and progress is affected by corruption as well as bureaucratic inefficiency. Still, countries that continue to invest through this challenging economic period are likely to gain global competitive advantage in the long term.

Activities and investment by country or region include the following:

- In the United Kingdom, private finance approaches are under fire at the same time that fiscal austerity forces the country to rethink infrastructure priorities.
- As the availability of debt capital shrinks from the region’s ailing banking sector, Europe’s depleted treasuries make new infrastructure projects look like a luxury that might not be affordable right now.

Shenzhen, China, has seen rapid economic growth in the past two decades.

- China's recent blistering infrastructure construction pace tempers in the face of some high-profile HSR failures and a slowing economy. Still, megaprojects to deal with the country's massive water challenges inch forward.
- India works hard to build infrastructure to keep up with its exploding population. It tries to accelerate projects and attract offshore capital, but its efforts might not be enough.
- The upcoming 2016 Olympics present an opportunity for Brazil to build new infrastructure, such as HSR connections, but projects hit snags.
- Canada keeps hacking away at its infrastructure deficit with an impressive list of transformative projects, maintaining its position as a world leader in using PPPs for infrastructure.

Just about every nation counts on greater private financing to mount future initiatives and looks for new funding tools to pay for projects. More large-scale public works involve public/private ventures as user fees and tolls become part of ultimate funding prescriptions, no matter the country.

United Kingdom

Budget fissures and austerity measures stress U.K. infrastructure spending, and reliance on previously lauded private finance initiatives is upended. Big projects like the London Crossrail move forward, and the buildout for this year's Summer Olympics completes on time and under budget. But the

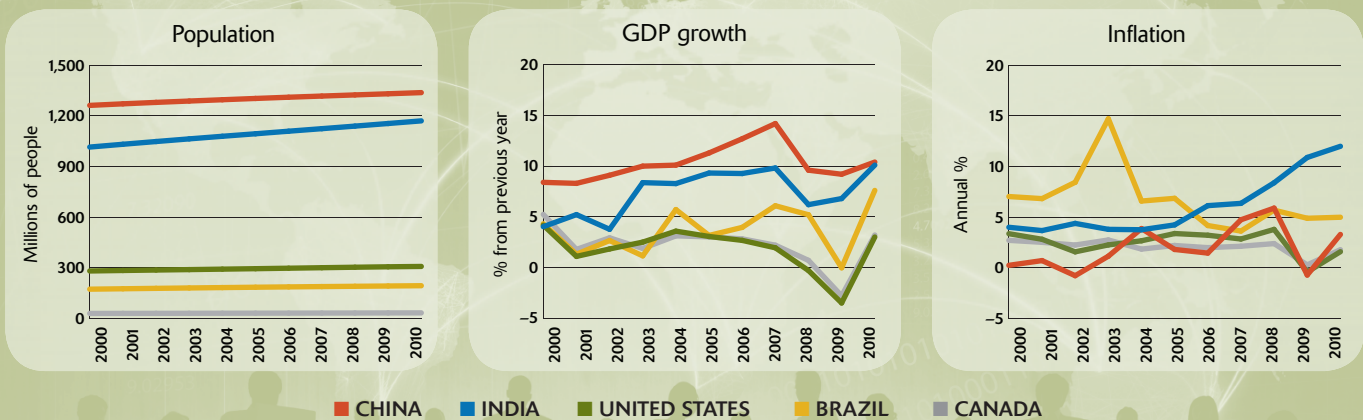
high-speed line, HS2, slated to connect London with Birmingham and eventually to Leeds, Manchester, and cities in Scotland faces strong citizen protests and other challenges. The earliest this project could be completed is 2026, and 2030 looks more likely given the potential \$50 billion-plus cost and lack of existing funding sources.

At present, other conceptual projects seem even more ambitious—they include the London mayor's proposed new airport east of the city to take pressure off overcrowded Heathrow and a utility spine or services duct along the future HS2 route, including broadband and electric power lines. "It would be an opportunity to create efficiencies, but the country may be too poor to do it. Perhaps it can be done piecemeal instead."

Possibly the most surprising victim of government belt-tightening has been the private finance initiative (PFI) program—one of the earliest versions of private financing, often held up as a model for PPPs in other countries. Most PFI projects involved social infrastructure—building and managing health care facilities and schools. "They ran their course, most of the low-hanging fruit had been picked, and the approach is much harder to apply on larger, more complex projects."

Critics contend PFIs stacked the deck in favor of private partners, who took advantage of taxpayers over the course of long-term operating agreements and made big returns selling assets

Population, GDP Growth, and Inflation in Selected Countries



Source: World Bank.



on secondary markets. The government still embraces private involvement but seeks new models, which secure more pension fund capital and provide greater revenue sharing with the public sector. Proponents suggest PFIs will be “rebranded” and regain some luster. Essentially, “government cannot do without PFIs.”

While financing questions take on focus, funding is an even more serious issue because “the government doesn’t have the money and no one has the answer.” As long as Europe gropes to overcome its debt crisis and job growth lags, “the U.K. will get worse and the revenue squeeze could last for quite some time.” The government says it will spend more on infrastructure, “but when you examine the details, the money allocated gets spread over years to much lesser effect and immediate impact.” Officials will also look at selling more infrastructure assets and concessions.

On the fix-it-first front, essential highway maintenance proceeds, but in local areas signs appear of cutbacks—paving repairs may be delayed; potholes do not get filled as fast. The privatized rail industry operates satisfactorily, but maintenance costs mount, raising fares and causing rider consternation.

Continental Europe

Various governments and EU entities put a brave face on prospects for continuing infrastructure initiatives like the connectivity TENs (Trans European Networks) projects, but the reality of failing economies, widespread banking insolvency, and mounting sovereign debt suggests policy will be a “basket case” until fiscal affairs get

The European Union’s Infrastructure Funding Programs

Program	Euros (billions)
CONNECTING EUROPE FACILITY (2014–2020)	
Energy	9.1
Transport	21.7
Telecommunications/digital	9.2
Subtotal	40.0
COHESION FUND FOR TRANSPORT (2007–2013)	10.0
Total	50.0

Source: European Commission, 2011.

The planned HSR station on Curzon Street in Birmingham, England, will be one of the many stops on HS2, a high-capacity railway linking London to Birmingham, and eventually to Leeds and Manchester. (Image courtesy of HS2)

sorted out. And that is unlikely to happen in 2012. “Everything slows—spending less and smoothing cash flows into the future” just as the forecast investment needs for infrastructure improvements total upward of 2 trillion euros across the continent over the next decade.

Some observers question the infrastructure pull-back as counterproductive, suggesting public works investments could help stimulate moribund economies and create jobs when high unemployment saps demand for goods and services. Undoubtedly governments will attempt to make up public sector shortfalls by selling more concessions and trying to engage public pension funds, insurers, and other private sector capital sources to invest in capital improvements. EU members also appear committed to maintaining their green agendas, reducing carbon emissions and tempering vehicle use by reorienting transportation systems and rethinking land use patterns.

A promising initiative would have the European Commission and European Investment Bank attract investors through guarantees on proposed project bonds for investments that meet connectivity objectives including transportation, energy, broadband, and telecommunications. But these EU-backed

bonds would not be available until 2014, if plans move ahead. Given the enormous funding needs, potential private sector participation, including from pension funds, will be insufficient to pick up all the slack. Compromised balance sheets and pending financial reforms forcing lenders to increase reserves pinch traditional lenders for infrastructure, particularly the large Euro-pean banks, who significantly reduce their capital outlays.

Essentially, the empty coffers and uncertain recovery scenarios mean more projects get shelved in 2012 waiting for signs of stability. Worst cases follow Ireland’s lead, where the Ministry of Transport suspended close to 90 road improvements because of budget cutbacks. Any new road construction in Ireland will depend on finding private companies to build toll roads, and the country’s overall 2012 capital budget has been slashed by 755 million euros to 3.9 billion euros.

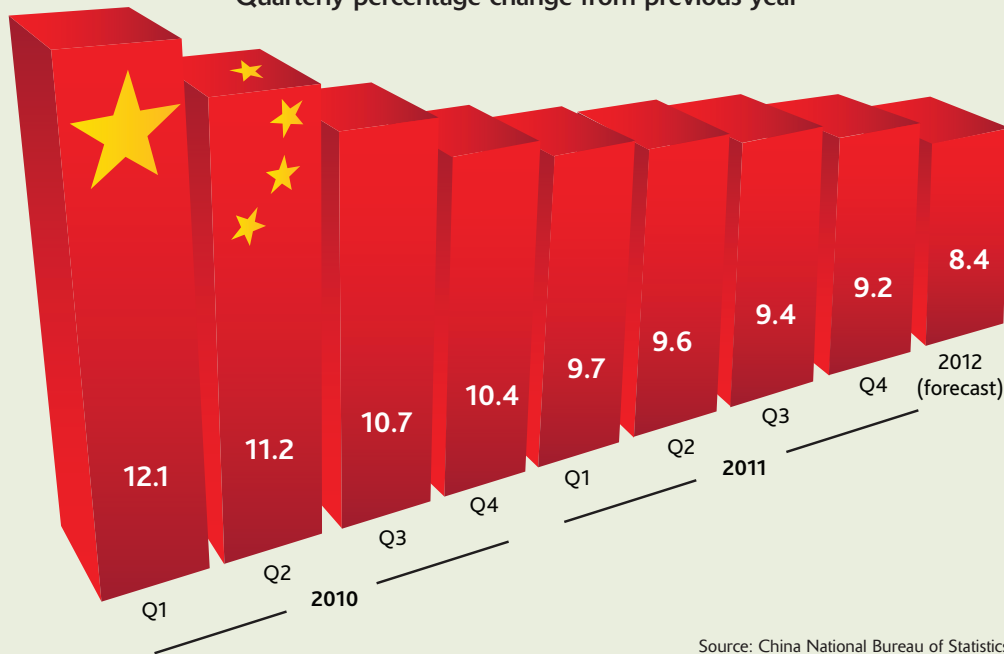
Spain has cut government infrastructure allocations by 40 percent after a decade-long road and rail spending spree but continues to build out its state-of-the-art HSR network. Neighboring Portugal unilaterally stopped work on the bullet-train line linking Lisbon to Madrid, however, leaving Spain in the lurch. The Portuguese govern-

The Olympic Park in east London has been transformed by major investments in utilities, roads, bridges, and transit infrastructure. *(Photo courtesy of London 2012)*



Gross Domestic Product Growth in China Is Slowing

Quarterly percentage change from previous year



Source: China National Bureau of Statistics.

ment claimed EU-mandated austerity left no other choice. In Greece, austerity measures force sell-off of infrastructure assets.

Other governments like Italy position to stimulate their economies by preserving infrastructure projects—providing jobs while investing in systems for the future. But the pressure of meeting deleveraging targets set by EU partners may compromise its plans. Most other countries reluctantly batten down the hatches.

China

China's recent accomplishments have been staggering—46,000 miles of expressways, the world's most extensive HSR system, futuristic airport terminals, booming new port facilities, extensive urban subway systems, and massive hydroelectric dams—and all built within the past 20 years. Estimates suggest a major stimulus kick from government coffers since 2009 amounted to spending an eye-popping 15 percent of gross domestic product (GDP) on public works—related projects (compared to less than 2.5 percent in total U.S. expenditures), which helped cushion effects from the global recession.

Unquestionably, China has taken dramatic strides to catapult itself into the position of

world's second-largest economy, creating extensive transport networks to support future growth around urban-based industry and linking cities across vast expanses. Interconnected systems—mass transit feeding into intercity rail, and webs of futuristic highways—keep people and goods moving in mushrooming metropolitan areas throughout the country. The projects have put tens of millions of people to work as the nation strategically reinvests and leverages its recent export manufacturing gains to fuel ever more expansion and move populations out of the countryside.

But after much attention for its modernizing prowess and seemingly impressive building spree, China and the rest of the world begin to assess the achievements and effects of this unprecedented construction in the context of ongoing global economic turmoil. The early acclaim has given way to more mixed reviews, and the country shows signs of needing to rein in its voracious appetite to transform in the face of possible fiscal fatigue.

For starters, China cannot escape the effects of the world economic slowdown, as its key European and North American export markets ebb in consumer belt-tightening. White-hot double-digit

growth in GDP tempers in the face of a maturing economy, international economic doldrums, and new efforts to put the brakes on public spending. China will have to deal with its own massive debt—estimated between \$1.5 trillion and \$2.2 trillion—accumulated from prodigious internal borrowing to finance the infrastructure and building rush.

China's new rail and road systems have helped connect vast expanses and lift millions out of poverty, but the pace and extent of construction have brought challenges. Water and energy remain pressing issues on the country's infrastructure priority list.

Rail

Until a July 2011 bullet-train collision killed 40 passengers, most of the new HSR projects had earned high marks for state-of-the-art efficiency and speeds routinely reaching 200 miles per hour. The accident led to questions about construction quality and railway safety, then work was suspended on 6,000 miles of rail projects across the country because of widely publicized fund shortages. Several high-level railway execu-

tives were sacked for corruption and management missteps after \$30 million in misappropriations was uncovered on the Beijing to Shanghai HSR line alone. Many trains run half empty, not only because of fears of future accidents, but also because most Chinese cannot afford the expensive fares. Adding to unease about rail travel, a third signal failure in three months on a new Shanghai subway line precipitated a train crash that injured almost 300 passengers. After a reassessment and new policies to restrain spending, the 2012 rail budget has been slashed 42 percent.

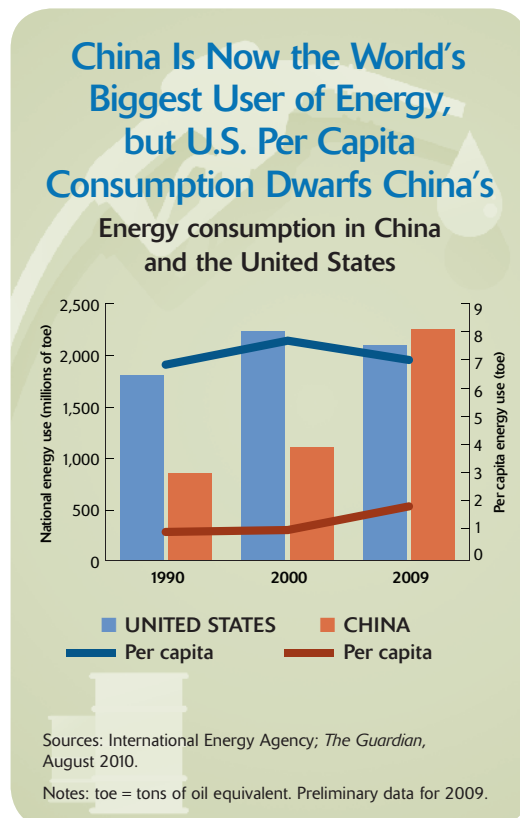
Roads

Budget constraints also reportedly caused work stoppages on road construction across the country in the fall of 2011. Early last year, the Ministry of Transport announced that work on 12 major national highways, nearly the length of the U.S. interstate system, had been finished 13 years ahead of schedule. The remaining 6,000 miles of roads are planned for completion by 2020, a still manageable target.

Despite all the expressway construction, traffic congestion mounts in and around the largest cities—last summer, Beijing gridlocked for days in an epic 60-mile jam—and all the new roads promote more driving, helping drive smog to dangerous levels in some urban centers. With approximately 5 million licensed cars on its roads, Beijing officials will limit new license plates to 240,000 cars annually. The Transport Ministry has also temporarily eliminated or reduced tolls on some highways after a torrent of citizen complaints about the cost.

Water

Two-thirds of China's cities lack sufficient water, and tap water in most parts of the country remains nonpotable. With 20 percent of the world's population, China has only about 7 percent of the world's freshwater resources, concentrated in its southern provinces, and most of its rivers, lakes, and aquifers are polluted. The push to rev up the nation's economy through hydro-power and coal-fired electricity consumes about 40 percent of the country's water, and recent extended droughts have exacerbated shortages in some regions.





The country's most high-profile infrastructure project, the \$23 billion Three Gorges Dam, continues to be mired in controversy, which now focuses on its inability to control floods as well as geological and ecological problems—destructive algae blooms and cracks in surrounding countryside. People in scores of cities and towns were relocated to make way for the dam project, which has otherwise met its hydroelectric goals.

Fifty years in the planning, an ambitious South–North Water Diversion Project to shift precious water supplies from the south to high-population industrial areas in the northeast suffering from encroaching desertification is proceeding. The mind-boggling \$62 billion project will rechannel water from major rivers in three artificial lines, displacing hundreds of thousands of people in its wake. Environmental consequences may not materialize until after the work is well underway or completed, and reducing and diverting trillions

of gallons of water from natural river basins raises serious concerns. Observers wonder whether emphasizing conservation and discouraging further population and industrial growth in more arid zones is a better strategy.

India

From new ports and airports to subways, freight rail, power generation, and tolled highways, India attempts to modernize, accessing private capital to further ambitious and necessary goals. Among headlined projects underway are a \$2.5 billion expansion of the Mumbai subways, construction of a \$3.6 billion Hyderabad Metro Rail system, a \$500 million highway upgrade between Jammu and Udhampur, and a \$173 million toll-road expansion from Ahmedabad to Godhra. Six new dedicated freight-rail corridors are also under construction with a phase 1 cost of \$10 billion.

China's massive Three Gorges Dam has met energy goals, but environmental concerns remain.

Despite devoting 8 percent of GDP to these and many other “desperately needed” infrastructure improvements, India suffers from a massive and widening supply/demand gap with “a lot of catching up to do,” and its ambitions to rival neighboring China show signs of stumbling in a maelstrom of debt, stubborn inflation, and the global banking crisis. During 2011, growth in manufacturing, construction, and agriculture dropped dramatically from levels in the heady low teens to mid single digits, still respectable levels that nonetheless signal increasing economic stress that could impinge on near-term infrastructure investment.

Even so, the government promotes a \$1 trillion national infrastructure plan covering 2012 to 2017, double the \$500 billion goal of the past five years, which missed its spending target by about \$100 billion. The proposed five-year plan calls for major outlays across the infrastructure spectrum with concentrations in power, roads, rails, and telecommunications.

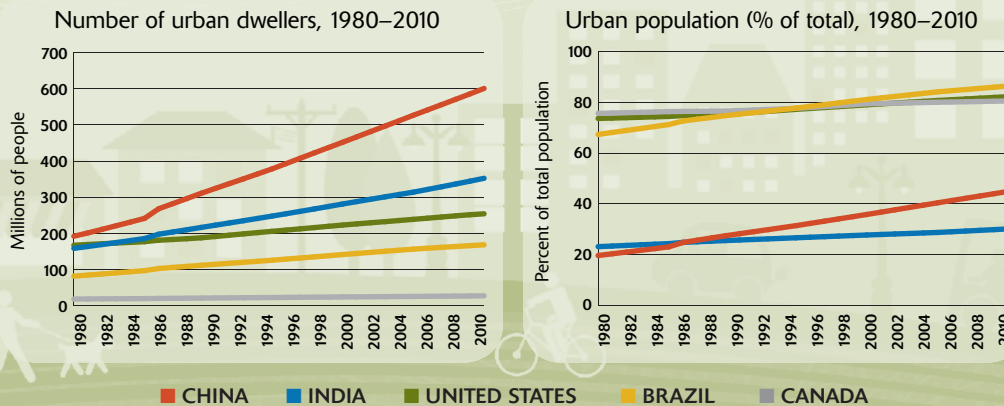
Population Pressures

Population growth, meanwhile, advances unchecked: India will vault ahead of China by 2025 to rank as the world’s most populous nation. And the country’s urbanization hurtles forward. Already overcrowded cities—including New Delhi, Mumbai, and Bangalore—have added 90 million people since 2001, with another 200 million urban dwellers expected by 2030. Speeds average just 20 miles per hour on pot-holed highways as the number of cars has multiplied nine times since 1990; 50 percent of the nation’s 4 million miles of roads remain unpaved. New airport terminals cannot keep up with jet traffic, which has quadrupled in the past four years, and people pack into subway lines on opening, overwhelming systems. Power outages remain daily occurrences in most of the country, hampering manufacturing and service industries, which must rely on backup generators, while water supplies remain untreated and undrinkable

India’s large population creates pressures for infrastructure.



China and India Are Rapidly Urbanizing



in most places. Recent annual freight traffic grows at a 10 percent annual clip, precipitating the urgent need for the new rail lines. Estimates suggest that upward of 40 percent of the country's fruit and vegetable production never reaches markets because of infrastructure-compromised supply chains.

Private Capital and Labor Challenges

Officials look to the private sector, but prospects appear dim in the short term, given a challenged domestic banking system and near paralysis in European financial centers. Still, India leads the emerging BRIC (Brazil, Russia, India, China) countries in attempts to attract private investment to its infrastructure sectors. In 2010 alone, the country entered into \$75 billion of infrastructure-related PPPs. Although foreign investors and operators have made money, the market can be difficult to navigate; even domestic players complain about failed policy frameworks and bureaucratic roadblocks. Recent kickback scandals in selling broadband licenses reinforce investor perceptions about corruption and difficulty in navigating convoluted state bureaucracies.

Lack of skilled labor presents another substantial hurdle. India needs more civil engineers, planners, and architects to manage all its necessary construction projects and faces the daunting task of training millions of unskilled construction laborers to work efficiently on projects.

A Race against Time

Essentially, India finds itself in a race against time, coping with the exigencies of its exploding and mostly impoverished population while trying to reformulate as a 21st-century economic power. By some estimates the country's growth rate could be 2 percent higher with improved infrastructure.

Brazil

South America's emerging market superstar, Brazil struggles to make long-neglected infrastructure improvements, many slated for welcoming hundreds of thousands of offshore visitors to the 2014 World Cup and 2016 Olympics. "Relative to ten years ago, the country has a lot going on and its economy will continue to grow faster than most, but recent stock market drops and a weakened currency will slow activity." In addition, corruption and favoritism create an uneven playing field, and red tape complicates the procurement process for major projects.

High-Speed-Rail Setback

Probably the most disconcerting setback involves the country's highest-profile transportation venture, a proposed \$19 billion high-speed railway linking Brazil's two most important cities—Rio de Janeiro and São Paulo. The National Land Transport Agency has struggled to attract experienced foreign investors and operators into public/private consortiums with Brazilian contractors to



build the “technically challenging” 300-mile high-speed line between its two gateways as well as connecting to Campinas. Top-tier international concessionaires, experienced in building bullet-train systems in Europe and Asia, balked at taking on substantial project risks for cost overruns for what they viewed as insufficient revenue guarantees from the government. Delays in settling on the contractor group have imperiled hopes of building HSR service between the cities in time for the Summer Games in Rio.

Getting Ready for the World

Tens of billions of dollars, meanwhile, pour into developing sports facilities and regional transportation links to host the World Cup, taking place in 12 Brazilian cities, as well as the follow-on Olympics. The budgeted price tag for all the improvements totals more than \$50 billion. Projects include subway extensions, bus rapid-transit (BRT) routes, new highways, port upgrades, and airport expansions. All will be needed to move athletes and throngs of sports-mad tourists.

The government has begun clearing favela shantytowns in the path of new routes to sports venues and upgraded hotel districts. Construction

of a \$450 million six-lane BRT route will require relocating 3,000 families from Rio’s northern suburbs alone, and some estimates indicate hundreds of thousands of people may be uprooted to make way for other projects.

Although the Olympics provides a welcome spur to address Brazil’s longstanding infrastructure deficits, for planners the overriding concerns focus on whether the government can muster enough money, expertise, and skilled manpower to complete all the work on schedule without compromising quality, a daunting task at the best of times.

Canada

Like the United States, the Canadian government funded and built most of its transportation and water infrastructure in the post–World War II years, tailing off expenditures and underfunding projects during the 1980s and 1990s. However, over the past decade, Canada has made infrastructure investment a national priority. As a result, the nation’s current infrastructure deficit estimate ranges between C\$50 billion and C\$125 billion, a modest amount compared to its south-of-the-border neighbor.

The government’s stable fiscal condition; rich stores of energy, commodity, and water resources; and a healthy and heavily regulated finance sector

Building Canada Funding, 2007–2014

Program	Canadian dollars (billions)
Municipal goods and services tax rebate	5.8
Gas Tax Fund	11.8
Building Canada Fund	8.8
Public Private Partnerships (P3 Canada) Fund	1.25
Gateways and Border Crossings Fund	2.1
Asia-Pacific Gateway and Corridor Initiative	1.0
Provincial-territorial base funding	2.275
Total	33

Source: Organisation for Economic Co-operation and Development, 2011.

A wide road cuts down the center of São Paulo, Brazil. The city suffers from chronic congestion caused by the convergence of several main state and federal highways. (Superstudio/Getty Images)

have combined to buffer the nation's economy against the worst effects of the global credit crisis, which has enabled the country to make steady inroads in upgrading facilities and infrastructure networks. In addition, provincial and municipal governments have been successful at using PPP procurement to build and operate a wide range of economic and social infrastructure projects.

Major Projects

Nevertheless, global economic turmoil promises to unsettle outlooks for some government initiatives during 2012. The spending emphasis shifts away from building social infrastructure to concentrating on road and transit projects to stem increasing congestion around major cities such as Toronto, Montreal, and Vancouver. Among the biggest projects underway or on the drawing boards are the following:

- **CHAMPLAIN BRIDGE, MONTREAL:** The C\$5 billion replacement of the Champlain Bridge in Montreal is slated as a PPP project funded by toll revenues. One of the nation's busiest crossings, handling an estimated 60 million vehicle trips annually, the bridge is rapidly deteriorating from salt corrosion to its steel beams.
- **PORT MANN BRIDGE, VANCOUVER:** The C\$3.3 billion Port Mann Bridge Project across the Fraser River in Vancouver is scheduled for completion by year end, built by a private operator and ultimately funded through tolls. Ten lanes across, the bridge will be the widest in North America, carrying an estimated 130,000 cars daily.
- **TRANSIT, VANCOUVER:** The ongoing expansion of Vancouver's C\$2 billion transit system now links downtown to the airport and continually exceeds ridership projections. Work will begin in 2012 on an eight-mile extension, the Evergreen Line, estimated to cost C\$1.2 billion and funded partly by higher local gasoline taxes. The existing 12-mile network, opened for the 2010 Olympics, was constructed with C\$720 million in capital from a private consortium that operates the service through a 35-year franchise.
- **HIGHWAY 407, TORONTO:** A planned extension of Highway 407 east of Toronto will be funded using an alternative financing and procurement method where the province owns the road and a private consortium finances and carries out construction. At 65 miles, the existing

Replacing the old arch bridge, scheduled for demolition, the new Port Mann Bridge in Vancouver, Canada, under construction, features a cable-stayed span. When completed, the new bridge will carry ten lanes of traffic.



Highway 407 is touted as the world's first barrier-free toll road, managed by a private operator and owned by pension fund partners on a 99-year lease entered into in 1999.

- **TRANSIT, TORONTO:** Toronto, meanwhile, grapples with how to expand its mass transit network and involve private partners—the mayor supports a single C\$8.2 billion cross-town subway line, potentially the country's largest infrastructure project, whereas other officials have favored a more extensive and less expensive above-ground light-rail alternative.

The Keystone pipeline project would expand freight rail and pipeline connections from western Canada's Alberta oil sands fields to Pacific ports in British Columbia, facilitating growing commodity exports to China and other Asian nations and diversifying away from U.S. markets. The project, destined to cross the U.S. border, has been blocked at least temporarily by the Obama Administration.

A PPP Leader

Spurred by the federal government's C\$1.25 billion P3 Canada Fund, municipalities and port agencies engage PPPs for more modest, local improvement projects ranging from new sewers and water mains to renewable energy and tourism-related public works.

The federal PPP effort builds off a C\$33 billion, seven-year Building Canada initiative, enacted in 2006, which supplements provincial funding for major projects and encourages more PPP engagements. But officials wonder if economic restraints caused by the global downturn might short-circuit a second round of Building Canada funding.

Even with reduced federal infusions, led by Ontario and British Columbia, provinces have established and empowered infrastructure agencies to take the lead on identifying and securing financing for important projects and engaging in PPP procurement. "It's the provinces that drive the process."

Relatively strong bank balance sheets and abundant public pension fund capital provide sound domestic funding capacity to help underwrite infrastructure investments over the short and long terms.

Given expected scenarios, the infrastructure funding process and growth in PPP initiatives should "keep bumping along at a consistent pace."

Middle East

For infrastructure contractors and deal makers, the Middle East remains a "bright light" despite the uncertainty of Arab Spring turmoil, challenges in Iran, and the always simmering Israeli-Palestinian conflict. Attention continues to focus on the relatively stable countries at global crossroads along the Arabian Sea and Persian Gulf, including the United Arab Emirates (UAE), Qatar, and Saudi Arabia. Most of these governments have money because the rest of the world, though debilitated, still buys plenty of oil and natural gas from the region.

"Nearly all of the Gulf States need more transportation infrastructure," but even these countries scale back some plans given the more sober world economic outlook. Attention concentrates on ports, airports, and rail networks, as well as urban mass transit.

- Six Gulf countries—the UAE, Bahrain, Oman, Qatar, Saudi Arabia, and Kuwait—begin to implement plans for a joint railway project to foster cross-border freight and passenger movement, including HSR links. Each state in the Gulf Cooperation Council would contribute part of the project's massive \$100 billion cost in its territory. The first lines are scheduled to begin in 2012 and 2013 in Saudi Arabia and the UAE, respectively.
- After a near meltdown in credit hammered its budding financial market and led to a bailout from Abu Dhabi, Dubai stakes its future as a distribution and trading center, concentrating on further expanding its port and airports, and leveraging relationships with India and China. As some luster dims from its overbuilt skyline, the city-state showcases a two-year-old metro transit project, which now carries more than 100,000 passengers daily, but officials have suspended plans for a 30-mile \$2.7 billion rail line to connect its two airports.
- Qatar gears up for the 2022 FIFA World Cup, planning tens of billions of dollars in projects expanding and upgrading its primary port and



international airport, building a new metro transit system in Doha to link to the airport, as well as constructing new expressways and causeways in addition to erecting 12 air-conditioned football stadiums.

- Saudi Arabia continues the buildout of a long-planned metro in Mecca and HSR lines between Mecca and holy sites in Medina and Jeddah. Designed to help take more than 30,000 cars off regional roads during religious pilgrimages, the \$1.8 billion first phase of the metro opened in 2010 along an 11-mile route with several extensions in planning. After a series of holdups, work is expected to begin in 2012 on the \$10 billion bullet-train system, which will eventually cover 280 miles, awarded in a design-build-operate partnership to a Spanish-led consortium. The train network, part of the Saudis' contribution to the regional rail system, will help transport the more than 2.5 million visitors who converge on the country during annual religious holidays.

Africa

Seeking to overcome infrastructure deficits and set the stage for future growth, countries in Africa are investing aggressively in infrastructure. Buoyed by tourism, recent growth, and invest-

ment from China, sub-Saharan countries are spending nearly 8 percent of their GDP on roads, power, aviation, telecommunications, and other sectors. Still, even though \$45 billion is going to African infrastructure, projected needs are double that for the next ten years. Key infrastructure issues worth watching are the following:

- South Africa's bold new \$127 billion (1 trillion rand) infrastructure investment plan, announced in February 2012, attempts to modernize the country's roads, railways, ports, power plants, airports, and housing. How to pay for and manage such an ambitious set of projects will be the challenge.
- In Libya, plans to upgrade railroads and utilities may have a chance to get back on track, depending on the viability of any post-Qaddafi government.
- Megrid, the trans-Mediterranean power project, hit the pause mode during the Arab Spring turmoil. The ambitious \$7 billion project would harness solar-wind energy in North African deserts to meet 15 percent of Europe's electricity demand by 2050. But solar panels and transmission lines would be located in Libya, Egypt, Tunisia, and Syria—countries in various stages of political unrest.

The West Bay central financial district's skyline marks the development of a new neighborhood in Doha, Qatar. (Gavin Hellier/Getty Images)





3 National Outlook

Is it grace under pressure, simply having no other choice, or maybe a combination of the two?

Dire fiscal conditions show few signs of ameliorating quickly, but attitudes in the United States—at least at the state and local levels—begin to shift toward strategies for dealing with the nation’s infrastructure needs. Federal reluctance forces governors, mayors, state legislators, and others to be creative in addressing metropolitan congestion, speeding freight movement, and preparing for population growth.

A sharply divided Congress imperils any hope of creating a national consensus at the federal level about how to reverse chronic underfunding, address delayed maintenance, or move forward with priorities. Although infrastructure cognoscenti and practitioners might wish for a national policy for constructively prioritizing infrastructure projects, allocating funding, and integrating systems, they are figuring out how to make things work without it. The public begins to realize that it must either pony up more in local taxes and fees or forgo the kind of future-focused infrastructure investments that will help secure a higher quality of life.

No one really expects the gap between funds and needs to do anything but grow larger; however, a new policy direction, nurtured by necessity, is emerging. Sobered local officials and planners refocus, bagging woe-is-me sentiment for concretely figuring out “what we can do under the circumstances.” These more resolute local leaders strive for incremental progress and look to stretch limited resources and seize opportunities to make more out of less.

This street-level rendering shows the 800,000-square-foot World Trade Center Transportation Hub, which, when complete, will accommodate 250,000 pedestrians per day. (Santiago Calatrava/Silverstein Properties)



That strategy translates into relying on “self-help” regimens, which attempt to get more life out of existing infrastructure, to eke the most out of every dollar spent, and to think carefully about where available dollars go. Popular support grows for regional solutions that promote overall economic productivity rather than destructive tax-base warfare against neighboring counties and cities. Breaking down agency walls and seeking more efficient intermodal solutions are also part of the process. “If we do things better—invest in the right projects which can boost economic productivity—it could effectively increase the buying power of every dollar we have.”

Of Trains and Ports

Long-awaited federal surface transportation re-authorization moves in fits and starts in Congress,

where progress is hampered by sharp partisan divides—at least in the House—and the politically tricky question of how to pay for current spending levels, much less raise them. The Highway Trust Fund slides toward insolvency, but any long-term solutions may need to wait until the 2012 elections are in the country’s rear-view mirror. Following is a look at the twisting story of American HSR and ramped-up efforts to get a share of new trade from an expanded Panama Canal.

High-Speed Rail’s Troubled American Journey

When the train appeared ready to leave the station in 2009, a grand vision for U.S. HSR, presented by the Obama Administration, depicted an ultra-modern network for passenger transportation, eventually stretching through every region

The planned Anaheim Regional Transportation Intermodal Center would serve as a hub for several transit modes, including HSR. (Rendering courtesy of the California High-Speed Rail Authority)

HSR Corridor Investment Comparison

Corridor	Length	Projected cost	Projected cost per mile
California HSR Network (Sacramento–San Francisco–Los Angeles–San Diego)	800 miles	\$43 billion (previous estimate); \$98 billion (current estimate, adjusted dollars)	\$54 million (previous estimate); \$123 million (current estimate, adjusted for inflation)
Northeast Corridor (Boston–New York–Washington, D.C.)	457 miles	\$117 billion (2010 dollars)	\$256 million (2010 dollars)

Sources: California High-Speed Rail Authority; Amtrak.

Congress and the White House Push Ahead

Sarah Jo Peterson

As this report went into production, federal action on infrastructure started picking up speed.

A \$63.6 billion funding bill for the Federal Aviation Administration finally crossed the finish line into law February 14, 2012, after a marathon 23 short-term extensions dating back to 2007 and a two-week partial shutdown over the summer that cost the federal government \$30 million a day in lost revenue. With the stability of spending authorization that runs through 2015, the Federal Aviation Administration can now focus its attention on long-term projects such as upgrading to the Next Generation Air Transportation System. The new law also boosts public/private partnerships by doubling the number of participant slots from five to ten in the Airport Privatization Pilot Program.

New surface-transportation legislation also got off the starting blocks. At first the House bill, known as HR 7, had all the momentum, but the Senate used the strength of bipartisanship to surge ahead. On March 14, 22 Republicans joined the Democrats to pass the Moving Ahead for Progress in the 21st Century Act, or MAP-21, on a 74–22 vote. With the current law about to expire, senators pressured the House to pass the Senate bill, but instead all agreed to another short-term extension—the ninth since 2009—until the end of June.

With no stomach for raising taxes on motor fuels, both the House and Senate proposed bills that do little to address growing infrastructure backlogs, but gained attention—and outcries and applause—for their divergent approaches to policy. The Senate’s MAP-21 proposes a two-year, \$109 billion spending authorization; the short time frame reflects the painful fact that even existing spending levels are quickly draining the Highway Trust Fund. MAP-21 also consolidates programs, streamlines project delivery, and adopts national transportation objectives and performance measures for investment in highways, transit, and freight. As part of its emphasis on “improved accessibility,” MAP-21 includes measures targeting resources to transit-oriented development and pedestrian and bicycle infrastructure.

Although House Republican leaders attempted to respect the tradition of a longer spending authorization with their five-year, \$260 billion bill, as of this writing, they are still struggling with how to pay for it. House leaders stumbled badly with their first proposal—giving to highways the 2.86 cents of the federal gas tax dedicated to public transportation—which caused Republicans from transit-rich metropolitan areas to balk.

Undermining transit proved politically risky, following on the heels of a year when transit ridership rose 2.2 percent, nearly

recouping its 2008 record ridership levels, while vehicle-miles traveled fell 1.2 percent, and the public was increasingly nervous about rising gas prices.

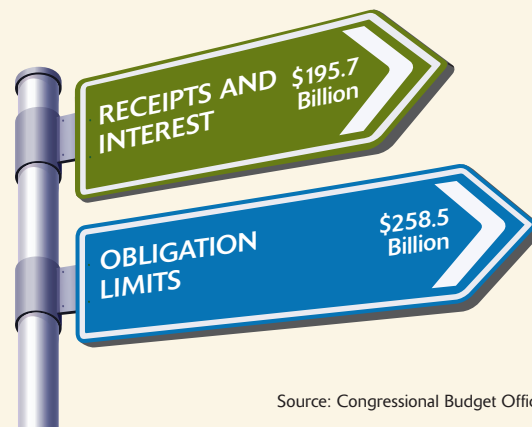
The Senate and the House are sending mixed messages on private investment and public/private partnerships. MAP-21 and HR 7 dramatically expand the Transportation Infrastructure Finance and Innovation Act (TIFIA) loan and loan guarantee program. The Senate bill, however, also includes measures that provide disincentives for some types of PPPs, and some House leaders object to expanding tolling except in the case of new capacity.

In the midst of the congressional debate, the White House released its own proposal for a six-year, \$476 billion surface-transportation authorization. In a move widely seen as an election-year statement, the administration’s fiscal year 2013 budget also calls for improving performance through competitive grants and continues to promote high-speed rail. President Obama proposes to pay for this significant increase in investment through a “peace dividend” from drawing down overseas military operations.

The Obama Administration did not shower the same love on federal programs for water and wastewater infrastructure: the budget calls for a 15 percent cut in the two main loan funds. Recent House and Senate hearings echoed the need to spur private investment and learn from TIFIA, even including proposals for a new Water Infrastructure Finance Innovation Authority, or WIFIA, program.

Transportation Spending Is Outstripping Revenues

Projected Highway Trust Fund receipts and interest compared with obligation limits, 2013–2017



Source: Congressional Budget Office, 2012.

of the country. HSR—that is, sleek intercity trains traveling at upward of 200 miles an hour—would be the marquee project for bringing American transportation infrastructure into the 21st century, akin to constructing the post–World War II interstate system. These bullet trains could help alleviate congestion along the nation’s air corridors and metropolitan highways while creating hundreds of thousands of construction jobs at a time of stubbornly high unemployment.

But the vision quickly turned into more of a mirage. After a spurt of stimulus funding, HSR now detours onto a side rail, apparently headed nowhere fast. Even proponents swallow hard in assessing the expense—both capital and operating—for the two most favored routes in California and in the northeast, where market demand is

most likely to fill trains and compete against airplanes and cars for speed and convenience.

In California, the plan for high-speed rail is revised after protests and waning public support prompted rethinking of its \$98 billion price tag (nearly double earlier estimates) and its concentration of early investment in the relatively underpopulated Central Valley. The new plan trims costs to \$68 billion and combines high-speed rail improvements with upgrades to commuter rail in the Los Angeles and San Francisco metro regions, striving for greater cost efficiency while providing earlier benefits to California’s congested population centers. The new plan still depends on funding from federal, state, and private sources, but now promises greater attractiveness to private investors. Each segment is



What Does “High Speed” Mean?

The U.S. Department of Transportation defines high-speed rail as a passenger-rail service that operates anywhere from 90 to 150 miles per hour (mph).

HSR is categorized in three ways:

- 1. Express HSR** is a frequent service between population centers that are 200–600 miles apart, reaching top speeds of 150 mph on dedicated track.
- 2. Regional HSR** serves centers 100–500 miles apart with top speeds of 110–150 mph and some shared track.

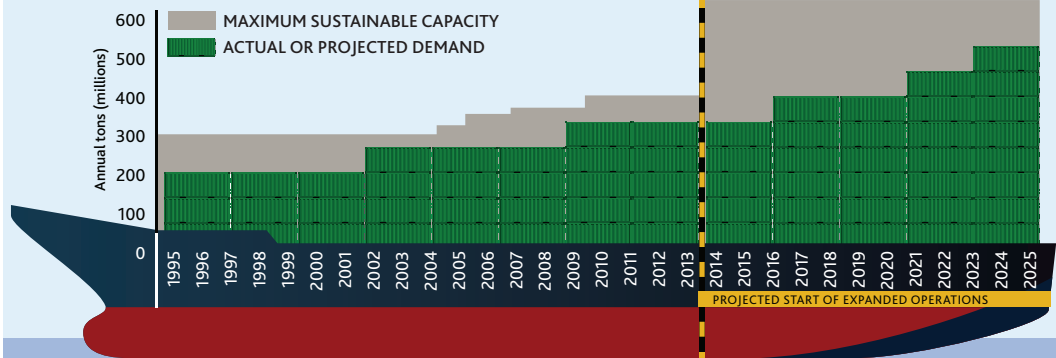
- 3. Emerging HSR** serves developing corridors that are 100–500 miles apart with trains that reach 90–110 mph on primarily shared track.

Since President Obama announced his vision to provide 80 percent of Americans access to HSR within the next 25 years, the U.S. Department of Transportation has solicited applications for more than \$10 billion in grant funding through the 2009 American Recovery and Reinvestment Act and annual appropriations for fiscal years 2009 and 2010.

High-speed Intercity Express (ICE) trains link cities in Germany and neighboring countries.

Expansion Project Will Double the Panama Canal's Capacity

Maximum sustainable capacity of the Panama Canal with the third set of locks and actual or projected demand



Source: Panama Canal Authority, 2006.

projected to generate revenue that exceeds operating costs.

The project widely touted for the Boston to Washington, D.C., corridor could speed up popular and often packed Acela Express trains now operating at an average of about 80 miles per hour. But the current price tag for northeast HSR is estimated at \$120 billion. In addition, untangling jurisdictional disputes and clearing a dedicated route for high-speed tracks seems daunting in the nation's most densely populated megalopolis. Expanding freight train requirements already compete for precious corridor space with passenger trains.

Game On: Gulf and East Coast Ports Vie for Trade

The country's primary ports along the West Coast—Los Angeles—Long Beach, San Francisco—Oakland, and Seattle-Tacoma—already strain with congestion from armadas of container ships offloading Asian imports, and some forecasts predict trans-Pacific traffic could triple by 2025. At the same time, trans-Atlantic freight could double over the next 15 years, and deep-hulled, super-post-Panamax container ships will be able to pass through a widened Panama Canal channel into the Atlantic by year-end 2014.

The stars all seem to align for the nation's Gulf and East Coast ports to take advantage of a surge

in new business as well as for a realignment of inland distribution hubs to speed freight deliveries to end users across much of the country. Winners in this contest could transform their local economies with infusions of new jobs and turbo-charge tax bases.

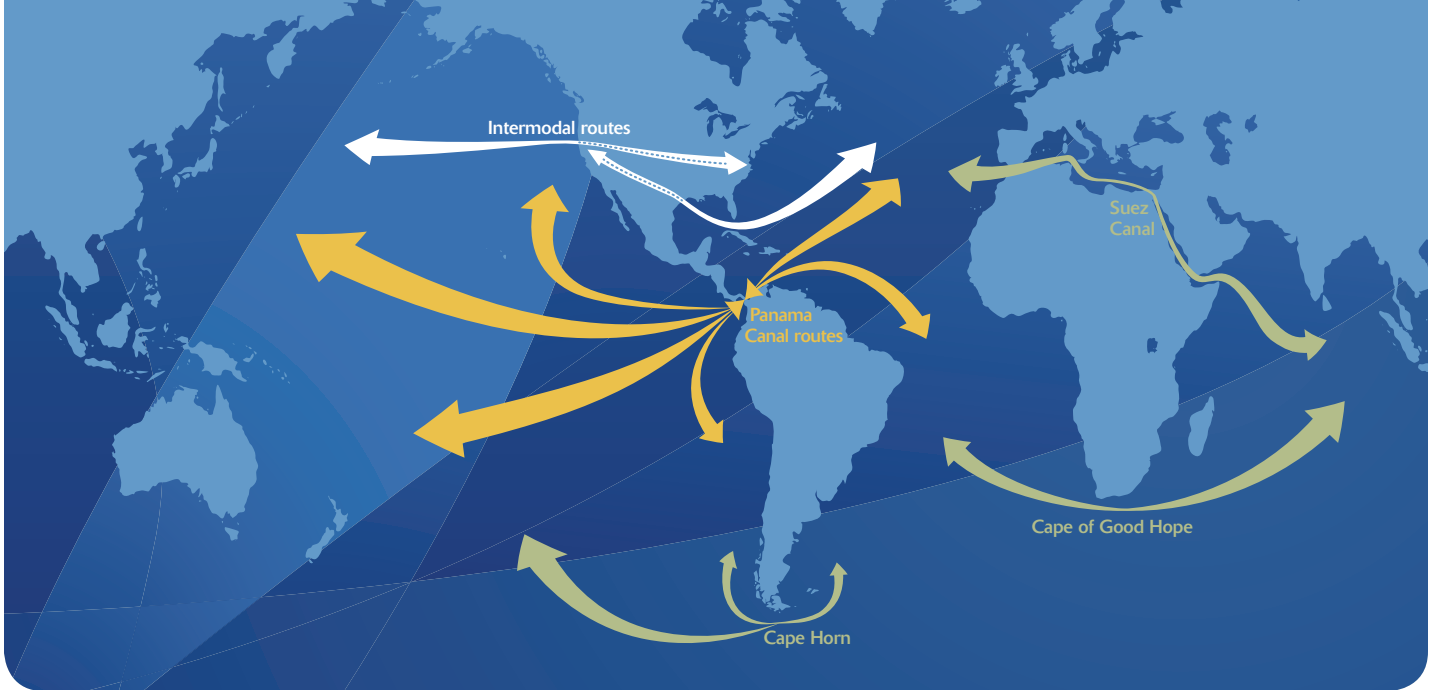
There's just one problem—only one of these harbors is wide and deep enough to accommodate the megaton ships slated to come through the canal. That port is Norfolk, Virginia. Now, other cities and states along the Eastern Seaboard and Gulf are dredging channels, building terminals, and linking offloading facilities to railroads, interstates, or river systems to move goods quickly to inland convergence hubs.

For 2012, the expensive competition for a share of the new port traffic proceeds:

- Charleston, South Carolina, and Savannah, Georgia, propose large-scale dredging and terminal projects, each budgeted at more than \$1.3 billion. Either port can connect into Atlanta's relatively close air, rail, and interstate convergence hub, which will benefit from augmented freight distribution coursing through its connections.
- Miami, Florida, nears completion of a new port tunnel, built through a \$1 billion PPP availability contract, and the state and federal governments commit \$150 million for harbor dredging.

The Panama Canal Plays an Important Role in U.S. Trade

Major world shipping routes



- The Port Authority of New York and New Jersey allocated \$1.6 billion to dredge a harbor entrance to its terminal, already the biggest on the East Coast, after realizing that the height of the Bayonne Bridge would need to be raised for an additional \$1 billion to allow big ships to pass under it.
- Along the Gulf, Houston, Texas, proposes a new seven-berth container-ship terminal on Pelican Island (near Galveston) and budgets \$1.7 billion for various expansions and upgrades. To the east, Mobile, Alabama, also builds a \$500 million terminal as well as improves railway and interstate connections.
- Louisiana gets in the hunt too, even though shallow sections of the Mississippi River prevent large container ships from navigating the 100 miles upriver to the vast New Orleans port that connects to all seven of the nation's railroad freight carriers. The state contemplates building a transfer station near the mouth of the Mississippi where super-post-Panamax ships could offload cargo onto river vessels that travel on to New Orleans and points further north.

The changing shipping landscape offers myriad other logistics solutions and competitive alterna-

tives. The sector certainly will be ripe for PPPs between port agencies, railroads, and truckers to create improved inland distribution centers to support established West Coast ports as well as the most competitive Atlantic and Gulf Coast markets. "The future will be linking everything together and mixing in PPP structures to help finance and operate facilities."

Properly positioned inland railroad ports—such as those in Harrisburg, Pennsylvania; Atlanta, Georgia; Memphis, Tennessee; and Kansas City, Missouri—would help minimize trucking costs. "They can provide a cheaper way to handle greater volumes entering congested coastal ports," where high land prices and development constraints in infill areas present expansion obstacles. At the same time, implementing available just-in-time delivery systems can extend coastal port capacities without building any new facilities. These logistics systems reduce "dwell time" so more containers can be moved in and out of ports faster to inland centers, making room for more ships.

Cities and states that cooperate on strategies could come out ahead, bolstered by appropriate federal tax and funding incentives to encourage a regionally oriented process tied into national networks.

Infrastructure Vanguard

Pressed to keep economic engines chugging and maintain position in an ever more competitive global and national marketplace, state and city governments weigh priorities, consider how best to pay for the investments needed, and work to break down silos and find creative ways to best plan and build infrastructure. Along the way, modest shifts in infrastructure approaches could augur a significant long-term transformation in land use patterns. The following sections review what is happening in some of the country's infrastructure vanguard regions.

New York Can't Afford to Stop

New York, one of the country's most populous and important economic gateways, emerges as an infrastructure innovator, making space for pedestrians in Times Square, boldly investing in bicycle and pedestrian facilities, and spending \$152 million creating the elevated High Line park.

Still, the area's bridges and tunnels are the big tickets, requiring tens of billions of dollars in upgrades to keep functioning, and expensive new mass transit routes are needed to provide mobility and address congestion in midtown and downtown. The city, two states, the Metropolitan Transit Authority (MTA), and the Port Authority of New York and New Jersey push toward the finish line a long list of transit, rail, and bridge projects.

Transit and rail projects include the following:

- The \$4 billion World Trade Center transit hub, scheduled to open in 2015, will link 13 subway lines to New Jersey PATH commuter trains and eventually the Long Island Railroad. Designed by Spanish architect Santiago Calatrava, the project will significantly enhance mass transit connections to and from the financial district.
- Underground blasting for the long-awaited Second Avenue subway, which is slated to open in 2017, continues. The first segment covers only 33 blocks, and the MTA lacks the funding required to finish the \$4 billion first leg, with at least another \$13 billion needed to complete the entire line.
- Meanwhile, an extension of the No. 7 line to the far West Side and possibly to New Jersey (via a proposed tunnel) has been financed

through the sale of development rights above MTA rail yards.

- A Long Island Railroad tunnel under the East River into Grand Central Station proceeds toward a 2016 completion target but needs an additional \$2 billion to get the job done. The \$7 billion rail line could cut commuting times for 160,000 riders by 30 to 40 minutes on average.

Bridge projects include the following:

- The Port Authority seeks its first PPP partner to help replace the corroded and "seriously deficient" 83-year-old Goethals Bridge linking New Jersey to Staten Island. In return for availability payments funded by higher tolls, the Port Authority wants to engage a partner who can deliver and manage a project, estimated to cost about \$1 billion.
- The authority also plans to raise the nearby Bayonne Bridge to accommodate larger post-Panamax ships using the widened Panama Canal. Officials intend to pay for the \$1 billion project from increased port fees paid by freight carriers. Other critical projects include replacing all 592 suspension girders on the 80-year-old George Washington Bridge (\$1 billion), constructing a new Lincoln Tunnel entry helix (\$1.5 billion), and making security upgrades to the region's airports (\$360 million). Most of these improvements will be financed through higher tolls.
- New York state officials are anxious about replacing the deteriorating Tappan Zee Bridge connecting suburbs and key interstates north of the city. An expensive but desirable mass transit component was recently scotched, scaling the project down to a basic two-mile-long vehicle crossing to which transit can be added in the future. But the new bridge still will cost more than \$5 billion, and even with tolls, private financing is uncertain.

Although some of these projects will be postponed or even mothballed, and schedules for others stretched out, enough momentum and urgency could propel significant and notable infrastructure improvements.

Chicago Gets Creative

Long a PPP leader, Chicago is experimenting with new ways of approaching infrastructure. “Necessity is definitely becoming the mother of invention,” spurring “more creativity instead of falling back on old solutions—we’re thinking about how to invest instead of just spend.”

Determined not to let dysfunction at the federal and state levels derail Chicago’s future, Mayor Rahm Emanuel announces a three-year, \$7.2 billion plan called Building a New Chicago. Touting a comprehensive approach, the plan promises to rebuild transit, sewer, and water systems, upgrade parks, and revamp schools. The mayor rejects raising taxes and sets his sights on funding through cost savings, direct user fees, and private investment. Distancing Chicago from the controversies surrounding previous PPP projects, including PPPs for city parking meters and the Chicago Skyway, the city is looking to new tools like the Chicago Infrastructure Trust—an innovative proposal for a municipal infrastructure bank—to attract private dollars to infrastructure.

In the suburbs, transportation officials did what they have been unwilling to do for 20 years—raise tolls on the 52-year-old Illinois Tollway to refurbish the increasingly jammed highway and accommodate a future mass transit line. The \$12 billion capital plan marks a “groundbreaking first” where tolls will be dedicated to support transit. The plan also incorporates a new managed toll lane.

The city also looks at how to better manage existing infrastructure and reduce the need for costly new projects. Programs include everything from bicycle sharing and bike lanes to variably priced parking and stormwater capture (to reduce the need for new sewers). “It’s all about inventively finding less costly interventions.”

Texas Rethinks Priorities

Dallas/Fort Worth and Houston are renowned for their ring road, spaghetti-junction expressway systems, and expansive suburbs, but more recently the state has been a leader at using PPPs, funded by toll concessions, to build new roads.

Now even this energy-rich state “reaches practical limits in what will be possible.” Texas is rethinking whether to subsidize roads and sewers for exurban development and looking at bolstering existing infrastructure in infill areas. This reflects the ongoing market shift by people wanting to live “closer to work, cultural amenities, and commercial districts.”

In Dallas, companies start to relocate back from the fringes “because their base of employees prefers a less car-dependent lifestyle and wants proximity.” The Dallas Area Rapid Transit light-rail system is setting the stage for commercial and multi-family development around its 55 stations and 15 transfer hubs just as “move-back-in market forces and demographic trends pull for greater urban activity.” The Dallas/Fort Worth metroplex now has the longest light-rail network in the United

Chicago, long a PPP leader, is forging ahead with bus rapid transit and other new infrastructure investments.





States, covering 72 miles and built over the last 20 years.

Even in Texas, roads are not free anymore. In fact, the public becomes conditioned to expect that any highway expansions in Texas metropolitan areas will involve adding managed toll lanes to existing roads. Once installed on high-occupancy-vehicle lanes, license plate-reading technology could be cost-effectively expanded to a wider number of adjacent free lanes. Officials, meanwhile, revise PPP (“comprehensive development agreement”) policy to encourage partnerships by clarifying and streamlining the bidding process.

California: Big Needs, Big Dollars

California faces monumental budget deficits and wrestles with state laws that straightjacket efforts to raise new taxes and leave leaders with difficult choices. Voters have approved nearly \$100 billion in various infrastructure bond issues to tackle some projects, but the state’s debt service ratio is likely to rise from 4 percent in 2000 to 7 percent by 2015, helping dig budget deficits deeper and hurting the state’s credit rating, which in turn increases borrowing costs. Any new infrastructure projects likely will require PPP financing as well as more tolls, increased managed lanes, and higher fees.

The state’s aging road networks—50,000 highway-lane miles and 12,000 bridges—present increasingly costly challenges for upgrades and replacements, and

earthquake-prone river levees and water delivery systems, including 700 miles of canals and pipelines, crucial for maintaining supplies to California’s urban population centers, also need overhauls.

The state’s HSR ambitions hinge on federal or private money, neither of which seems like a good bet. A separate, privately financed HSR proposal, the DesertXpress connecting eastern Los Angeles suburbs to Las Vegas casinos, hinges on receiving a federal loan of as much as \$6.5 billion, which would leave the federal government taking a gamble on ridership projections.

In San Francisco, Bay Area Rapid Transit agency planners begin studying how to remodel and expand the city’s 40-year-old subway system. An estimated \$7.5 billion in long-term maintenance and rolling stock replacements will be needed in the next 25 years and have no current source of funding.

In Los Angeles, the city has cut budgets in the middle of the current fiscal year and forecasts more slashing for 2012–2013. But the region is pursuing the buildout of an extensive light-rail system designed to temper the area’s world-famous and increasingly burdensome freeway congestion. The first phase of the long-awaited Expo light-rail line, an 8.6-mile stretch between downtown and Culver City, is set to open in 2012 after costing nearly \$1 billion. A second phase extending to Santa Monica, budgeted at \$1.5 billion, is scheduled for a 2015 launch.

Burbank Station opened in December 2010 as part of the Dallas Area Rapid Transit system’s Green Line extension. The station’s design mimics the adjacent Dallas Love Field airport. (Photo courtesy of Dallas Area Rapid Transit)



Infrastructure Leadership in the New Economy

Deborah Myerson and Rachel MacCleery

Infrastructure is a long-term proposition, one that has always required an understanding of future demand and trends, balanced with a realistic appraisal of available resources. Despite a very challenging economy, many leaders are forging ahead, applying innovations and trying out new ideas and approaches in an effort to bring America's infrastructure into the 21st century.

This chapter provides concrete, recent examples of how politicians, agency directors, and members of the business community are working to meet infrastructure needs in the new economic era. The six case studies in this section examine approaches that have been successfully applied in a variety of metropolitan areas across the country. Three focus on how regions are using ballot measures to fund critical infrastructure, and three showcase other examples of infrastructure leadership.

Global economic competitiveness demands new kinds of regional entrepreneurship, and each of these place-based stories provides insights and inspiration for leaders seeking infrastructure solutions:

- North Carolina's Research Triangle illustrates some of the challenges of funding and planning a regional transit system that spans three counties. In late 2011, one of the area's three counties passed a ballot referendum to fund its piece of the system. Now the region's other two counties must follow suit.

- Oklahoma City has developed an innovative way of funding civic projects—bundle them into short-term, focused packages, and subject them to a vote. The city's third in its Metropolitan Area Projects series, MAPs3, passed in late 2009 and is generating \$777 million for transformative downtown parks and other civic infrastructure over seven years.
- In Los Angeles, the campaign for Measure R—which will generate \$40 billion in local funding for critical transportation investments—relied on strong leadership from public officials and ample grass-roots support.
- In northeastern Illinois, a broad regional effort has produced a new water plan that works within existing institutional frameworks to ensure future water supplies for the region. Will the plan translate into action on the ground?
- In San Francisco, a cutting-edge parking program that uses new technology and pricing is better managing the city's parking resources.
- In New England, the "Knowledge Corridor" brand is providing a regional hook that leaders in two states are leveraging to build a more sustainable, transit-oriented future.

Voting for Infrastructure

Despite a sustained economic recession, voters in many parts of the country are approving local and state ballots that support infrastructure. Leaders recognize the potential for ballot mea-

The Bricktown Canal near downtown Oklahoma City, Oklahoma, was completed under the city's MAPs program.

asures to rally popular support for infrastructure investments that might otherwise languish unfunded. When given the opportunity, voters are saying yes to increased sales taxes, property taxes, and vehicle fees for investments that provide a clear benefit for their communities.

The Center for Transportation Excellence, which tracks transportation ballots, reports high approval rates even at the height of the economic recession. From 2008 to 2011, ballots that allocated funds to transit capital or operations had a 73 percent success rate, while those that included a combination of road and transit capital and operations had a 64 percent success rate. The Midwest is a popular place for ballot measures, and transportation ballots are successful across the country.

Whether states encourage voting for infrastructure depends on their political culture, often embedded in state laws and even

constitutional requirements. Many states, especially in the Midwest, require referendums to approve local bond issues. Other states allow local governments to collect local-option taxes and fees, such as sales taxes or vehicle registration fees, only if approved by voters. These local-option revenue sources have become potent vehicles for increased infrastructure investment.

Voters are also supporting open-space and land conservation measures, according to data gathered by the Trust for Public Land. In 2011, voters approved 14 of 24 measures, or 58 percent, yielding more than \$312 million in approved conservation funds; 2010 saw voters favoring such measures by an even greater margin—83 percent—or 41 of 49 ballot measures around the country. Open-space initiatives generated more than \$2 billion in 2010. From 2001 to 2011, 73 percent of 1,387 total measures were passed, resulting in upward of \$87 billion total funds approved.

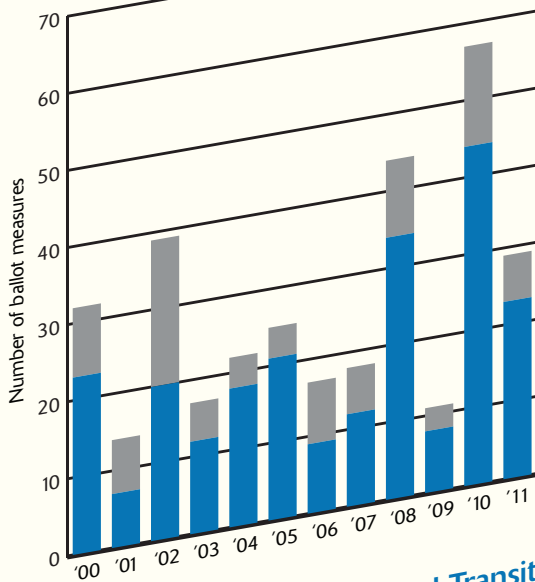
Big Votes in 2011; Votes to Watch in 2012

Win for infrastructure?	Measure	Type of ballot	Type of infrastructure	Summary
BIG VOTES IN 2011				
Yes	Grand Rapids, Michigan, BRT system	Property tax	Transportation	Voters approved 0.35 millage increase to property tax to support their local bus system and build the state's first BRT line. The tax will raise \$15.6 million per year.
Yes	Cincinnati, Ohio, street car system	Amendment	Transportation	Cincinnati voters voted down an amendment to prohibit the city from spending or borrowing money on a downtown streetcar project. This is the second time in two years that citizens have voted to support the project.
Yes	State of Washington highway tolls	Legislation	Transportation	Voters rejected an initiative aimed at restricting the use of highway tolls and blocking light rail from Interstate 90 near Seattle.
No	City of Seattle car-tab fee	Car-tab fee	Transportation	Seattle citizens voted against a \$60 car-tab fee that would have raised \$204 million over a decade for road and transit repairs.
Yes	State of Texas Water Proposition 2	Bonds	Water	Voters approved Proposition 2, which will allow the state to create a revolving \$6 billion bond package to finance water conservation and sewage and flood-control projects.
Yes	Travis County, Texas, Bond Proposition 2	Bonds	Parks and open space	Voters said yes to the county to spending \$82.1 million in bonds that will support eight park projects or land purchases.
VOTES TO WATCH IN 2012				
To be determined	State of California Water Bond 2012	Bonds	Water	The California Water Bond, on the ballot for 2012, would allow the state government to borrow \$11.1 billion to overhaul the state's water system.
To be determined	Atlanta Regional Transportation Ballot 2012	Sales tax	Transportation	The Atlanta region will vote in July 2012 on a one-cent sales tax increase to fund a list of transportation projects, including transit and roadway improvements, costing \$6.14 billion.
To be determined	State of Maryland Transportation Trust Fund Amendment 2012	Gas tax increase; vehicle registration fees	Transportation	Maryland state government has under discussion for the November 2012 ballot a measure establishing a transportation trust fund and increasing gas taxes and vehicle registration fees.
To be determined	State of Oregon Renewable Energy and Fuel Development and Security Initiative 2012	Legislation	Energy	Oregon citizens are collecting signatures for a November 2012 ballot measure that would authorize a commission to develop and distribute electricity and renewable energy.

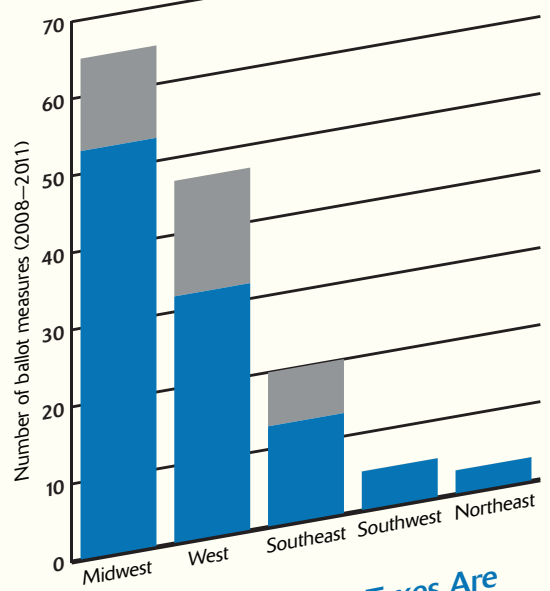
Source: ULI analysis of various sources.

Voting for Transportation at the Ballot Box

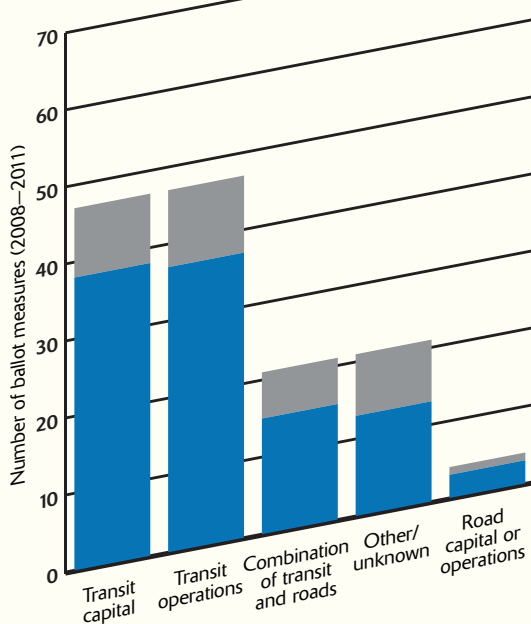
Transportation Ballot Measures Overwhelmingly Win with Voters



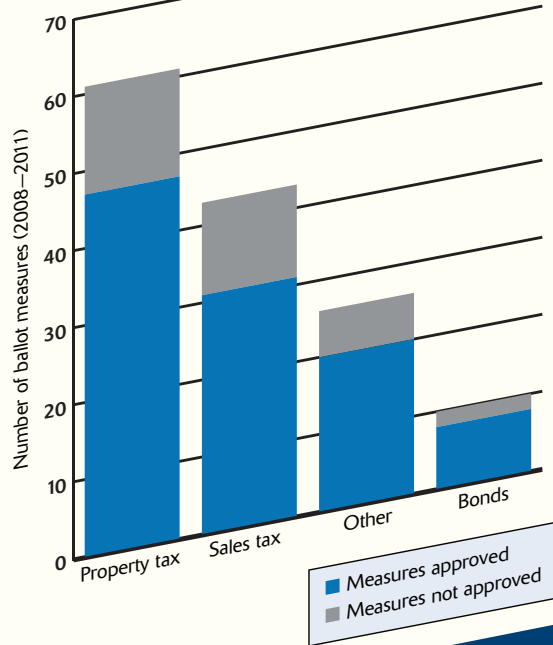
The Midwest and West Dominate Transportation Ballot Measures



Ballot Measures Often Fund Transit Capital and Operations



Property and Sales Taxes Are Often Included in Ballot Measures



Source: ULI analysis of Center for Transportation Excellence data.

Note: Analysis of data by year, region, project type, and revenue source.

■ Measures approved
■ Measures not approved

What are the traits of successful referendums? Best practices that have emerged from campaigns include the following:

- Wrap a specific list of projects into one vote. Voters want to know exactly what projects they are putting into motion and are wary of creating a slush fund for politicians. Aggregating projects broadens the ballot's appeal.
- Find the right funding mechanism. Increases in sales taxes and property taxes have been popular, but these are not viable in every state. Other prospective revenue sources may include vehicle fees, hotel taxes, or income taxes.
- Know your voter. Use polls and research to identify voters' values and priorities; hone the message to resonate with voters.
- Learn local politics. Consider how to take advantage of timing.
- Lead with champions. Position persuasive people and organizations to be the face of the message.
- Build a solid coalition. Reach out broadly to coordinate among stakeholders.
- Prepare to persist. Some ballots may need a second try to win; the first time may be a "trial run" that familiarizes voters with the issue.

Voting for Infrastructure Has Supported the Expansion of Transit across the United States

METROPOLITAN AREAS BUILDING MAJOR NEW TRANSIT SYSTEMS

Metro area	Transit improvements	Referendums to increase taxes?	Approved on first vote?	Source of funds
Charlotte	Light rail, commuter rail, streetcars, and BRT	Yes	Yes	0.5¢ sales tax
Dallas	Light rail	Yes	Yes (although some cities voted not to join)	1¢ sales tax
Denver	Light rail and commuter rail	Yes	No	0.4¢ sales tax
Honolulu	Light rail	No	Not applicable	Not applicable
Houston	Light rail	No	Not applicable	Not applicable
Las Vegas	BRT	Yes	Yes	0.125¢ sales tax
Los Angeles	Light rail, commuter rail, and bus projects	Yes	Yes	0.5¢ sales tax
Phoenix	Light rail and BRT	Yes	Yes	0.5¢ sales tax
Portland	Light rail and streetcars	No	Not applicable	Not applicable
Sacramento	Light rail	Yes	No	0.5¢ sales tax
Salt Lake City	Light rail, commuter rail, streetcars, and bus projects	Yes	No	0.25¢ sales tax
Seattle	Light rail, commuter rail, streetcars, and BRT	Yes	Yes: King County No: Sound Transit	Various sales taxes
St. Louis	Light rail and streetcars	Yes	Yes	1¢ sales tax
St. Paul–Minneapolis	Light rail, commuter rail, BRT	Yes	Yes	6.5¢ motor vehicle sales tax

Source: ULI analysis of various sources.

Beyond the Ballot Box: Leadership, Innovation, and Partnerships for Infrastructure

Of course, leadership in infrastructure extends beyond the ballot box. Across the country—even without major new local funding from a ballot measure—cities and metropolitan areas are finding ways to move forward with infrastructure in the new economy in creative and innovative ways.

Promising approaches include those that advance the following:

- Using existing infrastructure to its maximum potential, fully leveraging every resource, and including conservation as part of the puzzle. Shiny new projects are not always necessary.
- Tapping available federal funding to maximize investment opportunities. For now, at least, federal funding can provide a critical springboard for new programs and projects.
- Linking, explicitly, infrastructure investment and development. In an era of scarce resources, building a new infrastructure project without considering land use is foolish—or on the flip side, planning a new development project without first thinking about water, transportation, and other infrastructure.
- Exploiting the potential of collaboration and partnership. "In major urban areas, regional cooperation is key to getting anything done," said Jack Basso, director of program finance and management at the American Association for State Highway Officials.

VOTING FOR INFRASTRUCTURE IN RALEIGH-DURHAM, NORTH CAROLINA

Mobilizing for the Future of Transit in the Research Triangle



The November 2011 ballot in Durham County, North Carolina, is a success story: a solid majority of 60 percent of voters approved a sales tax increase to meet local transportation needs. But the ballot also illustrates the political complexity of developing a regional transit system that spans multiple jurisdictions. To move forward on the region's transportation plan, Orange and Wake counties also must pass their own sales tax referendums.

The Research Triangle (also known as Raleigh-Durham) is a region in north-central North Carolina anchored by leading technology firms, government, world-class universities and medical centers, and three important cities. The region includes Durham, Wake, and Orange counties and is home to a combined population of 1.5 million people that is projected to grow to 2.5 million by 2040.

LONG-RANGE TRANSPORTATION PLANNING

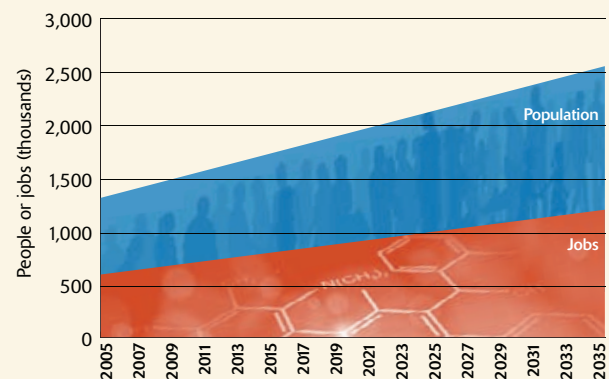
The region is served by two metropolitan planning organizations that, in an unusual collaboration, adopted a Joint 2035 Long Range Transportation Plan in 2009. The plan identified greatly expanded local and regional bus service, light rail, and commuter rail as priorities for the region. The plan, however, also noted the need for new sources of revenue to support its \$3.5 billion three-county bus and train network ambitions.

As transportation planners reviewed options for funding new transit investment, a sales tax stood out as the most feasible and attractive option. "Over the last five years, we have analyzed what we ought to do as a region, looked at the demographic projections, considered the volume of money needed, and surveyed national examples," explained David King, chief executive officer for Triangle Transit, the regional public transportation authority serving Durham, Orange, and Wake counties. In addition, nearby Charlotte successfully launched a new light-rail system in the 2000s, funded by a sales tax increase approved by voters in 1998.

But the Research Triangle faced two obstacles: the need for state legislation and the coordination of votes across three counties. By state law, only Charlotte's Mecklenburg County was permitted to submit sales tax increases to voters. In an effort to obtain the same opportunity in other parts of the state, a coalition of transit, transportation, and environmental groups advocated for State House Bill 148, which permitted other counties to vote on sales tax increases for transit. The bill was signed into law in August 2009.

High Growth Is Predicted for the Research Triangle

Estimated 2005 and forecast 2035 population and jobs in the Research Triangle



Source: Capital Area Metropolitan Planning Organization and Durham-Chapel Hill-Carrboro Metropolitan Planning Organization, 2035 Long Range Transportation Plan, 2009.

The Bull City Connector runs between downtown Durham and the Duke University campus and medical facilities. (Photo courtesy of Durham Convention & Visitors Bureau)

Planned Transit Investments Will Span Three Counties

Investments depend on outcome of upcoming votes



Source: Triangle Transit.

DURHAM COUNTY LEADS THE WAY

In June 2011, Durham County Commissioners scheduled a November 2011 referendum on a half-cent sales tax, ahead of action by Wake and Orange county officials. With the Durham ballot on the calendar, the campaign began in earnest. Strong supporters included Mayor Bill Bell, other local officials, and Triangle Transit. The campaign also enlisted prominent spokespeople to cheerlead the effort. The ballot received endorsements from three of the county's major political-action groups—the Durham Committee on the Affairs of Black People, the People's Alliance, and Friends of Durham. The strong economic development potential of the measure earned an unexpected endorsement from the Friends of Durham—a conservative group that has traditionally opposed tax increases—and helped establish a broad base of support for the measure.

On November 8, 2011, a strong showing of 60 percent of the voters in Durham County approved the half-cent sales tax for transit. The half-cent sales tax is projected to generate \$18.4 million annually over the next 30 years. With its revenue, Durham County seeks to expand bus service by 25 percent within the first three years, open a light-rail line between downtown Durham and University of North Carolina Hospitals by 2018, and build a commuter-rail line from downtown Durham to eastern Wake County by way of the Research Triangle Park by 2025. A half-cent sales tax in Orange County would generate \$5.1 million each year, with the Wake County tax bringing in \$54 million each year.

Projected Revenue and Expenditures for Transit in Durham County

	U.S. dollars (millions)	Percent of total
PROJECTED REVENUE (2012)		
One-half cent sales tax	18.4	85
\$7 vehicle registration fee	1.58	7.3
\$3 vehicle registration fee increase	0.677	3
Rental car tax revenue (Durham)	1	4.7
Total	21.66	100
EXPENDITURES (TOTAL SPENDING OVER LIFE OF 23-YEAR PLAN)^a		
Project		
Rail capital	1,669	73
Rail operations	283	12
Bus capital	47	2
Bus operations	151	7
Debt	136	6
Total	2,286	100

Source: Durham County Bus and Rail Investment Plan, June 2011.

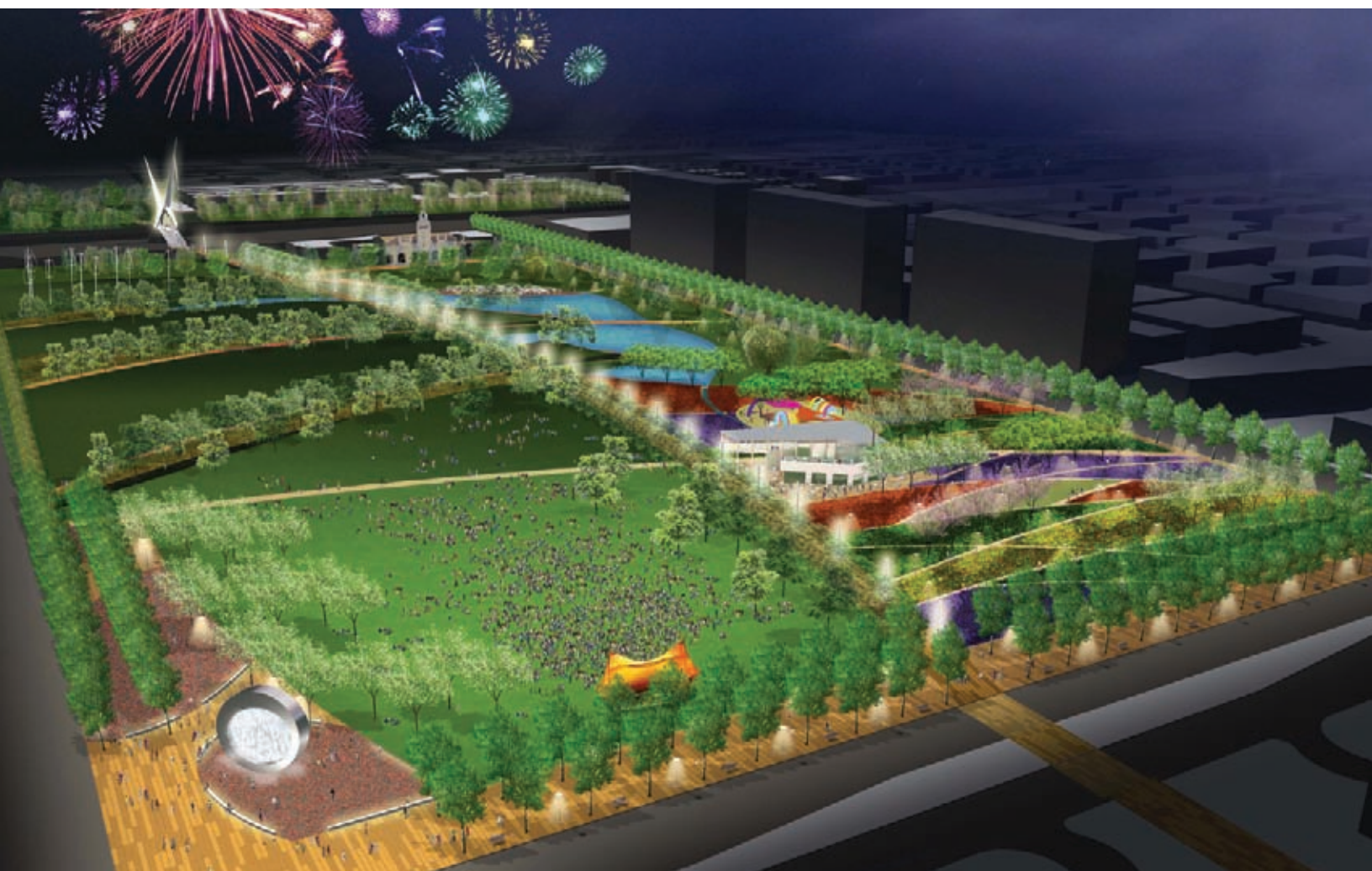
Note: The plan includes a 25 percent capital cost contribution by the North Carolina Department of Transportation and a 50 percent capital cost contribution for light rail and commuter rail from the federal government.

a. A cost-sharing understanding was reached by officials from both Durham and Orange counties that identifies how costs would be allocated for the light-rail project that crosses county borders.

PLANNING FOR THE FUTURE

Regional transit achieved a crucial step with Durham County's approval of the sales tax increase, and supporters hope that Durham's success will generate similar enthusiasm in the region's other counties. Durham officials, however, have indicated that they will not levy the new tax passed in Wake and Orange counties. Wake and Orange counties have not yet scheduled referendums for 2012, as they confront caution from conservative leaders and negotiate over transit routes and revenue issues.

The Research Triangle area demonstrates the challenges associated with trying to plan and fund transit investments across multiple jurisdictions. Triangle Transit's David King observed, "We must acknowledge that we live in a region, and sink or swim as a region. Transportation crosses boundaries without regard as to who is elected where." He added, "When we get this done on a three-county basis, it will be a victory for the political community, that they've gone beyond parochial boundaries and see themselves as a leader of a region."



VOTING FOR INFRASTRUCTURE IN OKLAHOMA CITY, OKLAHOMA

Making Room for Parks in Oklahoma City

Oklahoma City has created a formula for success in its Metropolitan Area Projects series. In December 2009, the city approved its third temporary sales tax increase to fund civic improvements and other projects. Revenue from MAPs3 is allowing the city to move forward with ambitious plans for a new central park and improved connections to the Oklahoma River.

Voters also enthusiastically support ballots for parks and recreation infrastructure. In a December 2009 special election, 54 percent of voters approved a one-cent sales tax increase to fund an ambitious parks and open-space agenda in Oklahoma City. The \$777 million MAPs3 ballot, the city's third in a series of successful MAPs votes that passed over the last two decades, included plans for a grand central park of 70 acres, 57 miles of new bicycling and walking trails, recre-

ational upgrades for the Oklahoma River, and intensive renovation of the state fairgrounds.

The ballot, which brings local sales tax to 8.375 percent, authorizes collections for a seven-year period starting in April 2010 and sunseting in December 2017. An appointed Citizen Advisory Board assists the city with implementation.

Why have the MAPs initiatives been so consistently successful? According to Russell Claus, Oklahoma City's planning director, consistently strong leadership at the city level—across several mayoral administrations—and effective partnerships with the Chamber of Commerce and others in the private sector have been important. Each initiative has been targeted and limited in scope and duration. And a strong track record in delivering the promised bundle of projects has helped build public trust and goodwill, as well as momentum for the next proposal.

This artist's rendering shows conceptual plans for Oklahoma City's Central Park, funded by MAPs3 revenues. (Rendering courtesy of the city of Oklahoma City)

Oklahoma City's MAPs3 Revenue and Expenditures, 2010–2018

	U.S. dollars (millions)	Percent of total
PROJECTED REVENUE		
Sales tax revenue	777	100
EXPENDITURES		
Project		
A new, approximately 70-acre central park linking the core of downtown with the Oklahoma River, including a restaurant, lake, amphitheater, dog park, skating rink, and other amenities	130	16.7
Fifty-seven miles of new public bicycling and walking trails throughout the city	40	5.0
Improvements to the Oklahoma River, including a public whitewater kayaking facility and upgrades intended to achieve the finest rowing racecourse in the world	60	7.7
Improvements to the State Fair Park public buildings, meeting halls, and exhibit spaces	60	7.7
State-of-the-art health and wellness aquatic centers throughout the city designed for senior citizens	50	6.4
A new rail-based streetcar system of five to six miles downtown, a downtown transit hub to link streetcar, commuter rail, and bus systems, and possibly increased funding for the building of commuter-rail lines	130	16.7
A new downtown convention center on the south edge of downtown near the proposed park	280	36.3
Sidewalks to be placed on major streets and near facilities used by the public throughout the city	10	1.3
Contingency funds to cover unforeseen costs	17	2.2
Total	777	100.0

Source: Oklahoma City.

MAPS3: POISED FOR SUCCESS

The success of the earlier two MAPs programs helped lay the groundwork for the city's third sales tax ballot effort. At nearly eight years and \$777 million, MAPs3 is the most ambitious and longest-lived program to date.

Early in the MAPs3 exploration process, the city conducted a four-month online call for ideas from Oklahoma City residents. Over 85 percent of respondents thought MAPs3 was a good direction to go. The calls also generated more than 2,700 suggestions for future projects, with public transit improvements leading the list. Of the 14 ideas that were most popular in the

survey, 12 were included in MAPs3 or addressed through other city programs.

Strong support from Mayor Mick Cornett helped bolster voter enthusiasm for MAPs3. At regular press conferences over a two-and-a-half month period, the mayor made a case for each of the eight projects (see chart) that made the MAPs3 ballot. Leadership elsewhere in city government, including long-term city council members and experienced agency staff, was also valuable.

At the December 2009 vote, MAPs3 carried the day, winning 54 percent of ballots.

A MAP FOR MOVING FORWARD

In its MAPs programs, Oklahoma City has developed a valuable system for funding important civic open-space, parks, and transit projects, an approach that continues to garner significant public support. Bundling seemingly diverse projects encourages links among them, in addition to creating appeal for a broad range of voters.

The limited lifespan, ten to 12 years, of each MAPs program has proven to be a smart idea. The time frame offers adequate opportunity to complete the promised projects while reassuring voters that their elected leaders remain accountable. Strong oversight has also helped. "We have tried to make it as transparent as possible," noted Claus. Success in the present builds momentum for future endeavors.



Oklahoma City has an ambitious infrastructure agenda, funded by MAPs and other sources.

VOTING FOR INFRASTRUCTURE IN LOS ANGELES, CALIFORNIA

Measure R: Going Multimodal in Los Angeles

In 2008, a supermajority of 67 percent of Los Angeles voters passed Measure R, a landmark referendum that authorized a half-cent sales tax increase. Measure R is expected to generate \$30 billion to \$40 billion over the next 30 years for an ambitious mix of transit and road projects. A list of projects calibrated to appeal to a varied demographic of voters helped build support for the measure. Frequent polling, a diverse coalition of interests, and a persuasive message were other elements that helped push the ballot over the finish line.

Los Angeles—the name alone instantly evokes freeways and car culture. Yet in 2007 a broad coalition of business, labor, environmental, and political leaders came together under the banner of “Time to Move LA” to address the region’s pressing

transportation needs and ambitious sustainability goals. At a January 2008 conference dedicated to questions of funding, 350 participants came to consensus that a sales tax increase was the region’s best bet. A new advocacy organization, Move LA, was born to push for the funding.

Ten months later, a 67 percent supermajority of voters approved Measure R, a half-cent sales tax proposed by the Los Angeles County Metro Transit Authority (Metro). Capital improvements for new transit and highway projects make up almost 60 percent of the Measure R funds. New transit projects include light-rail lines to new locations in the county, BRT systems, and high-capacity bus programs. Another quarter of the Measure R budget is for transit operations, which will help support low fares and consistent services.

For the 2008 campaign, the nonprofit Los Angeles County Economic Development Corporation estimated that Measure R would help fund dozens of vital transit and highway projects, produce more than 210,000 new construction jobs, and generate \$32 billion for the local economy.

Measure R Will Dramatically Change the Transit Landscape in Los Angeles County

Proposed rail and rapid-transit expansion and highway improvements



Source: Map courtesy of Metro. © 2012 LACTMA.

THE SUPERMAJORITY AND THE SALES TAX

A countywide sales tax of up to 1 percent is the most common tool for funding local transit in California and is used by more than a third of California counties. Such transit sales taxes typically extend for about 30 years. Two half-cent transportation sales taxes were already in effect in Los Angeles County prior to Measure R and supported the past decade’s improvements to transit and roads.

Yet levying a local-option sales tax for transportation in California is not simple. All such taxes must be put before the voters, and the state imposes a high bar for approval. Ballots must earn approval from a supermajority of more than 66.67 percent of county voters. This rule raises the stakes for ballot proponents, requiring careful strategizing and legwork before a campaign even begins. But before Measure R proponents could even think about a vote, they had to secure state legislative authorization to exceed the one-cent cap on local-option sales taxes for transportation, an effort led by Assemblyman Mike Feuer with support from Metro.

THE MEASURE R CAMPAIGN

An understanding of public opinion was crucial: separate polls by Metro, Move LA, and the Los Angeles Mayor’s Office suggested that voters would be receptive to a well-crafted, carefully designed campaign that emphasized transportation benefits. Timing also appeared to be fortuitous: 2008 was a presi-

Los Angeles County's Measure R Revenues and Expenditures, FY 2010–2039

PROJECTED REVENUE		U.S. DOLLARS (MILLIONS)			
Half-cent sales tax revenues, 30 years		40,000			
EXPENDITURES					
Project	Percent of total (net of administration)	First-year amount	Ten-year amount	30-year amount	
Transit capital: New light- and commuter-rail and BRT projects	35	241	2,930	13,790	
Transit capital: Metrolink capital improvement projects within Los Angeles County (operations, maintenance, and expansion)	3	21	251	1,182	
Transit capital: Metro rail system improvements	2	14	167	788	
Highway capital: Carpool lanes, highways, goods movement, grade separations, and sound walls	20	138	1,675	7,880	
Rail operations: System improvements, rail yards, and rail cars, including a Metro fare freeze until 2013	5	34	419	1,970	
Bus operations: Countywide bus service operations, maintenance, and expansion	20	138	1,675	7,880	
Other: City-sponsored local transportation improvements (for cities to determine)	15	103	1,256	5,910	
Administration costs	Less than 1.5	11	127	600	
Total	100	700	8,500	40,000	

Source: Los Angeles County Metropolitan Transportation Authority.

dential election year, and high voter turnout was predicted. A favorable voter forecast persuaded the Metro board of directors to place Measure R on the November 2008 ballot.

Strong political support for Measure R from Mayor Antonio Villaraigosa created essential momentum for the Measure R campaign, as did support from the supervisor of the Los Angeles Third District, Zev Yaroslavsky, a majority of the five-member County Board of Supervisors, and other local elected officials from around the county. Highly influential—though politically odd—bedfellows of business, labor, and environmental constituencies organized to back the yes vote. Endorsements from the Los Angeles Area Chamber of Commerce, the Los Angeles Business Federation, and other organizations helped build widespread support for the initiative.

According to Jaime de la Vega, former deputy mayor for transportation, four factors contributed to the ultimate success of the Measure R campaign:

- Mayor Villaraigosa's vision for an expanded transportation and transit system;
- Measure R's specific list of projects, with a mix that included "something for everyone"—transit as well as roads and highways, including an allocation of 15 percent of revenues for local priorities;
- An external, privately financed campaign team of professionals who had been involved in Mayor Villaraigosa's election; and
- Luck: gas prices in Los Angeles reached \$5.00 a gallon in summer 2008, reinforcing for voters the need for transportation alternatives and congestion reduction.

In addition, Metro's "Five Point Plan" sought to easily summarize the projects into something for everyone: rail expansion, street improvements, traffic reduction, public transportation, and quality of life.

In summary, Measure R's recipe for success included the following ingredients: strong political support from persuasive elected leaders and the regional transportation agency; proponents organized in a broad, diverse, and enthusiastic grass-roots coalition; a specific list of projects with enough variety to appeal to a critical mass of voters; and a carefully tuned message tailored to voter submarkets.

LOOKING FORWARD

Following the approval of Measure R, Mayor Villaraigosa began to campaign at the national level for his "30-10" plan, allowing the construction of Measure R's projects in ten years, rather than 30. The premise of the plan, since renamed "America Fast Forward," calls for the federal government to provide credit and tax incentives for packages of projects like Measure R. The outcome depends in part on Congress's advancement of a new federal transportation bill.



INFRASTRUCTURE LEADERSHIP IN NORTHEASTERN ILLINOIS AND GREATER CHICAGO

Securing Water for the Future in Greater Chicago

Northeastern Illinois's Water 2050 plan is a substantial regional undertaking. Concerned that population and economic growth could lead to water shortages, the region's water leaders prepared Water 2050 to help safeguard water supplies in the region's 11 counties through midcentury. Officially endorsed by regional water leaders in January 2010, the plan lays out over 200 water conservation strategies, many of which seek to create stronger links between land use and water.

Despite the appearance of nearly limitless freshwater in a region nestled between the Mississippi River and Lake Michigan, water is a precious resource in northeastern Illinois. During the summer of 2005, a long and costly drought—one that ranked among the state's three most severe in 112 years of record—raised the profile of water supply and spurred some soul searching among the region's leaders. How should water supply and demand be managed for the next generation and beyond?

The Illinois governor's office—finally heeding years of calls for comprehensive state and regional water planning—issued an executive order in January 2006, directing the state to initiate a water supply planning process for the 11-county northeastern Illinois region. A stakeholder committee composed of 35 delegates convened to prepare the plan. The region's powerful

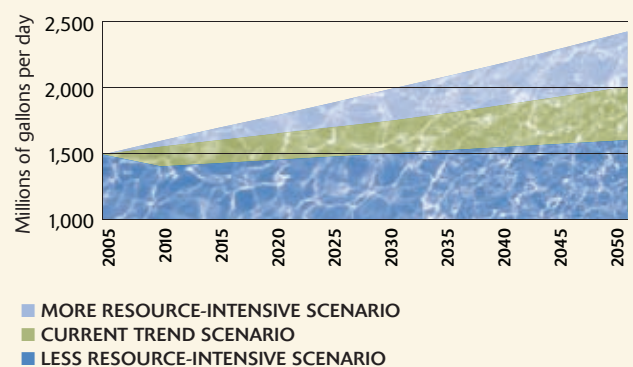
Despite the appearance of nearly limitless water resources, water management in the Chicago region is a challenge.

planning body, the Chicago Metropolitan Agency for Planning (CMAP), was commissioned to support the process.

The committee—called the Regional Water Supply Planning Group—started with a number of goals. The water plan, the group determined, should help maintain water supplies in the region and protect the quality of ground- and surface water. Other goals included informing residents about the importance of water stewardship, better managing water withdrawals, pro-

Water Demand Is Projected to Increase Dramatically in Chicago

Demand scenario water withdrawals, 2005–2050



Sources: Chicago Metropolitan Agency for Planning.

moting intergovernmental coordination, and improving the integration of land use and water management. Notably, the focus of the plan was not on changing the region's existing governance structures for water or on identifying capital projects.

The water planning process occurred against a complex legal backdrop. A 1967 U.S. Supreme Court Consent Decree limits the amount of water that Illinois may divert from Lake Michigan to about 2 billion gallons per day. The state is also a party to the Great Lakes Compact, a historic, multistate 2008 agreement that limits diversion from the Great Lakes by neighboring states and provides goals for the conservation of Great Lakes water. Illinois is subject to the compact's conservation requirements. These factors—and the possibility of water shortages caused by population and economic growth—added urgency to the region's water planning process.

THE WATER 2050 PLAN

In January 2010, after three years of monthly meetings, Water 2050: Northeastern Illinois Regional Water Supply/Demand Plan was completed, winning the unanimous support of the planning group. Water 2050 summarizes the group's findings and analysis and offers more than 200 water use strategies. The plan's recommendations target the state of Illinois, CMAP, municipalities, and local water suppliers.

Among the overlapping recommendations included in the plan are the following:

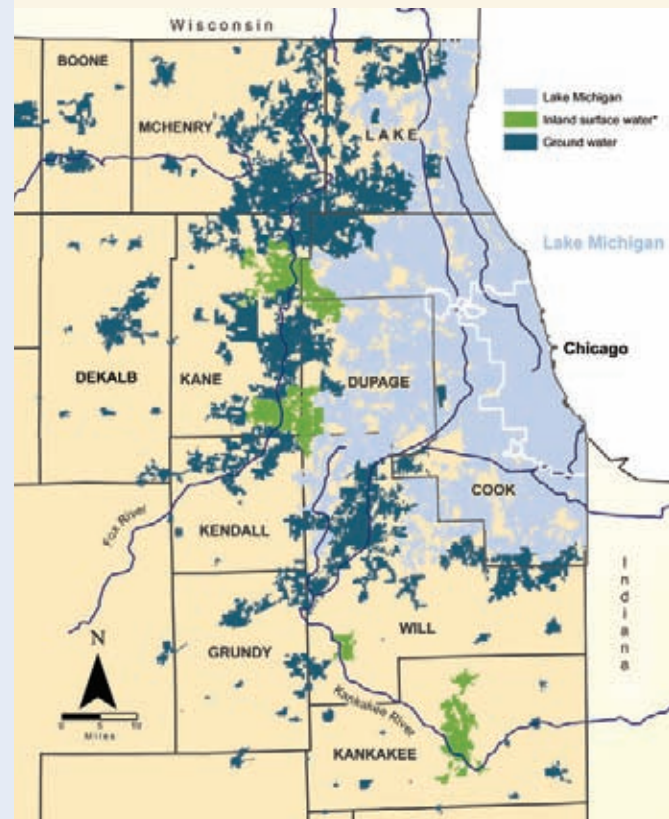
- **Better integrate land use and development considerations with water:** encourage compact development patterns in or near existing communities, use conservation design principles and practices, and preserve open lands and green space;
- **Encourage conservation:** price water to reflect the cost of water supply as well as distribution (known as “full-cost” or “conservation” pricing), institute public information campaigns, reuse graywater and wastewater, and create new “conservation coordinator” positions; and
- **Protect water quality:** use more environmentally friendly methods to deice roads and introduce more protective land use measures.

LOCAL DECISION MAKING

Hundreds of local water authorities manage water in northeastern Illinois; Water 2050 attempts to integrate recognition of the regional nature of water resources into their decision making, which historically has focused on meeting local water needs. Adoption of the recommendations, however, is voluntary. “It is now up to public water suppliers to see the common sense in the recommendations and implement them,” explained Tim Loftus, principal for water resources planning and programming at CMAP.

Lake Michigan Supplies Most of Metropolitan Chicago's Water

Source of public water supply by municipality in the 11-county planning region



Source: Chicago Metropolitan Agency for Planning.

Implementation is picking up momentum at the local level. Building off Water 2050, five counties and other partners have formed the Northwest Water Planning Alliance to develop shared subregional policies that complement or support the overall plan. The city of Chicago is taking the cue to up the price of water. Mayor Rahm Emanuel's 2012 budget establishes rate increases of 25 percent in 2012, with additional 15 percent increases in each of the next three years. Revenues will fund an ambitious investment program. CMAP itself has integrated Water 2050's findings into GO TO 2040, the region's long-term comprehensive plan.

The Water 2050 process illustrates the complicated challenge of managing and maintaining a vital resource like water—one that is shared regionally, nationally, and internationally. Water 2050 provides the region with a common framework for understanding its water future and a set of strategies for effecting change. Translating this work into more action on the ground is now the task at hand.

INFRASTRUCTURE LEADERSHIP IN SAN FRANCISCO, CALIFORNIA

The Price Is Right: Parking Goes High Tech in San Francisco

Circling a busy city district in search of an on-street parking space? San Francisco wants to make your life easier. A pilot program, called SFpark, uses variable pricing to match demand and supply, providing a glimpse at the technology-rich future of parking.

SFpark, launched in San Francisco in April 2011, operates on 7,000 on-street spaces and 12,250 garage spaces throughout the city. It combines dynamic pricing with technology that uses embedded roadway sensors to track the availability of parking spaces and transmit the information wirelessly to a data feed. Tech-savvy Bay Area drivers can check online via smartphone app or text message, or call a phone hotline to see where spaces are available, then pay for parking by credit card or phone.

SFpark gives drivers choices: pay more and walk less, or pay less and walk an extra block or two. The price of parking is adjusted according to demand and varies based on location, time of day, and day of week. Hourly rates can reach as high as \$6.00 but can be as low as 25 cents during nonpeak times in low-demand areas. As SFpark gathers information about the effect of pricing on parking supply and demand, it periodically adjusts rates, which are displayed at garages and meters and online. The \$25 million program, which received a \$20 million federal grant from the U.S. Department of Transportation's Urban Partnerships program, is in a pilot phase through summer 2012.

Making parking easier and more convenient is SFpark's primary goal, but its planners have bigger things in mind. The new pricing schemes should improve access to local businesses; removing circling vehicles from the traffic lanes should reduce congestion, increase traffic flow, improve the reliability of city buses, and improve air quality. "SFpark is helping us to realize the promise of using data to make smarter decisions," explained Jay Primus, SFpark manager for the San Francisco Municipal Transportation Agency (SFMTA).

Thus far, the program has helped boost meter revenue; income from SFpark meters increased by 20 percent in 2011 over 2010. One unexpected outcome: all the upgrades are driving down citation fees from parking violations. These fees declined by more than 30 percent in 2011.

CREATING SFPARK

SFpark was championed and administered by SFMTA. In some cities, separate departments manage on-street parking, city-owned garages and lots, and parking enforcement. In San



San Francisco's SFpark parking management system uses sensors to adjust meter prices based on demand. Users can access information with smartphones. (Photo courtesy SFpark)

Francisco, SFMTA is the sole agency responsible for these tasks and thus was in a strong position to focus on delivery of the project. The Port of San Francisco, which has jurisdiction over 1,000 metered on-street spaces along the city's waterfront, was also involved.

SFMTA enlisted the help of several partners to develop and launch the program, including an academic advisory team and a variety of private sector players. The academic advisory team, which included parking management guru Donald Shoup, provided early consultation on program design and data collection. Private sector contributors helped create supporting technology, including software, smartphone applications, parking sensors, mapping, and redesigned meters.

THE IMPORTANCE OF MESSAGING AND DATA

Effective communication has been a key component of the *SFpark* program. Helping the public understand that the program was about managing transportation in smarter ways—not just about increasing the price of parking—was crucial. “So far, public reception has been very positive,” reported Primus. “We really haven’t received any complaints. In large part, it’s

because there’s a strong value proposition. Parking is easier to find, easier to pay for, and more convenient, with longer parking time limits,” he explained.

SFpark periodically evaluates the program’s effect on parking availability, revenues, and congestion. In 2012, SFMTA will take a look at how well the pilot program achieved its broader goals of reducing congestion and improving bus reliability. The agency also hopes to produce a comprehensive guide on the technical aspects of the project that can aid other cities interested in replicating the effort.

INNOVATIVE APPROACHES AND TECHNOLOGY

As the country’s first large-scale application of smart technology and pricing to manage parking, strong leadership from the agency in charge was critical, as was the federal funding that helped underwrite the program. But going first also raises risks, which SFMTA mitigated by tapping into the region’s wealth of knowledge and private sector technological prowess. *SFpark* is attracting attention: the Institute for Transportation and Developmental Policy gave San Francisco its 2012 Sustainable Transport Award, in part for the innovative parking management program.

***SFpark* adjusts parking rates in San Francisco’s Moscone Garage in response to demand. (Photo courtesy of SFpark)**



INFRASTRUCTURE LEADERSHIP IN HARTFORD, CONNECTICUT, AND SPRINGFIELD, MASSACHUSETTS

Using Transit to Build a Bi-State “Knowledge Corridor”

The bi-state area of central Connecticut and western Massachusetts has a history of strong regional cooperation. Since 2000, the region’s public and private sector leaders have promoted the area as “New England’s Knowledge Corridor” and fostered a unified approach to economic, cultural, and civic development. Now, a new bus rapid-transit system, regional rail line, and federal planning grants are helping the region usher in a more sustainable, transit-oriented future.

The central Connecticut and western Massachusetts region is home to 1.6 million people, with 160,000 students at 32 universities and colleges. Anchored by Hartford, Connecticut, and Springfield, Massachusetts, and situated between New York and Boston, the area shares many assets and common interests.

Rather than competing for economic opportunities, local leaders have worked for over a decade to promote and develop the area as a whole. In 2000, Northeast Utilities convened a bi-state group of the chief business, economic development, planning, and educational organizations, creating the Hartford-Springfield Economic Partnership to begin working together to advance the region’s economy. The group developed the “Knowledge Corridor” brand as a way of describing and promoting the region as a whole and of emphasizing “the area’s rich history of innovation, invention and world-class education assets,” as the partnership’s website puts it.

Lyle D. Wray, executive director of the Capitol Region Council of Governments, explained the need for a common approach. “The state border between Connecticut and Massachusetts is political, but that’s not the way the economy works. People cross the state lines every day for work. We need to border bust: stop looking at the border as a barrier, and instead see it as an opportunity.”

LEVERAGING REGIONAL COOPERATION FOR FEDERAL FUNDING

Building on a decade of regional economic cooperation, the area’s three regional planning agencies were well positioned to apply for the new Sustainable Communities Regional Planning Grant from the U.S. Department of Housing and Urban Development (HUD). The three agencies partnered with nearly 40 regional, state, and city agencies and nonprofit organizations to put forward a proposal for a package of housing, education, transportation, employment, and nutrition activities advancing the “New England Sustainable Knowledge Corridor.” HUD recognized their achievement with a \$4.2 million, three-year grant awarded in 2011.

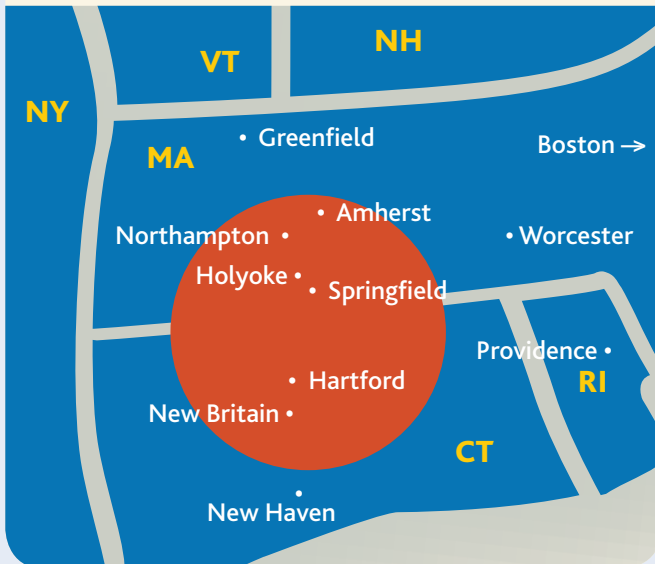
Over the course of the grant period, the partners will jointly implement projects, provide technical services, and match HUD dollars with additional funding. The consortium is pursuing a combination of “planning, doing, and measuring,” undertaking



Buses wait for passengers at the Holyoke Transportation Center in Holyoke, Massachusetts. A fire department headquarters was converted into the transportation hub in 2010. (Photo courtesy of Pioneer Valley Planning Council)

The Knowledge Corridor Spans Two States

Leaders are working together to promote growth



public outreach and capacity-building exercises, conducting special planning studies, and developing metrics on sustainability.

An overarching goal of the consortium is to connect housing, employment, and education to good-quality transportation, and one of its key deliverables will be to update and integrate existing regional plans to help achieve this goal. The final Knowledge Corridor Detailed Execution Plan for a Sustainable Region includes the following:

- Strategies to leverage the land use potential of transportation assets—including BRT and rail corridors;
- Policies to support and encourage denser, more compact, mixed-use land uses; and
- New guidelines and codes for affordable housing.

Overall, 80 communities participate in the grant's strategic planning, market analysis, and code development activities. The grant is also working to advance transit, streetscape, and other physical improvement projects in six municipalities. For example, a new multimodal transportation center is being moved forward in one low-income community. "These on-the-ground projects are helping to show citizens that this is a not a superficial effort," explained Timothy Brennan, executive director of the Pioneer Valley Planning Commission.

More generally, the members of the consortium are looking to the grant-funded work to generate new economic activity in the region. "We are hoping that the analyses conducted under the grant will stimulate interest by the private sector," noted Wray.

CREATING A TRANSIT-ORIENTED REGION

Several major transit projects, critical to the implementation of the Knowledge Corridor vision of an interconnected, sustainable, transit-oriented region, will advance over the next ten years. A ten-mile, \$567 million busway connecting New Britain and Hartford was awarded \$275 million in federal New Starts funding in 2011. The buses will use an abandoned railroad right-of-way, halving city-to-city travel times to 20 minutes. Local leaders hope that the high-frequency, well-equipped express buses will relieve congestion on Interstate 84 and be the first step toward a regional system of rapid-transit buses.

Rail links between New Haven, Hartford, and Springfield are also getting an upgrade. The project, which is receiving \$323 million in federal funding and \$162 million in state funding, will shorten trip time, improve reliability, and increase ridership by building 39 miles of new track, adding and renovating stations, and providing connections to the New Britain-to-Hartford busway. In addition, the region will receive \$70 million in federal funding for the design and construction of the "Knowledge Corridor Restore Vermonter Project," a plan for Amtrak's intercity train service. The line will create links between Knowledge Corridor cities and major northeastern metropolitan hubs.

"We've sought an emphasis on connections as a way of being competitive," said Tim Brennan, executive director of Pioneer Valley Planning Commission in the Springfield area. "The game changers are the intercity and commuter-rail proposals, which can connect the corridor with the New York City area." But land use has not been forgotten. The HUD sustainability grant funds work that is helping Knowledge Corridor partners maximize the land use and development potential of these transit investments.

TAKING THINGS TO THE NEXT LEVEL

Although the region has been a recent recipient of large federal grants, prospects for future federal funding are dimming, and local governments' ability to help is limited. State law in Massachusetts and Connecticut does not allow local-option sales taxes. As a result, the region may face challenges funding transportation projects. "There will be money problems based on the gap between what is available and what is needed," warned Brennan. "The backlog of projects—transit, highway, bridges, bike paths—has passed the billion-dollar mark." New ways of raising money will need to be explored.

Despite the funding concerns, leadership advocating regional cooperation is helping the area move forward with key transit investments and related long-term land use planning. Linking transportation improvements and land use development—as the Knowledge Corridor stakeholders are striving to do—will help maximize the value of the region's infrastructure investments.





4 Paying the Way

The infrastructure funding crunch arrives at a critically difficult time for the United States. “We’ve been living off past prosperity and haven’t had to pay for anything new for 30 or 40 years—but now we do.” When greater needs slam into depleted resources, something has to give. Either you get more creative, pragmatic, and efficient, or you fall further behind with potentially dire consequences—compromised productivity and lowered quality of life in the form of greater congestion and various systemic breakdowns. Simply put, “If we’re working with less than we need, we’ve got to invest it better.”

Policy Shifts

As the gap between available monies and infrastructure needs grows, Congress gets mired in ongoing federal deficit cutting, and stimulus money runs out, the infrastructure funding burden is increasingly shifting to states and local governments. State and local leaders are challenged to think in new ways about how to plan and fund the infrastructure that will keep regions economically competitive.

Time for Change

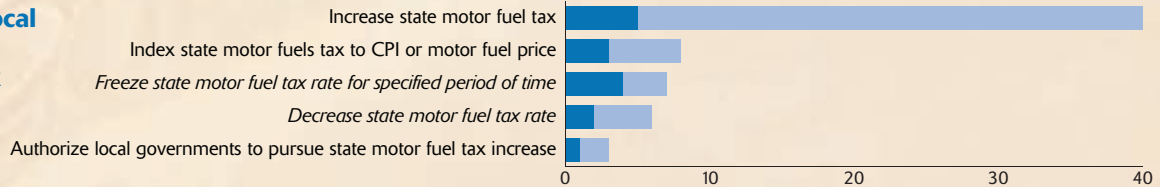
For starters, the country must “change how we make decisions.” Unlike many of its global competitors, which retain more centralized control and attempt to implement national plans, the U.S. federal system defers most infrastructure planning to state and local governments. Deeply embedded in the constitutional separation of powers, the ground-up approach can lead to disconnected projects. Little chance of near-term

Cars drive through toll booths on the New Jersey Turnpike in Woodbridge, New Jersey. (Mike Derer/*Associated Press*)

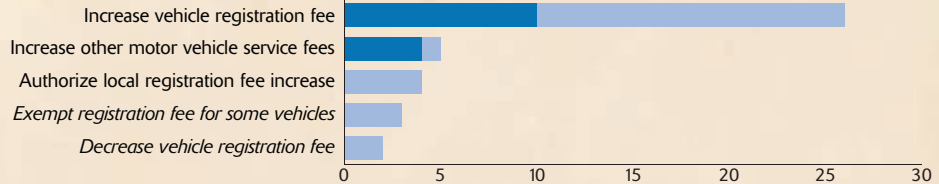
States Look to Many Sources for Transportation Funding

Proposed and enacted state legislation for transportation funding, 2008–2012

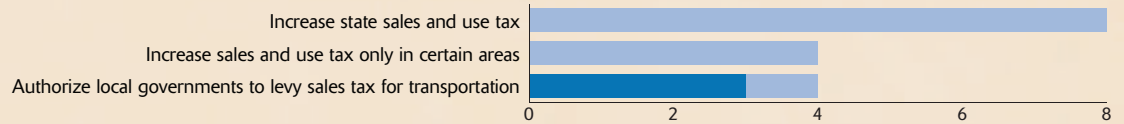
State/local motor fuel tax



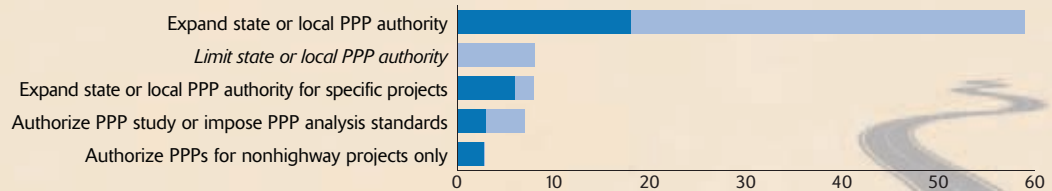
Vehicle tax and fees



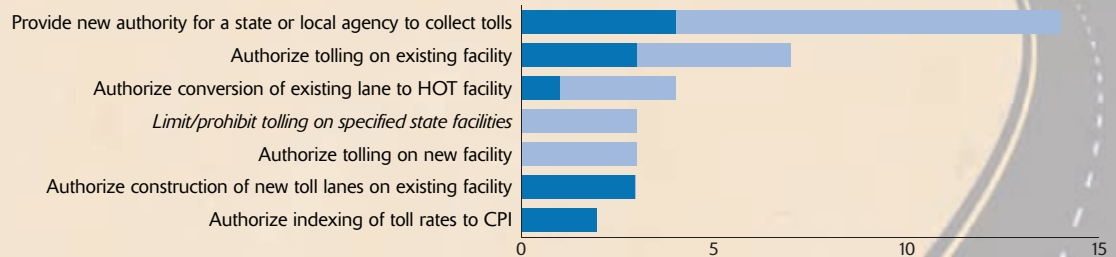
Sales and use tax



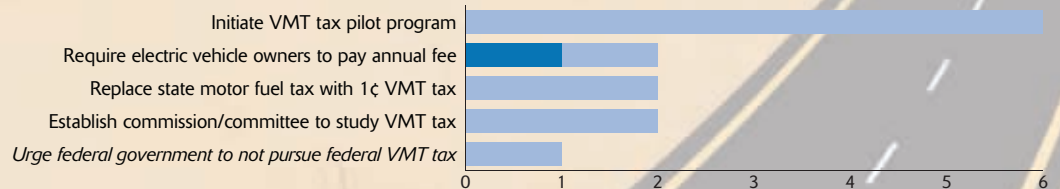
Public/private partnerships



Tolling



Vehicle mileage fee



■ NUMBER OF BILLS ENACTED ■ NUMBER OF BILLS PROPOSED

Source: Texas Transportation Institute.

Notes: Italics indicate state legislation to freeze or reduce transportation revenues. VMT = vehicle-miles traveled.

change exists; a U.S. Infrastructure Bank, modeled on Europe's, which could have helped identify and finance merit-based projects meeting national goals, is stalled in Congress.

Despite all "the less than optimum" hurdles and "partisan rancor," however, interviewees sense the first small signs of possible "transformative change" as infrastructure initiatives look more promising to more leaders from both parties as a way to help remedy the sputtering economy and position the country for future growth.

Not Counting on the Feds

Beginning three decades ago, the federal government began deemphasizing new project infrastructure funding after a spending spree that built some of the world's most modern transportation networks, including 50,000 miles of interstate highways, other roads, sewer treatment plants, and water lines across the country. When completed, responsibility to maintain these projects belonged to states and local governments, which seemed manageable at the time because new systems need less money. But now costs steadily mount as aging systems require refurbishment or replacement, and Washington shows no inclination to increase its share of the cost load. "We're in an era of self-

help where you can't depend on federal hand-outs to get by."

Tax-allergic federal legislators last raised the federal gas tax in 1993, while higher fuel efficiency standards further stanch growth in gas tax revenues. Consequently, the country's Highway Trust Fund—the mainstay for both road and transit projects—is running short of cash. Up to this point, Congress has found ways to top off the trust fund with general revenues, maintaining federal spending levels, but growing controversy over these repeated bailouts translates into declining federal support for state and city infrastructure programs.

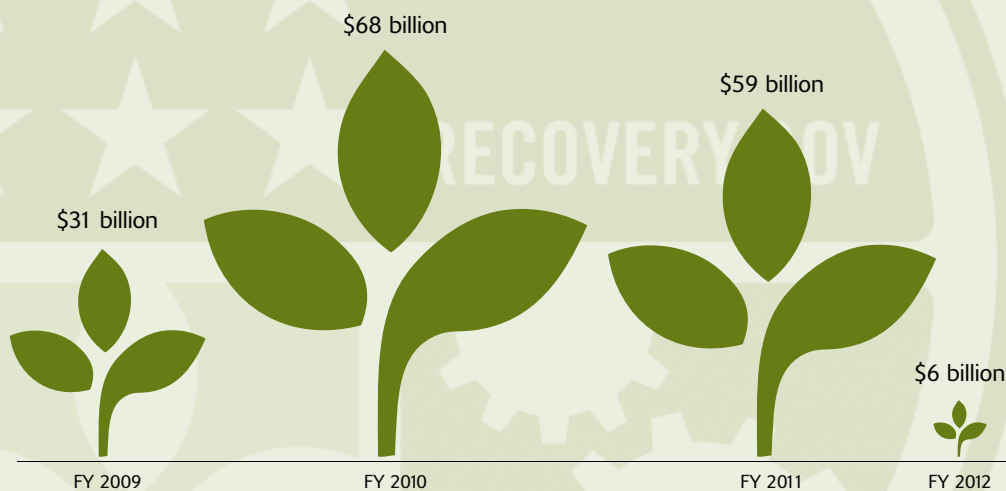
The trust fund breakdown occurs just as local leaders struggle with their own budget red ink, straining even to fund necessary repaving or fix-it-first refurbishments—now they must bankroll major projects like light-rail lines or highway extensions without as much federal help. State and local governments look to a variety of sources, including state gas tax hikes, user fees, and ballot measures, to build the infrastructure they need.

Stimulus Runs Dry

A favorite punching bag for deficit cutters, stimulus funding actually saved the day for many state and local agencies. Some states, like Florida—

Little Recovery Act Funding Will Be Available after FY 2011

Recovery Act Funds, 2009–2011



Source: Center on Budget and Policy Priorities.
Note: FY = fiscal year.

which had 14 shovel-ready transportation projects identified in its pipeline—scored major wins. They could execute on major initiatives that otherwise would have been impossible to complete—“stimulus had a significant impact on addressing existing congestion and network gaps, and helping accommodate the significant growth expected in these situations.” But now stimulus allocations tap out, Congress will not re-up, and states must pick up the slack, hoping for upticks in tax revenues as the economy improves.

Ending Competition

With the onus on states and cities to be smarter, regions would be well served to work together to build the development and infrastructure they need, concentrating on projects that will deliver the greatest economic performance and long-term benefits. “It’s problem solving at the grass roots, figuring it out by ourselves.”

Ad hoc project funding, compartmentalized planning, and competition among neighboring jurisdictions have always been counterproductive—now they are totally unaffordable. “Business as usual no longer works” in a global economy. Metropolitan areas will learn to profit from inter-governmental collaboration and coordination or suffer ruinous consequences from their real competitors, who are overseas, not in adjacent counties.

Regional and national policy makers would also be well served to make sure that core cities remain strong and that the nation’s core economic drivers—the global gateway cities whose airports and ports sit along international commerce pathways—are building the infrastructure that will position them for the future.

Multiple Benefits

Officials would be wise to broaden their metrics beyond traditional transportation goals involving speed, safety, and mobility to include environmental, housing, and economic development measurements—“we need to attain multiple benefits from every dollar spent.”

That means investing in transportation and



related housing solutions that enable greater convenience, reduce car dependency and congestion, and permit more efficient, cost-effective lifestyles. In turn, building and maintaining systems that support more people and businesses in denser land use configurations can help boost efficiencies and economic returns.

Power and water-related infrastructure investments must also include lower-cost conservation and sustainability initiatives—smart metering, green roofs, tree planting, water recycling, and stormwater-retention technologies.

Raising Money the Local Way

Sobriety takes hold; states and local governments must regain their bearings and focus on what can be done until outlooks improve—“that may be four or five years, probably longer.” They either raise sales or gas taxes to support bond issues, switch to more user fees, or most likely adopt some combination, while cutting back services. And they consider more PPPs. When the going gets tough, “they’ll be more likely to do whatever it takes.”

Atlanta’s July 2012 transportation referendum could direct additional revenues to transportation.
(Scott Moore 2012/Getty Images)

TIFIA Push

Federal-level action is not totally absent. But even the few moves being seriously contemplated—such as a major expansion of the federal Transportation Infrastructure Finance and Innovation Act (TIFIA)—are designed to leverage local sources. TIFIA is a federal program that can draw more private investment into local projects, augmenting states' and cities' spending power. "It's the federal government's way of providing greater flexibility for obtaining private financing, while putting fewer dollars into the system." TIFIA helps by providing credit assistance and reducing financing risk, including interest rate protection, for local governments and private partners in PPP transactions.

Each federal dollar under TIFIA can provide approximately \$10 in credit assistance and potentially leverages \$30 in infrastructure investment for local project funding, not exceeding 33 percent of total eligible project costs. With relatively minimal impact on federal deficit calculations, TIFIA offers a welcome policy prescription in debt-ridden times and could help ignite slow-to-evolve PPP procurement in the United States. TIFIA can apply to a wide range of major project initiatives from highways, mass transit, and passenger rail to freight rail and port facilities.

Toll Time

The rush to raise or impose new highway tolls appears to grow as state and local officials more willingly advance into once uncomfortable decision-making territory. Driver wrath is muted by state-of-the-art electronic technologies that streamline toll implementation and reduce labor costs (no need for toll takers)—overhead gantries with easy pass and license plate tracking systems eliminate the need for traditional stop-and-pay barriers, which can slow traffic flows, increase the incidence of accidents, and raise driver blood pressures. The whole process is less noticeable and less irksome; user fee charges can get lumped in with monthly charge card billing, easing the apparent effect on drivers.

Even though tolling can be regressive, hitting lower-income drivers hard especially when they have few or no mass transit alternatives, many drivers are slowly accepting the increases or changing driving patterns to start using mass transit where it is available. They come to realize the charges are necessary for maintenance and building new systems. "There's a connect-the-dots aspect to user fees making them more palatable than paying taxes where you're not sure how the taxes are being used."

SR 520, a floating bridge in Seattle, is being replaced. A toll instituted in December 2011 is generating funding for construction of the new bridge, shown here in a rendering. (Image courtesy of Washington State Department of Transportation)



Tolls can encourage more efficient use of facilities. Traffic flows eased noticeably on roads leading into the State Route (SR) 520 bridge in Seattle after new tolls were installed.

Despite back-and-forth in Congress about the expansion of tolling on federal highways, local toll activity is strong. Toll action across the country includes the following:

- California, Georgia, Illinois, Texas, and Virginia, among other states, ramp up plans to add more HOT lanes. Any road extensions or lane additions come with toll features to pay for them. “There’s no way you build a new road without tolls.”
- Already featuring more toll roads than any other state, Florida plans a \$300 million road-widening project east of Jacksonville that will create a new tolled highway. Florida also moves to a statewide all-electronic transponder system, which should facilitate planned tolling on additional roads and lanes.
- Pennsylvania raised the toll rate along its east-west turnpike to 8.5 cents per mile, the highest in the nation among grandfathered interstate toll roads. Since 2007, the turnpike tolls have provided the state more than \$3 billion for road and bridge repair work. Next door, New Jersey will increase tolls on its turnpike and the

heavily traveled Garden State Parkway by more than 50 percent over the next three years.

- Cash tolls on bridge and tunnel crossings from New Jersey into New York City were hiked late in 2011 from an already stiff \$8 to a swallow-hard \$12 per ride with increases slated to \$15 by 2015. Toll revenues help pay for a raft of necessary refurbishment projects as well as construction of One World Trade Center (the replacement for the Twin Towers).
- Major toll increases appear in store for the deteriorating Tappan Zee Bridge across the Hudson River in New York to help pay for a new span.
- Maryland doubles tolls on some highways and has increased the fee for the Chesapeake Bay Bridge from \$2.50 to \$4. The long-awaited Intercounty Connector opened in 2011, linking the state’s Washington, D.C., suburbs. Variably priced tolls are collected electronically at highway speeds.
- The SR 520 bridge linking Seattle to its eastern suburbs adds variably priced tolls, ranging up to \$3.50 a crossing, depending on time of day.

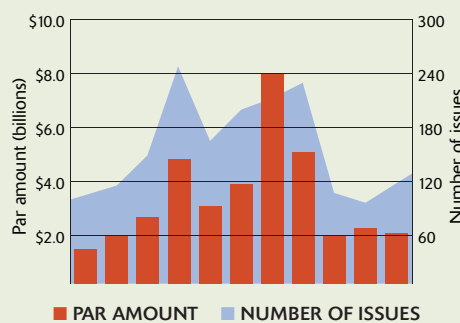
New Gas Taxes and Land Sales

Over the past year, more than a dozen states have raised fuel taxes, another potentially politically charged move. State and local officials find some cover in highly volatile gas pump prices; drivers have become inured to sudden price hikes and may not factor in a few additional tax cents to the gallon. More states likely will follow suit on such tax hikes, given relatively tempered driver reactions and overriding funding needs. Congress also might take note: maybe the public could handle a gas tax infusion to help suture the ruptured Highway Trust Fund.

Cities step up one-off sales of underused sites—like the rail yards on Manhattan’s West Side—to raise dollars from developers for transit projects and other priorities. But local governments have just so much prime acreage available to fetch significant proceeds: “These are one-time harvests; you can’t grow these crops next year.”

Tax Increment Financing Activity Has Slowed Significantly Since the Recession

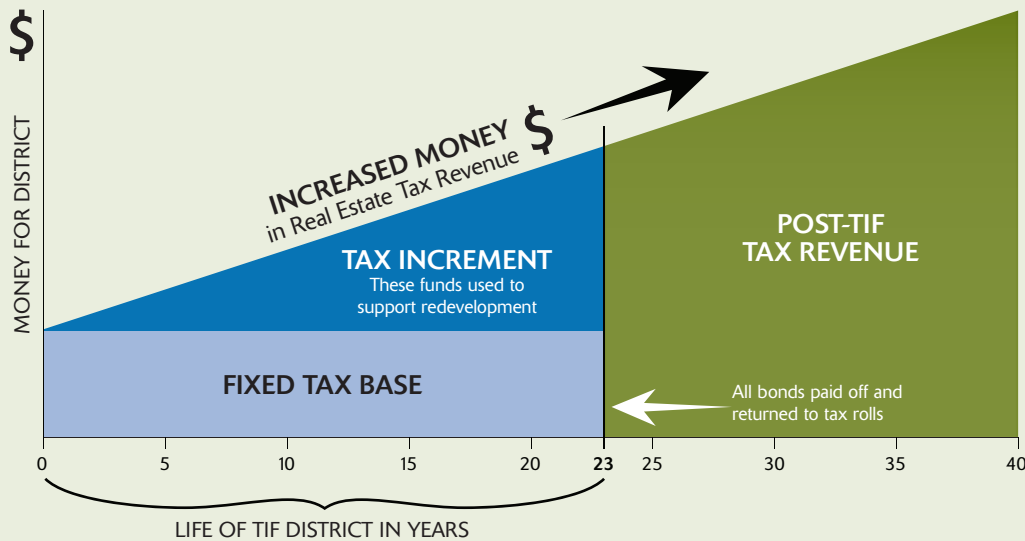
Annual U.S. TIF issuance, 2000–2010



Source: U.S. Public Interest Research Group, 2011.

Note: Par amount is the amount that will be paid to the investors over the term of the TIF bond.

Life Cycle of a Tax Increment Financing District



Source: Diamond-TIF, 2009.

Tax Increment Financing and Special Assessment Districts

State officials are thinking more boldly and creatively about other funding strategies as well. Special assessment districts—where property owners are charged additional taxes that support infrastructure projects—can channel resources to transit and other infrastructure projects. Special assessments are a key component of the local funding for the Silver Line heavy-rail expansion to Dulles International Airport in Virginia.

Tax increment financing (TIF) is a traditional infrastructure financing tool that—despite a falloff in recent issuances—still shows promise. In a TIF district, the increase in taxes (the tax increment) that results from new development spurred by infrastructure improvements is used to capitalize the bonds that pay for the infrastructure investments. Traditionally, TIF districts have been used to aid struggling neighborhoods. New applications are seeking to extend TIF-style financing across multiple districts and communities and for new kinds of projects, including transit. For example, jurisdictions in the Dallas/Fort Worth metroplex are hoping that TIF will help build the Cottonbelt Line, but issues of phasing and market strength will need to be resolved.

Public/Private Partnerships

Properly framed, PPPs should “not be viewed in any way as privatizations of public assets.” Rather, PPP structures can give “government greater continuous leverage over the private sector than through traditional procurement.” They become more rationally “understood as a tool in the procurement tool box,” which can help realize development and operating efficiencies, achieve proper risk transfers that protect taxpayers, and enable more cost-effective financing for new projects. “We’re still in the learning curve process, there’s more receptivity, but we’re not yet at a tipping point.”

PPP approaches are being applied to water assets and, in Europe, even to social infrastructure. The U.S. PPP market in transportation is evolving in fitful steps, but interviewees anticipate overriding government financing needs will force adoption of more PPP transactions and help mainstream structures and practices in coming years. Over the past decade, about half the states have used PPPs to help build nearly 100 transportation projects, totaling approximately \$54 billion, but 65 percent of those transactions were confined to just eight states, and 26 states have yet to initiate any PPP construction. In particular,

Ten Metropolitan Areas Account for the Majority of U.S. Transportation PPP Investment Value

Top ten U.S. metro areas for PPPs

Metro area	PPP cumulative value, 1989–2011 (billions of 2011 dollars)	PPP projects (number)	PPP value (share of U.S. total)
Washington-Arlington-Alexandria, DC-VA-MD-WV	\$7.2	8	10.8%
Los Angeles-Long Beach-Santa Ana, CA	\$6.7	10	10.1%
Dallas-Fort Worth-Arlington, TX	\$6.5	4	9.7%
New York-Northern New Jersey-Long Island, NY-NJ-PA	\$5.2	5	7.9%
Denver-Aurora-Broomfield, CO	\$5.1	6	7.7%
Miami-Fort Lauderdale-Pompano Beach, FL	\$3.7	8	5.5%
Seattle-Tacoma-Bellevue, WA	\$3.5	4	5.2%
Austin-Round Rock, TX	\$3.3	3	5.0%
Salt Lake City, UT	\$3.0	2	4.5%
Chicago-Naperville-Joliet, IL-IN-WI	\$2.1	1	3.1%
Total	\$46.3	51	69.5%

Source: Brookings Institution, 2011.
Note: Includes design-build projects.

Virginia continues to receive high marks from interviewees for its vanguard role in establishing sound PPP legislation.

Entering 2012, only 14 greenfield PPP transportation projects were underway nationwide, but they comprise some the country's biggest infrastructure initiatives, and nearly 50 other PPP projects move forward in the feasibility or procurement stage. "PPPs are still a very small part of the overall pie," says an interviewee, "but if you're a government official there's now enough of a body of work to weigh lessons learned—we're no longer wandering in the wilderness."

Interviewees offer reflections on the evolving PPP marketplace and recent lessons learned:

- **PATCHWORK OF RULES:** Despite progress, many states still have not drawn up procurement rules for PPP projects, and other states separately create a patchwork of codes and regulations, which make the bidding process more costly and onerous, discouraging private participation. "The federal government could be supportive by encouraging more uniform rulemaking at the state level" by helping identify the best procurement rule-making practices." Various federal agencies also have separate PPP procurement regulations, making for additional complications.

- **INSTITUTIONAL CAPACITY:** Many state public works agencies lack the knowledge base to understand and negotiate PPP deals. "The public sector needs to have better resources to manage and structure transactions as well as exercise oversight." Hiring private consultants can be tricky too. To build the needed capacity, the United States could look to successful models in Canada, where provinces such as Ontario have established authorities to concentrate infrastructure management skill sets and oversee PPP procurement across provincial agencies.
- **POLITICAL RISK:** Significant preclosing political risk can make potential investors think twice about getting involved in PPP projects. High-profile PPP project meltdowns—such as the 11th-hour cancellation of the North by Northwest Expressway PPP by the Georgia governor and litigation over the Presidio Parkway in California—undermine private sector confidence.
- **PUBLIC CONTROL:** Drivers are more comfortable with government agencies maintaining control over tolling authority and other user charges. Drivers do not want fee decisions left unilaterally in "for-profit" private sector hands. PPP structures involving tolls work well when private operators are compensated through availability payments—"we'll see a repetition of this concept around the country."

- **THE NEED FOR CHOICE:** Managed toll lanes gain widespread consumer acceptance by providing a choice—either using free lanes or “paying a premium for better performance.” Private operators can be properly incentivized to take the risk for optimizing traffic flows (quickly clearing wrecks, preventing slow-downs), which the public will pay for in return for delivering reliable time savings.
- **USING PPP FUNDS:** The public expects any concession proceeds from transactions with private partners to fund long-term infrastructure needs, not short-term fixes for general obligations such as covering pension liabilities or balancing current budgets. Finding ways to accomplish PPP financing for new projects could free up “increasingly limited funds” from traditional state budget sources for critical maintenance needs.
- **SWEET SPOT:** Lack of clarity in the procurement process from jurisdiction to jurisdiction becomes particularly problematic for private operators considering bids on smaller projects: high upfront expenses in the complicated proposal process can turn daunting, deterring par-

icipation. The private partner “sweet spot” for bidding on projects ranges from “\$500 million to a couple of billion dollars.”

- **MEGAPROJECTS:** Complicated megaprojects may cry out for private investment, but these deals remain particularly difficult to put together, given risks involved in multibillion-dollar project costs getting out of control and uncertainty over complex payment calculations—“what will the revenue streams be?” “Private investment will get more involved in undertaking these projects, but the billion dollar question remains exactly how.”

Growing Capital Base— Other Funding Sources

As governments around the world scrounge for infrastructure funding, institutional investors and sovereign wealth funds raise capital to fill at least some of the gap. But these investors struggle to get comfortable with various options and hesitate to rush full bore into the sector, especially in the United States where fractious PPP policies throw up hurdles. Studies show dedicated funds for

When completed in 2012, Virginia’s Interstate 495 Express Lanes project, a PPP among the Virginia Department of Transportation, Fluor, and Transurban, will add four new high-occupancy toll lanes—two in each direction—along the Capital Beltway. (Photo courtesy of Transurban-Fluor)



infrastructure have multiplied worldwide by more than fourfold over the past five years from \$60 billion in 2006 to \$250 billion in 2011.

More than 60 infrastructure funds, including vehicles managed by investment banks and private equity managers, have a leveraged purchasing power of about \$625 billion, which could be directed at the U.S. market if suitable investments can match up with risk-return targets.

Sovereign Wealth Funds

Investor profiles are changing, dominated by sovereign wealth money from Pacific Rim countries including China, Korea, and Australia. China in particular is emerging as an overseas infrastructure investment powerhouse, building projects throughout the world. China's aggressive construction of roads, bridges, and rail projects in Africa—part of a bid to gain access to rich stores of natural resources—has the potential to transform the continent.

Sidestepping investment manager fees, the cash-flush sovereign funds team up directly as capital partners with engineering-concession companies, which are happy to reduce equity contributions and transform into more full-fledged

operating partners. These public companies no longer can avail themselves of ready leverage in the capital markets, and they have less incentive to invest more of their own money since they are now more likely to get penalized by shareholders for greater exposure.

Pension Plan Sponsors

Pension funds have been “slow to get their act together—still only one-half of 1 percent of their total assets” get allocated to infrastructure, but that could change, especially among public plan sponsors. Infrastructure's modest but steady investment yields can appeal to pension funds interested in reliable income returns to match with their long-term liabilities. Governors and mayors, meanwhile, hold more conversations with public fund officials about investing in infrastructure projects, which could produce jobs for their future beneficiaries and lift local economies.

On balance “it's gotten easier to raise money from pension funds, but there are headwinds,” say fund managers, “and despite growing allocations, commitments, and interest, the pace of growth isn't as high as the need.” Investors look for low volatility, predictable investment returns that meet actuarial rates of return in the 7 to 8 percent range, or inflation-adjusted returns plus 4 to 5 percent, which infrastructure can provide. But they remain concerned and distracted about “putting out fires in various portfolios,” whether investment in Europe is safe, and “political partisanship in the U.S.,” which stifles problem solving. The absence of available debt also steals away any chance to leverage up returns. “Overall uncertainty offsets general enthusiasm for asset class.”

For the United States, “a great deal of capital remains interested—all it will take is the government becoming more constructive in approaching procurement of private capital and PPPs.” The ideal combination for these risk-averse investors is a franchise with an identifiable long-term income stream, backed by government support through availability payments or guarantees, and a strong private operating partner. So far, investment activity has been relatively “minuscule.”

Macquarie and Goldman Sachs Are Largest Infrastructure Investors

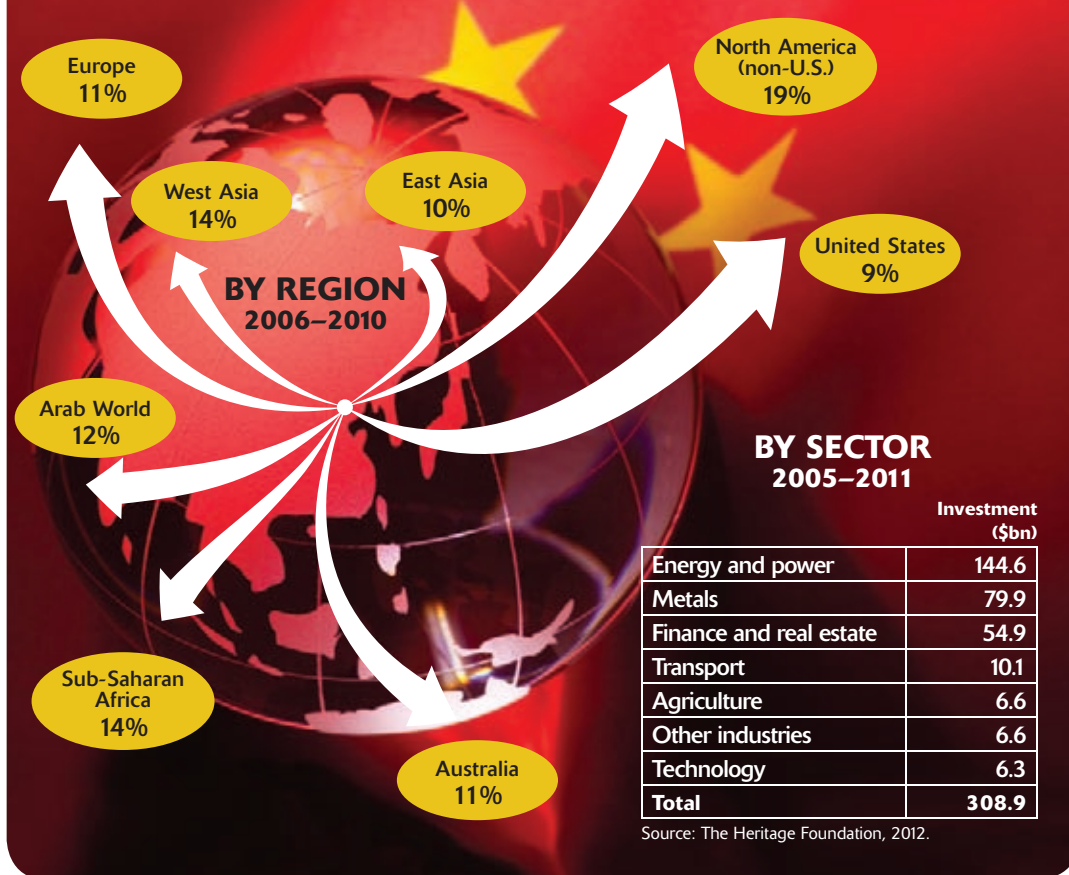
Top investors in the infrastructure asset class, 2011

Rank	Name of investor	Five-year capital creation total (\$bn)
1	Macquarie Group	\$31.83
2	Goldman Sachs	\$10.72
3	Canada Pension Plan Investment Board	\$9.97
4	Ferrovial	\$9.42
5	APG Asset Management	\$7.43
6	Alinda Capital Partners	\$7.10
7	Energy Capital Partners	\$7.04
8	Brookfield Asset Management	\$6.26
9	QIC	\$6.24
10	La Caisse de dépôt et placement du Québec	\$5.92

Source: *Infrastructure Investor*, June 2011.

China Is Investing Heavily Overseas

Outward investment by region and sector



A Look Forward

Progress often precipitates from failures—tough times have a way of helping reshape priorities and focus attention on crucial economic and social policies necessary for meaningful and sustained recovery. Noticeably, the will gathers to recognize and take up the nation’s substantial challenges and consensus starts to develop for doing something even if there is less funding available.

In the global infrastructure game, local governments are stepping up to the plate, assuming more responsibilities and leveraging many sources of funding to build the infrastructure to bolster flagging economies and position for the future. But local efforts can only go so far, and in the United States, at least, lack of a clear federal direction for policy and funding can create uncertainty and inertia.

The immediate future will test whether the country can do more with limited resources: make progress on identifying worthy projects and attract private capital to pool with taxpayer funds to get them built. For success, planning and funding ultimately must orient to developing regional priorities in the context of integrating with national objectives to compete effectively in global markets. That will mean moving people and goods more efficiently and economically, using less energy and less water per capita, and enabling the growth of metropolitan areas where populations increasingly concentrate. At the same time, the country must keep repairing what its citizens already depend on.

It all amounts to an extremely tall order. But incremental progress may lead to better results—that’s at least the hope.

CURRENCY

All currency is in U.S. dollars, unless otherwise noted.

QUOTES

ULI conducted 27 interviews with industry experts for this report. All attributed and unattributed quotes are from these interviews.

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Infrastructure 2012: Spotlight on Leadership

is the sixth in a series of annual reports exploring infrastructure investment and trends around the world. The series examines the subject from both national and global perspectives, and provides key insights on the future of infrastructure planning and funding.

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