

Infrastructure 2013

Global Priorities, Global Insights

 **Urban Land
Institute**

 **ERNST & YOUNG**
Quality In Everything We Do

Infrastructure 2013

Global Priorities, Global Insights



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Cover: The Octavio Frias de Oliveira Bridge, a cable-stayed bridge in São Paulo, Brazil, that spans the Pinheiros River, opened in May 2008.

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In a world suffering unprecedented economic and environmental challenges, the importance of infrastructure is being recognized by populations and politicians alike. The long-term issue of funding (who pays?) and the shorter-term options for financing of infrastructure (how do we pay?) are becoming hugely important questions for policy makers and the government officials responsible for creating and maintaining the assets that enable 21st-century cities to function. In this turbulent period of low growth and government deficits, economies need fiscal stimulus and creation of employment. Spending on infrastructure offers both of these benefits and, if wisely directed, this investment delivers improved quality of life to the affected community.

The Urban Land Institute and Ernst & Young have collaborated again, for the seventh year, to examine key trends and issues in the major global markets of the Asia Pacific region, Europe/Middle East/Africa, and the Americas. *Infrastructure 2013* has drawn upon a broad range of discussions with public and private sector procurers, funders, operators, and advisers to report on the critical factors affecting infrastructure in emerging and developed economies.

In many developed economies such as Europe and the United States, spending on infrastructure is predominantly directed at asset maintenance and repair, with few opportunities for brand-new installations. Where new projects are contemplated, the driver is often to address urgent climatic impacts or to provide a differentiated economic benefit to a municipal government or federal government. In the connected global economy where cities are competing for business and investment, the quality of infrastructure is commonly a determining factor.

With the increased importance of infrastructure comes the risk of political interference. Some cash-rich emerging economies are able to make swift decisions to invest, but other countries must guard against political uncertainty over major infrastructure policies and strategies. Taxation, user charging, environmental impact, and public safety are all poten-

tial vote-losing issues in a democratic society, but step changes in the quality of infrastructure usually require bold decision making.

As the world's population increasingly chooses to live in large urban centers, there is an increasing need for improved connectivity, efficient use of natural resources, and the creation of sophisticated transport hubs. Now more than ever, innovation, technology, and instant communications are enabling improvements in design, installation, and operation of assets.

The winners, *Infrastructure 2013* suggests, will be those countries and regions that can meet the rapidly changing needs of the people by delivering the best facilities in the swiftest and least disruptive manner.



Patrick Phillips
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An aerial photograph of La Paz, Bolivia, showing a dense urban landscape built on a steep hillside. The city is characterized by numerous multi-story buildings, many with red brick facades. In the background, a range of rugged, brown mountains stretches across the horizon under a cloudy sky. The word 'Introduction' is overlaid in a large, white, serif font in the upper left quadrant.

Introduction

The city of La Paz, Bolivia, lies below the Illimani mountain.

An aerial photograph of a city built on a hillside, with mountains in the background. The city is densely packed with buildings, and the mountains are rugged and brownish. The sky is blue with some clouds. The text is overlaid on a semi-transparent white box.

“A vast percentage of the population will continue to live in cities, putting huge pressure on infrastructure and therefore on the climate.”

“In Asia, people want cellphones and urban mass transit.”

“Most countries should invest more in digital technologies rather than asphalt.”

“Latin America—especially Brazil, Colombia, and Panama—as well as India and eastern Europe, will be powerful developers of new investments.”

“With over \$3.3 trillion in foreign currency reserves, there will be more Chinese capital flooding outbound to overseas infrastructure.”

In 2013, the slowly recovering global economy influences widely differing approaches to setting infrastructure agendas, as nations work to gain competitive footholds amid ongoing financial distress, political unease, and the challenges of climate change.

Across the globe, infrastructure is the lifeblood of prosperity and economic confidence in the 21st century. Well-planned and well-executed investments offer developing economies the hope of basic facilities for all and a chance to compete in a global marketplace. In developed economies, superior and well-maintained infrastructure attracts the best talent as well as dynamic businesses seeking reliable connectivity and a high quality of life for workers.

Infrastructure—the structure or underlying foundation on which the continued growth of a community depends—is critical for countries in all stages of development. But adverse economic and political conditions can make effective investment in infrastructure difficult to achieve, and affect how efficient countries are in realizing anticipated benefits.

Emerging-market players are looking to remove transport bottlenecks and upgrade inadequate systems for water and power, which can stunt growth ambitions. At the same time,

many mature countries—particularly the United States and those in Europe—are grappling with how to repair or refashion once-advanced, but now increasingly outmoded, infrastructure in the face of limited funding capacity. New technologies and urban planning strategies may yield improved returns on infrastructure investment in developed markets, as countries forgo rebuilding in-kind for transformational changes.

Some governments are reluctantly paring back 21st-century modernizing schemes—they must deleverage or reorder their fiscal affairs before they can launch into backlogs of wish-list projects. Fiscal constraints may force a focus on investing in the highest-priority needs.

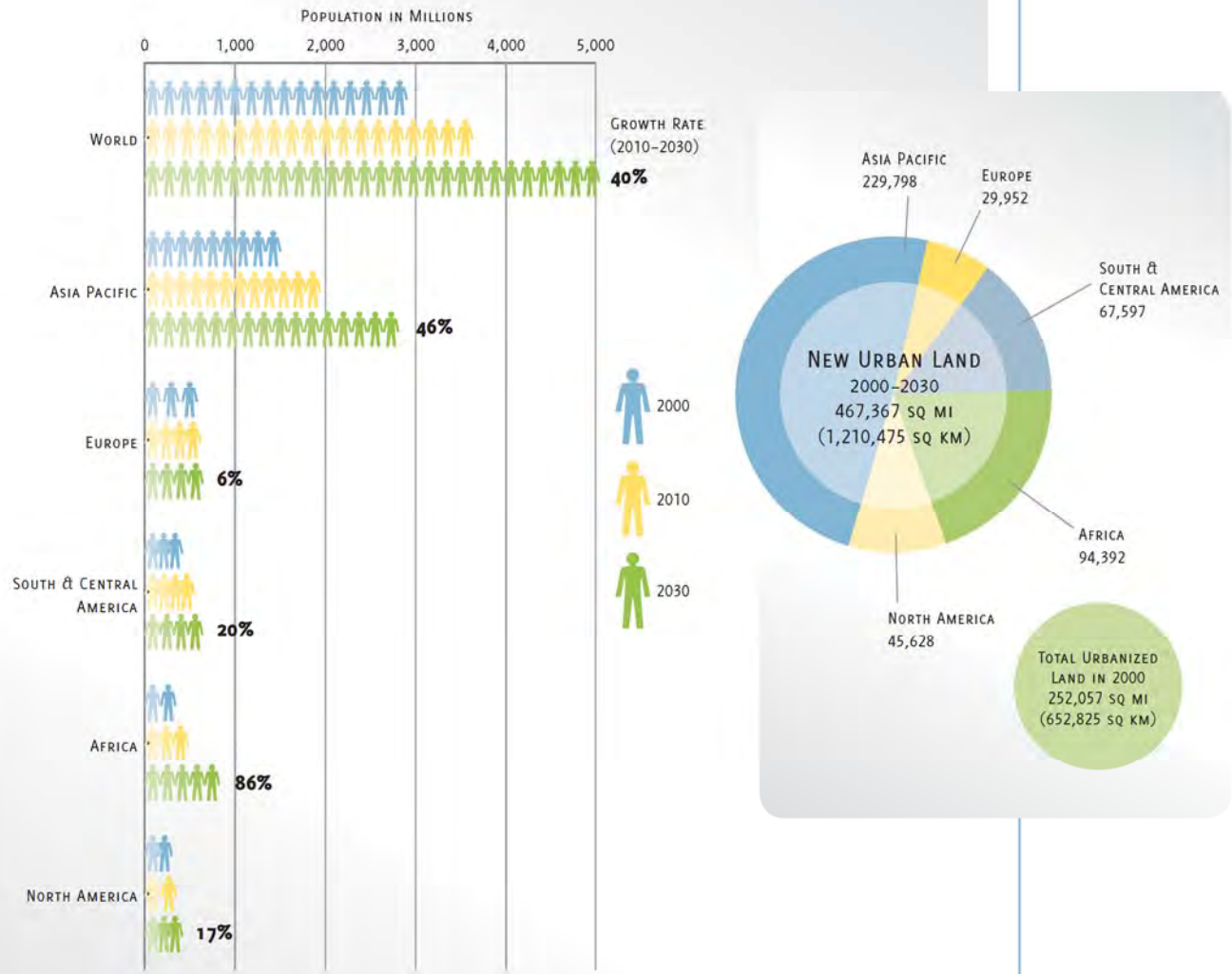
Other countries in better financial condition realize they just cannot pay for everything they need to do and execute strategies in incremental steps. Only China keeps on building—seemingly without limits—but with growing questions regarding potentially suboptimal project selection, quality control, and long-term sustainability.



Shoppers line a street in Shanghai, China.

Population Growth Is Driving Land to Become Urban

Projected Urbanization of the World and Regions



Sources: United Nations, *World Population Prospects, 2011*. Karen C. Set, Burak Gunalp, and Lucy R. Hutyra, "Global forecasts of urban expansion to 2030 and direct impacts on biodiversity and carbon pools," proceedings of the National Academy of Sciences of the United States of America, Vol. 109, No. 40, 2012.

Governments around the world are increasingly turning to public/private partnership (PPP) and public concession models to help build and finance infrastructure initiatives. Large sovereign wealth funds and institutional investors are tentatively warming to the potential for reliable returns from infrastructure that exceed current bond performance and offer inflation-hedging potential.

But infrastructure investors still worry about the reliability of government partners, deal structures, and the long-term viability of some investments, as evidenced by recent experience with toll roads in Spain and the United Kingdom's reassessment of its PPP programs and policies. In the end, PPPs and related approaches are financing tools—taxpayers and users must still pay the costs.



A Dallas Area Rapid Transit train crosses a bridge over a freeway, with Dallas in the background.

Our Urban Future

The need for infrastructure is becoming even more pressing as more of the world's population crowds into urban centers. The world's vast gateway cities—London, New York, Shanghai, Singapore, Mumbai, São Paulo, and Mexico City, among others—concentrate commerce, culture, businesses, government, universities, and medical centers. Surrounded by rapidly urbanizing areas, they generate jobs and wealth.

But in order to function and sustain growth over the decades ahead, urban areas will require novel, new-age infrastructure and land use concepts that can foster mobility, limit congestion and pollution, deliver sufficient supplies of power and potable water, provide “smart” communications connectivity, and promote a desirable quality of life for tens of millions of people living and working there. In turn, prosperity for secondary and tertiary cities, agricultural regions, and manufacturing centers will depend on ever more time-saving links to nearby gateways, ports, and distribution hubs.

Among the daunting challenges:

- **Providing the basics.** In many developing economies, including India, parts of Africa, and elsewhere, meeting basic human needs for potable water, wastewater treatment, and electricity remains a challenge. Despite

its considerable progress in modernization, China also lags in providing clean water and municipal and industrial sewage treatment in much of the country. Lack of this basic infrastructure holds back economic development, increases health problems, and reduces life expectancies. Even in the United States, water shortages are leading to large investments in new technologies such as desalinization and the use of new techniques to maintain aquifers and preserve water tables.

- **Building multimodal mass transit systems.** These include light rail, subways, and bus rapid transit, through and under densely populated areas in efficient networks that connect neighborhoods and commercial centers to other transport terminals. The costs can be prohibitive, but the alternative of car dependence augurs implacable traffic gridlock, as already seen in Beijing and other sprawling urbanized areas.
- **Converting from coal and oil to less polluting, lower greenhouse gas-producing energy sources**—and then complementing these investments in new facilities with power grids and pipelines to reach end users reliably and cost-effectively. Wind and solar remain heavily dependent on public

subsidies that are subject to uncertainty, nuclear struggles to overcome its spiraling costs and less than fail-safe reputation, and new natural gas hydro-fracturing technologies raise environmental concerns. Simply put, no clear choice exists and the policy debate rages over what to do.

- **Anticipating the next wave of communications requirements to empower businesses and commerce.** Yesterday's landlines and cables have been supplemented and may be supplanted by wireless and broadband. But what's next? How can investing in the wrong technologies be avoided, and how can service be extended into exurban and rural areas for a reasonable cost-benefit?
- **Maintaining and overhauling existing infrastructure.** Many once-cutting-edge highways and sewage treatment plants built 40 and 50 years ago are reaching the end of their life cycles. Some older bridges and water tunnels require replacement or risk failure. And the threat of climate change is changing the perception of existing infrastructure. The expense of maintaining and upgrading these systems may force many agencies to delay or even sacrifice new initiatives as they squeeze some additional life from existing assets. Planning for the next gen-

eration of technologies to meet these basic needs lags in many cases.

- **Convincing a cash-strapped public and body politic to pay increased taxes and user fees.** Public acceptance will undoubtedly be based on the promise that new projects will eventually result in a stronger economy, greater efficiencies, and a healthier environment. However, in many cases large investments have failed to yield promised outcomes, undermining the trust needed to authorize new taxes and user fees.

Many forms of infrastructure—particularly water and transportation—have been heavily subsidized, and the public is reacting negatively to proposals to either continue to underwrite escalating subsidy requirements or pay actual costs through user fees. Extensive cost-cutting and evolving labor/management relationships are occurring in response to these pressures, but long-term capital investment is still required.

Factoring Climate Change

Concerns about how to pay for infrastructure are overshadowed by greater urgency in regions affected by the vagaries of climate



Hurricane Sandy flooded this street and surrounding buildings in Hoboken, New Jersey. The storm severely damaged coastal communities in New Jersey and New York.

change—rising sea levels, increasing incidence of destructive storms, and enduring droughts.

In general, major coastal cities and ports around the world must reconsider how to deal with their susceptibility to stormwater surge and runoff, protecting property values where possible. With no resulting direct income stream flowing from these preemptive investments, funding has been hard to come by. Now that governments have experienced the costs

of environmental damage from severe weather events, budgets for resilience measures may become available.

In 2012, Superstorm Sandy forced New York suddenly to contemplate multibillion-dollar schemes like harbor barriers to protect underground transport systems and vulnerable waterfront development, including Manhattan's financial district. The United Kingdom wonders whether a second Thames River barrier is

A boy gets water from a well in Afghanistan.



needed to shield London from increased threats of flooding while moving forward with a vast new sewage tunnel to reduce storm-related overflows of polluting effluent into the river.

And some governments begin to ponder abandoning development in flood-prone zones and restoring natural wetland protections—why keep rebuilding at considerable cost when these projects have an increasing likelihood of being swept away? “Resilience turns into another level of sustainability for many cities”—they must prepare for how “to get back in business as quickly as possible and limit any dislocation.”

At the other end of the climate spectrum, recent long-term droughts pose equally difficult conundrums for many regions with growing populations facing water shortages. These include Middle East countries, Australia, and parts of Africa and China as well as a vast swath in the United States extending from Texas to California. Conservation, water recycling, and precipitation-capturing technologies (like the old-fashioned cistern) dovetail with regional prescriptions for overcoming scarcity.

Wide-open deserts (in the western United States, China, and northern Africa) hold promise for renewable power sources from solar and wind, but nuclear power and natural gas may provide more tenable energy solutions—at least in the short term. These approaches,

however, are likely to require new, reformulated, and expensive energy grids.

The Year Ahead and the Way Forward

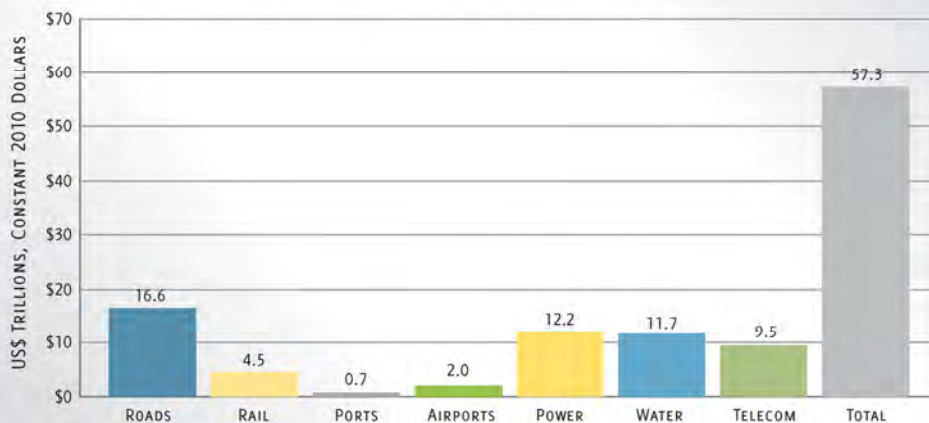
Coming to terms with these realities and rethinking how we can live, work, and prosper in a rapidly evolving global order intensifies the need for transformational infrastructure change in many regions. But this report suggests that countries and cities can outperform their peers over time if they factor certain trends and strategies into infrastructure decision making.

Here are a few of the report’s key takeaways:

- **Urban mobility.** Global population growth, coupled with urbanization trends, will continue to spur infrastructure planners to integrate transport systems in ways that improve mobility while reducing reliance on cars and trucks and decreasing pollution. This often involves investing in mass transit. In some places, more operational efficiency will be eked out of roads through the creation of managed lanes, which use pricing and technological innovations. Regions will have a chance to prosper further only when mass transit and rail hubs in increasingly dense commercial centers link to airports, ports, and residential neighborhoods offering convenient access to pedestrian-friendly shopping districts and parks.

Global Infrastructure Demand Requires \$57 Trillion in Investment by 2030

Based on projections of demand equaling 3.5 percent of global GDP, 2013–2030



Source: McKinsey Global Institute, *Infrastructure Productivity: How to Save \$1 Trillion a Year*, January 2013.

- **Setting priorities.** The gap between available funding and infrastructure needs should not impinge on effective prioritizing of projects based on economic, social, and environmental benefits. In fact, fiscal exigencies can help put the focus on top priorities, including maintaining existing assets. National and regional schemes, which affect the greater good, take precedence over local one-off projects.
- **Putting PPPs in context.** PPPs are properly understood as an infrastructure delivery mechanism, best implemented after the hard work of planning is done. For PPPs to work, governments should fine-tune procurement models and make the process more efficient, encouraging the adoption of best practices. As an example, “the infrastructure sector is moving toward performance contracting, where payment is linked to results and milestones achieved against fixed deadlines.” Successes should engender greater public acceptance and willingness among the public to pay for investments.
- **Addressing climate change.** More nations are adapting infrastructure policies to recognize the negative effects of climate change. The European Union (EU) has been a leader in seeking to decrease carbon emissions and engaging renewable-energy solutions, while more recently Australia, Canada, and Japan are making commitments to tackle these issues in the planning and execution of new projects. China and the United States notably continue to lag, although the Obama administration shows signs of taking more forceful action in its second term and cities across the country are forging ahead with visionary green building and investment plans.

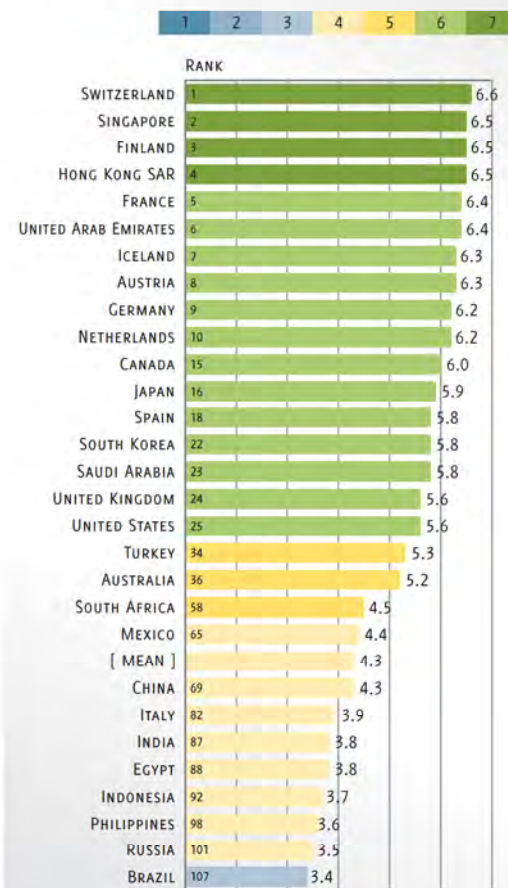
Now well into the new century’s second decade, the world is rethinking how infrastructure should work in a rapidly transforming global order.

A Spectrum of Approaches

The ULI/Ernst & Young infrastructure report reviews infrastructure trends in the three global areas of the Asia Pacific region, Europe/Middle East/Africa, and the Americas for a broad view of how national policies and approaches will be shaped in 2013 and the years beyond.

Business Executives Rate the Quality of Infrastructure

Assessment of the quality of transport, telecommunications, and energy infrastructure on a scale of 1 to 7



Source: World Economic Forum, *The Global Competitiveness Report*, 2012.
Note: 144 countries were represented in the survey.

This popular Saigon district in Ho Chi Minh City, Vietnam, is full of shops, bars, and guesthouses.



Below is a summary of how various countries are coping with the daunting infrastructure obstacles they face.

Emerging-Market Spenders

Concerned about maintaining its economic growth, **China** is pouring money into an already unprecedented infrastructure building spree—constructing high-speed rail and urban mass transit systems throughout the country. The high-speed rail program, which faced serious safety and corruption issues in 2012, appears to be getting back on track. These investments have supported dramatic economic expansion, but are adding to the country's large debt burdens and creating long-term liabilities for operating subsidies and ongoing maintenance. The country has yet to get a handle on serious air pollution and water quality challenges.

India also recognizes that modernizing its infrastructure should be a top priority. The country is striving to keep up with aspirations to become a global market heavyweight. Even without widespread corruption, a swelling

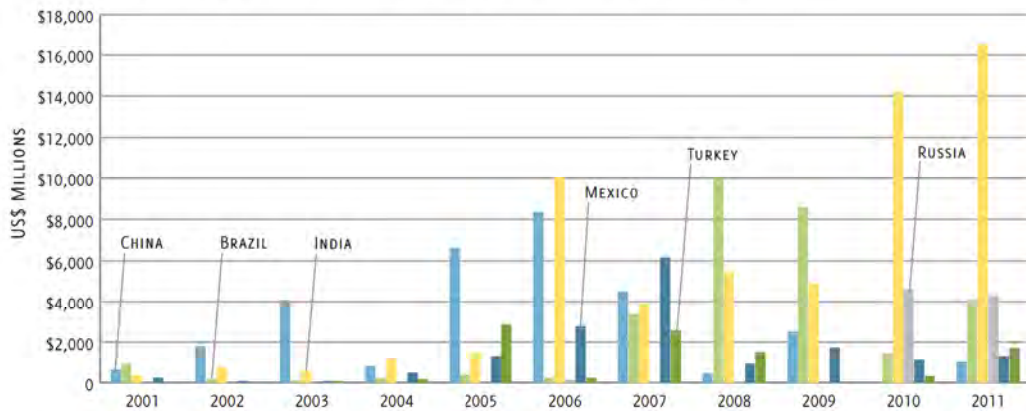
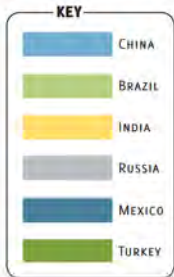
population and severe income inequality would make this job even harder.

Brazil, Mexico, Indonesia, the Philippines, Vietnam, South Africa, and even **Mongolia**, among other rapidly growing economies, try to entice foreign investors interested in profiting from emerging market demand and “possibly igniting a more robust worldwide recovery” in the process. These emerging-market forays are “not for the fainthearted—investors must worry about sovereign risk” and seek premium returns, which government partners find hard to muster in order to nail down commitments. “Operators want assurance that agreements will be adhered to”—a high hurdle in places that have real or perceived political and regulatory issues.

Flush with cash, the **Middle East Gulf states** have the luxury to spend freely in order to diversify their energy-based economies into trading hubs. The sustainability of the huge asset bases being built remains an open question. And other regional players caught up in the Arab Spring face problematic outlooks for executing needed projects.

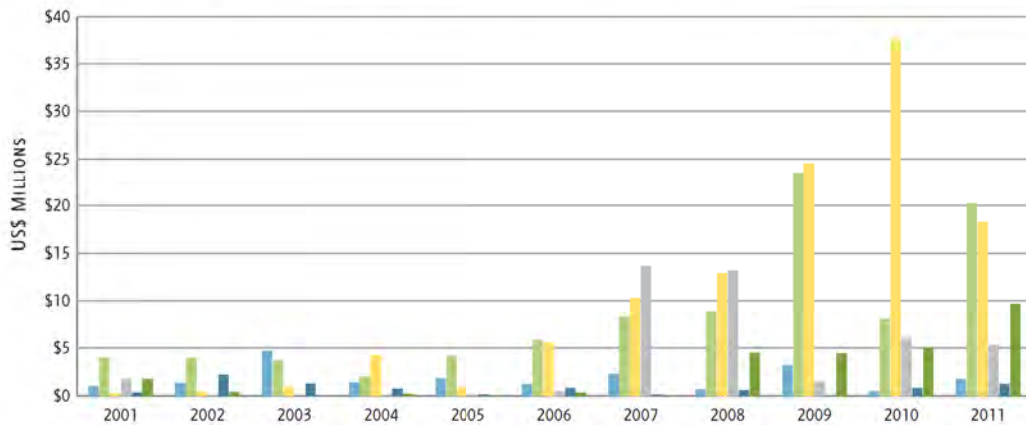
Public/Private Partnerships for Infrastructure in Six Emerging Markets

All Countries Are Active in Transportation PPPs; India and Brazil Show Growing Use
Total Value of Transportation Investments with Private Sector Involvement



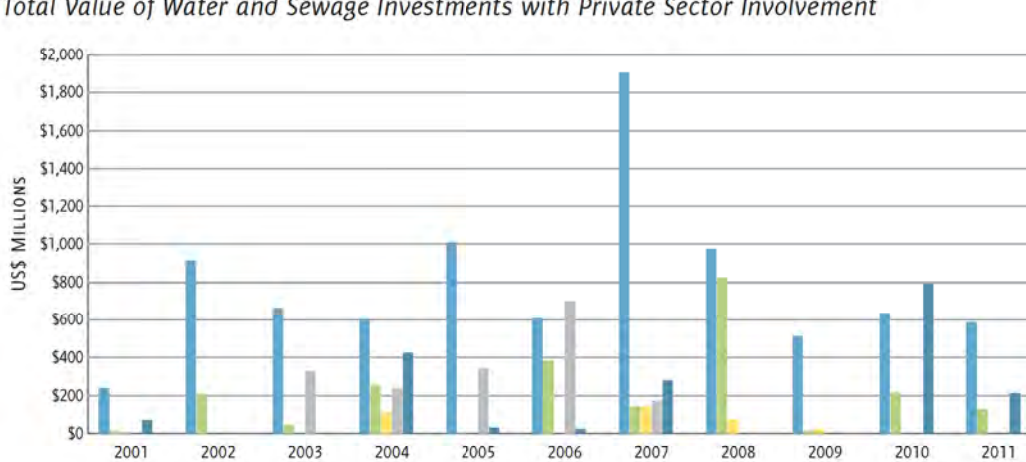
Source: World Bank Group, Private Participation in Infrastructure Database, 2013.

India and Brazil Lead PPPs for Energy; China Hosts Little Activity
Total Value of Energy Investments with Private Sector Involvement



Source: World Bank Group, Private Participation in Infrastructure Database, 2013.

China, Brazil, and Mexico Show the Most Investment in Water; India Has Little; Turkey Hosts None
Total Value of Water and Sewage Investments with Private Sector Involvement



Source: World Bank Group, Private Participation in Infrastructure Database, 2013.

Constrained by Austerity

Over the past two decades, Europe has made significant strides in building out motorways and laying track for impressive high-speed passenger rail systems, as the European Union prioritized connectivity projects and funneled funds into poorer eastern countries to boost their prospects. Now, the unsettling aftershocks of the European credit debacle have short-circuited many initiatives, as countries rein in spending and deal with paying down debt.

In the **United Kingdom**, public support for infrastructure grows behind a national plan. The government sets an ambitious agenda to advance railroad, airport, and energy agendas, but finding enough money stands in the way of full execution. Reassessments of prior transactions have led to a stronger public finance role in “private” undertakings.

Despite fiscal constraints, **France** continues to expand its high-speed rail system, improving connectivity across the country, and makes investments in roads and canals. The infrastructure picture in **Spain** is more troubling, with most major plans grinding to a halt, a spate of bankruptcy declarations in toll roads, and rethinking of subsidies provided for alternative energy.

Only **Germany** can afford to hold back on infrastructure investments. Sitting at Europe’s crossroads, the European mainstay’s modernized transport networks have benefited from steady investment in maintaining and improving new and expanded airports and ports.

Digging Deeper

In Asia, **Japan**—bogged down by 20 years of stagnation and debt—takes the opposite tack. The new government doubles down on more infrastructure stimulus to try to pump up the moribund economy and deal with the damage wrought by the tsunami.

A Slow Awakening

Due to fiscal constraints at the federal level and fractured jurisdiction over rail and other key infrastructure assets, the **United States** lacks a national infrastructure investment plan.

State, regional, and local agencies are filling the void, addressing mounting issues to stretch underfunded budgets for fix-it-first initiatives and find ways to build big-ticket projects like new roads, light-rail lines, transport terminals, and levees. Increasingly, public leaders at all levels are embracing PPPs while advocating various tax and user fee hikes.

Infrastructure in the United States Shows Slow Improvement

American Society of Civil Engineers 2013 Infrastructure Report Card

Infrastructure Sector	Grade	Trend*	
Aviation	D	—	
Bridges	C+	↑	
Dams	D	—	
Drinking Water	D	↑	A = Exceptional B = Good C = Mediocre D = Poor F = Failing
Energy	D+	—	
Hazardous Waste	D	—	
Inland Waterways	D-	—	
Levees	D-	—	
Ports	C	N/A**	
Public Parks and Recreation	C-	—	
Rail	C+	↑	
Roads	D	↑	
Schools	D	—	
Solid Waste	B-	↑	
Transit	D	—	
Wastewater	D	↑	

Source: American Society of Civil Engineers, 2013.
*Compared to 2009 Infrastructure Report Card.
**New category in 2013.

Incremental Progress

Australia and **Canada**, similarly sized countries (both in population and territory) with resource-based economies, managed to weather the global recession while developing and implementing modest national infrastructure plans using well-thought-out PPP procurement approaches to help finance projects.

Aging highway systems and urban congestion pose ongoing challenges, but both countries make progress in addressing their substantial needs, buoyed by relative fiscal calm.

Part

1

Asia Pacific

Construction workers build a railway bridge over the Yamuna River in India, where inefficient infrastructure hinders economic growth.



“Investment in transport infrastructure in China and India is continuing, even in the downturn.”

“We will see more intra-Asian investment, with greater engagement by Chinese, Japanese, [and] Korean investment entities working in other countries within the region.”

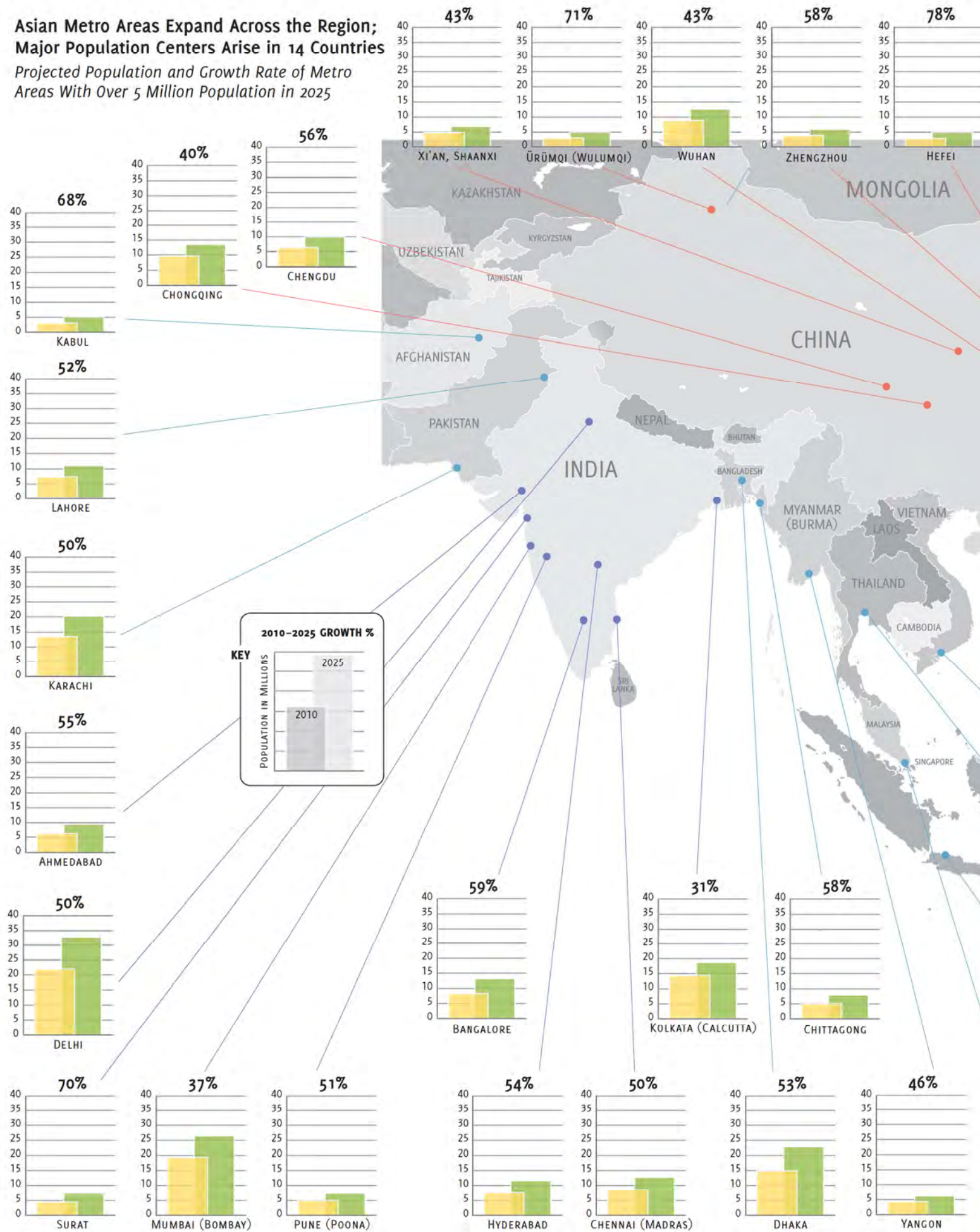
“The future will be in emerging markets, particularly Korea, Vietnam, Indonesia, and the Middle East [mainly Saudi Arabia and Qatar].”

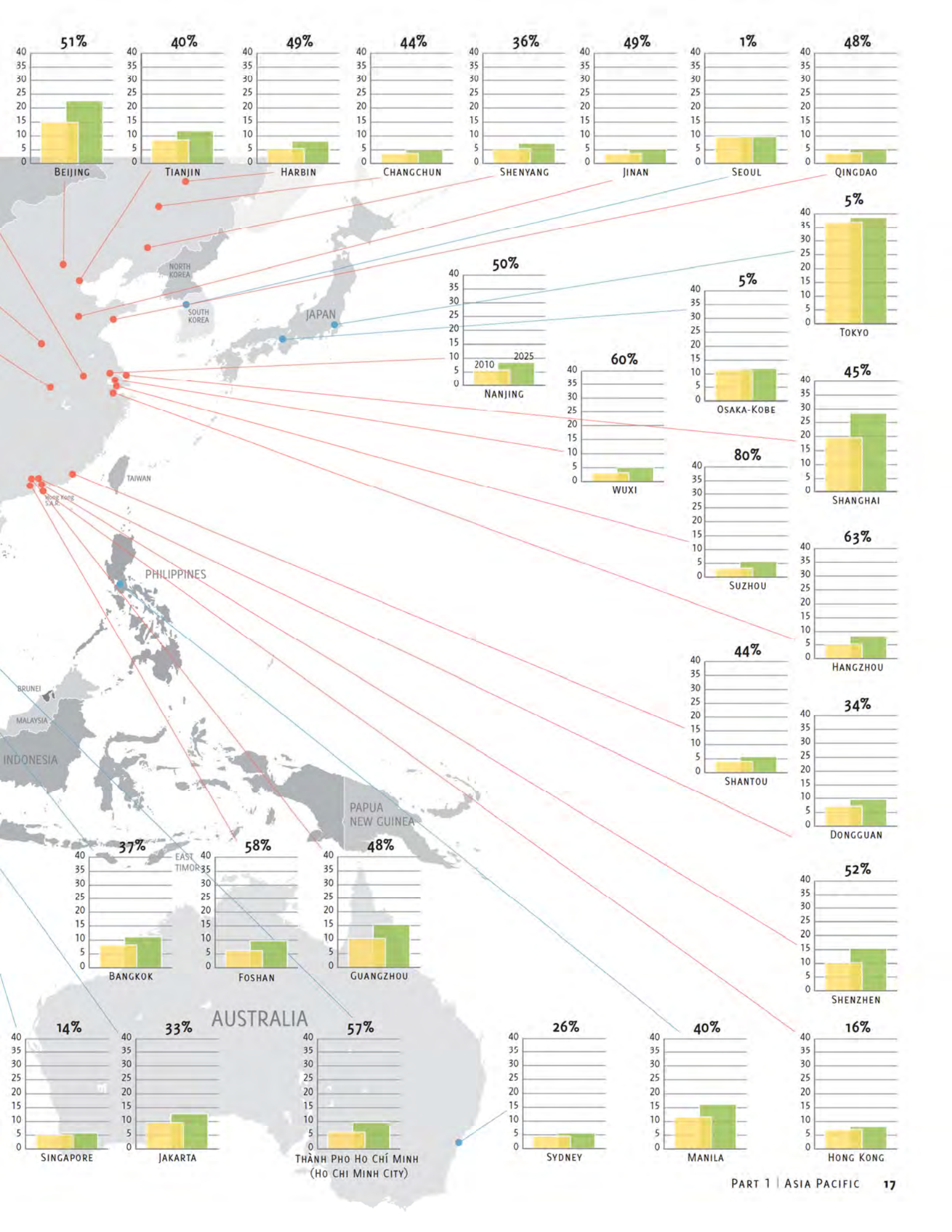
“Every city in India is building its own metro system.”

“The PPP project delivery framework of the future is alive and well in only one country—Singapore.”

Asian Metro Areas Expand Across the Region; Major Population Centers Arise in 14 Countries

Projected Population and Growth Rate of Metro Areas With Over 5 Million Population in 2025





Paced by China, many Asian nations continue to make infrastructure development a high priority, building out some of the most advanced and integrated systems in the world. From Tokyo to Beijing to Seoul and Singapore, efficient new international airport terminals connect by high-speed rail to center-city commercial districts and state-of-the-art mass transit lines link to residential neighborhoods.

Some observers question whether China has overextended itself by constructing far-flung intercity high-speed rail lines and expressways, while still lacking basic water and sewage treatment systems in many regions. But China's infrastructure push is not over, and continues both inside the country and outside of it.

India plays catch-up, needing more foreign investment not only to meet the demands of an exploding population, but also to realize the potential for expanding its manufacturing and service sector industries, which cope with daily power brownouts and transportation chaos. Indonesia faces similar emerging-market growing pains—remedying Jakarta's traffic gridlock takes on particular urgency.

Japan, a perennial leader in infrastructure innovation, is adding to its prodigious govern-

ment debt in rebuilding the region devastated by the 2011 earthquake and tsunami, and aims to use fiscal stimulus to jump-start an ailing economy. And Australia faces challenges more similar to those faced by Europe and North America in dealing with how to revamp once-advanced systems that no longer support its heavily export-dependent economy.

China

Rising labor costs and tepid demand from China's primary export markets slacken the "Middle Kingdom's" once-torrid economic growth track from a fairly consistent, government-reported 10 percent or more annually to under 8 percent at year-end 2012—still solid, but a 13-year low. In response, the central government of the Asian manufacturing behemoth returns to its familiar stimulus playbook,

Insights about the Asia Pacific Region from *Infrastructure 2013* Interviewees

Across the region, infrastructure is being affected by global forces.

Finances are a major source of worry in India, as international funding is limited.

We are now seeing significant investment from global infrastructure players into the Australian market.

The Eurozone and the U.S. economy are having an impact on the infrastructure sector in India. They directly affect the general economy, and also specific sectors such as railway freight. We are an integrated and globalized country—slowdowns in larger and more developed economies affect our exports and imports and growth rate.

Interviewees are concerned about water in China and India.

In China, water resources are scarce and the quality of the water is seriously affecting the living level of the entire nation.

In India, water will become a major issue in coming years. India is at a very early stage for municipal water and waste treatment.

In China, water-based projects—water treatment, access to potable water, droughts, and flood control—all deserve more attention and investment.

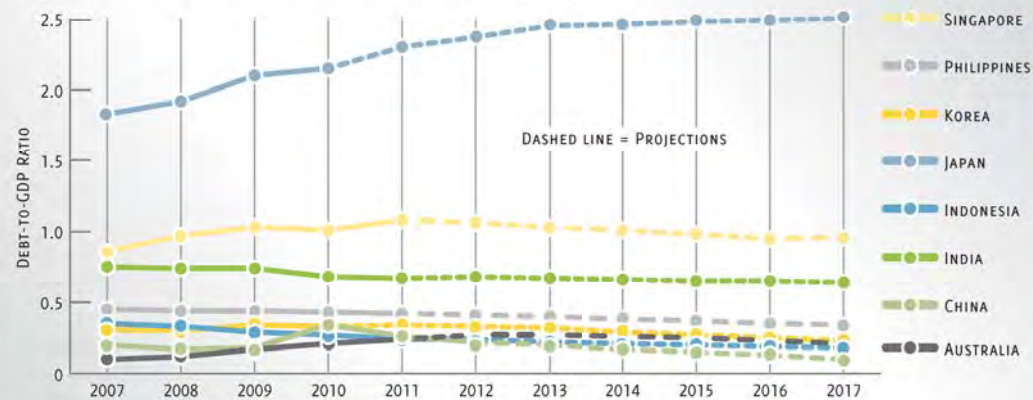
Energy and power are other key areas of need and investment in China and India.

In India, a demand/supply mismatch for energy, with demand in urban areas soaring and inadequate supply, caused in part by inadequate coal supplies, caused the grid to collapse, cutting power to 600 million people for two days. This event is spurring a call for privatized distribution.

The biggest issues for infrastructure delivery in India include fuel supply in the power sector, as well as environmental clearances.



Debt-to-GDP Ratios: Asia Pacific Region (2007–2017)



Source: International Monetary Fund, World Economic Outlook Database, October 2012.

fast-tracking 60 infrastructure projects with cumulative price tags of \$158 billion and signaling that more allocations may follow during the year.

In fact, infrastructure may be one of the country's key growth drivers in 2013, employing hundreds of thousands of laborers who might otherwise be out of work, supporting myriad manufacturers including steel companies and machine makers, and sustaining regional and

local governments in the expansion of various road, rail, and subway projects. As a result, "China will continue to outpace everywhere else" in infrastructure spending and building.

Indeed, over the past 20 years, trillions of dollars' worth of infrastructure investment has transformed China into an exemplar of modern urban transit, expansive highways, vanguard high-speed intercity rail, and highly efficient ocean ports. Late in 2012, the longest high-

Power is and will remain the major sector for investment in India, accounting for one-third of total investment. Major investments in renewables are included in the latest five-year plan.

Clean energy will claim the lion's share of infrastructure investment in China in the future.

Australian infrastructure is challenged by construction costs and planning issues, and approaches are evolving.

In Australia, a major issue is the cost of delivering infrastructure.

In Australia, we are starting to see less focus on politically friendly projects and much greater focus on project selection and prioritization of projects in accordance with proper economic investment guidelines and objectives.

Privatizations and user charging are the two key solutions that we are looking at in Australia.

We are certainly seeing that we have a much better resourced and informed government sector, which has hired private sector expertise, has created greater policy harmonization across the country, and is sharing knowledge and experience much more freely.

Countries in the region are paying attention to the impacts of urbanization and climate change.

Future infrastructure investment in China needs to be more sustainable, more low-carbon, and more efficient, with higher quality and lower pollution.

With regard to climate change, in Australia we certainly see that it has spurred the emergence of new projects such as desalination and wind farms. However, weather delays here have also played a significant role in cost and time overruns on major projects, which have led to substantial losses being incurred!

Land acquisition and eminent domain are major concerns in India, with population pressures leading to an emphasis on projects that use less land.

The Aizhai Suspension Bridge in China's Hunan Province has significantly reduced travel time between the cities of Changsha and Chongqing. (©Associated Press / Jiao Zi - Imaginechina)



China Opened the World's Longest High-Speed Rail Line from Beijing to Guangzhou in December 2012

Passengers Travel 1,200 Miles in about Eight Hours



speed rail route in the world—covering 1,200 miles in an eight-hour ride—opened between Beijing and Guangzhou. The country's "clustering strategy"—building factories near terminals served by major transport lines—has proved "hard to beat" for many industries.

Despite the breakneck pace of construction, many major Chinese cities still lack adequate housing, with China's evolving housing policy struggling to keep pace with demand and cool pricing in the real estate market. This has led to an undersupply of affordably priced housing units in urban markets. Agricultural logistics chains have also proved inadequate in many rural areas. According to McKinsey, China has only 452 airports with paved runways compared with more than 5,000 in the United States and 700 in Brazil, its smaller competitor. Also, the country does not have a unified electrical grid.

Credit Concerns

Government leaders are pushing to complete more projects to maintain the world's second-largest economy and satisfy expectations of an increasingly consumer-oriented population, which will live primarily in urban areas—forecasts indicate that by 2025 China will have 200 cities with populations exceeding 1 million. But this ongoing infrastructure boom remains mostly credit-fueled, adding to the country's debt load and heightening worries about whether municipalities and regional governments—not to mention the central treasury—could become "overextended."

The credit risk may be exacerbated by Chinese banks' underwriting standards, which are seen as less stringent than those used in international practice. Interviewees based in the region suggest that Chinese financial institutions are "relationship driven," while

A high-speed train speeds by a cluster of residential apartment buildings in Shanghai, China.

(©Associated Press / Xu Hede - Imaginechina)



other bankers appear more stringent—“looking at projected revenue streams, insurance, and proper credit.” For Chinese projects, “there’s also a sense that the debt burdens are greater than the revenues from toll roads, power stations, and train lines,” but it is hard to tell given limited and often inscrutable government information.

These concerns mount just as some neighbors, including Vietnam and Indonesia, begin to compete against China at cheaper manufacturing price points, and even U.S. factories regain some favor due to a combination of lower energy and shipping bills. How long can China maintain its infrastructure spending spree in the face of debt burdens and competitive realities?

Big Goals

Quality-control issues and fast-paced construction have also resulted in several notable examples of construction issues and system failures, including a handful of high-speed rail and subway crashes. With nearly 6,000 miles of high-speed lines beginning operation in just the last five years, “quantity over quality has some consequences, but this is part of their learning process. When you do so much so

fast, there will be bigger issues, but overall, good results have pushed growth.” A longer-term sustainability issue will be how well the challenges of ongoing operations, maintenance, and capital asset renewal will be met for the rapidly expanding infrastructure base.

Among China’s latest high-profile projects:

- **Shanghai commercial and transportation hub.** The Hongqiao Transport Hub, a massive shopping mall and commercial entertainment center connected to major transportation links, will serve a staggering 75 million people within its high-speed rail lines’ catchment zone.
- **Asian rail connections.** A web of new rail lines is taking shape to connect with neighbors—Thailand, Myanmar, Vietnam, Laos, and Cambodia. The lines are designed to extend China’s regional economic clout and provide additional access points for trade, particularly from nearby ports.
- **Western train connections.** A 107-mile rail track construction program is proceeding across three provinces in western China.
- **Urban transit expansions.** Twenty-seven subway-building programs are proceeding, including expansions of transit systems in Guangzhou and Shanghai.



A crowd of passengers waits for a train at a subway station in Beijing, China, during the National Day holiday. Many Chinese cities, including Beijing, are expanding transit capacity to accommodate surging urban populations. (©Associated Press / Xiang Ryc - Imaginechina)

- **Airports.** Construction is advancing on 82 new airports and the refurbishment of 100 others by 2015.
- **Rural highways.** Expansion of rural road networks is continuing to connect all cities with populations exceeding 200,000, bringing the country's total highway network to nearly 2 million miles by 2020.

China continues to struggle with industrial- and car-related air pollution, as well as a lack of potable water caused in part by inadequate sewage treatment and runoff of factory- and agriculture-related contaminants. Recent droughts and stepped-up industrial demand are further straining water supplies in many areas. Political pressure to address these issues will build, requiring greater investment in water treatment facilities, strategies for dealing with vehicle congestion, and altering dependence on dirty carbon fuels like coal and oil. China may be fertile territory for employing hydro-fracturing technologies to secure natural gas reservoirs, and the country is becoming a world leader in wind power.

Foreign infrastructure companies continue to face high barriers to entry, often participating only when domestic players lack expertise

as minority partners with Chinese state-owned enterprises. Power- and water-related projects offer the most favorable opportunities, but many offshore companies are growing wary of the lack of transparency, and voice concerns about Chinese partners appropriating their proprietary business practices and technologies.

Japan

In a familiar gambit for Japan, the country's new conservative Liberal Democratic government is looking to public works spending to jump-start the economy, which has stagnated for more than two decades.

An "enormous" \$215 billion stimulus package will focus on creating jobs and reviving the tsunami-ravaged Fukushima region, which lies northeast of Tokyo. Thanks to an ongoing stream of generous government allocations, Japan already features some of the world's most advanced, state-of-the-art transportation infrastructure including integrated high-speed rail, subways, and airports.

But infrastructure spending to fund corporate enterprise and keep people working has created overcapacity in some regions, as the country's population ages dramatically and promises to shrink over the next generation.



Japan has made significant investments in trains and other urban infrastructure.

At the same time, population concentrations in Tokyo and a handful of other major cities worsen congestion, requiring new ring roads and upgrading of aging overpasses, bridges, and tunnels.

Public debt now equals more than two times national output, and Japan ranked as the world's most indebted major economy even before this new round of spending. Unquestionably, past highway projects—many of which offered limited mobility benefits—have contributed to these ballooning credit problems.

Substantial public deficits likely will force the government to privatize more infrastructure assets to cover costs and deal with debt-service burdens. The two airports serving Osaka are looking to raise as much as \$15 billion from a private operator to manage the facilities over the next 40 to 50 years. If a deal can be reached in Osaka, other airport privatizations may follow and serve as models for PPPs on other infrastructure franchises, including a project for underground tunnels to replace elevated expressways in Tokyo.

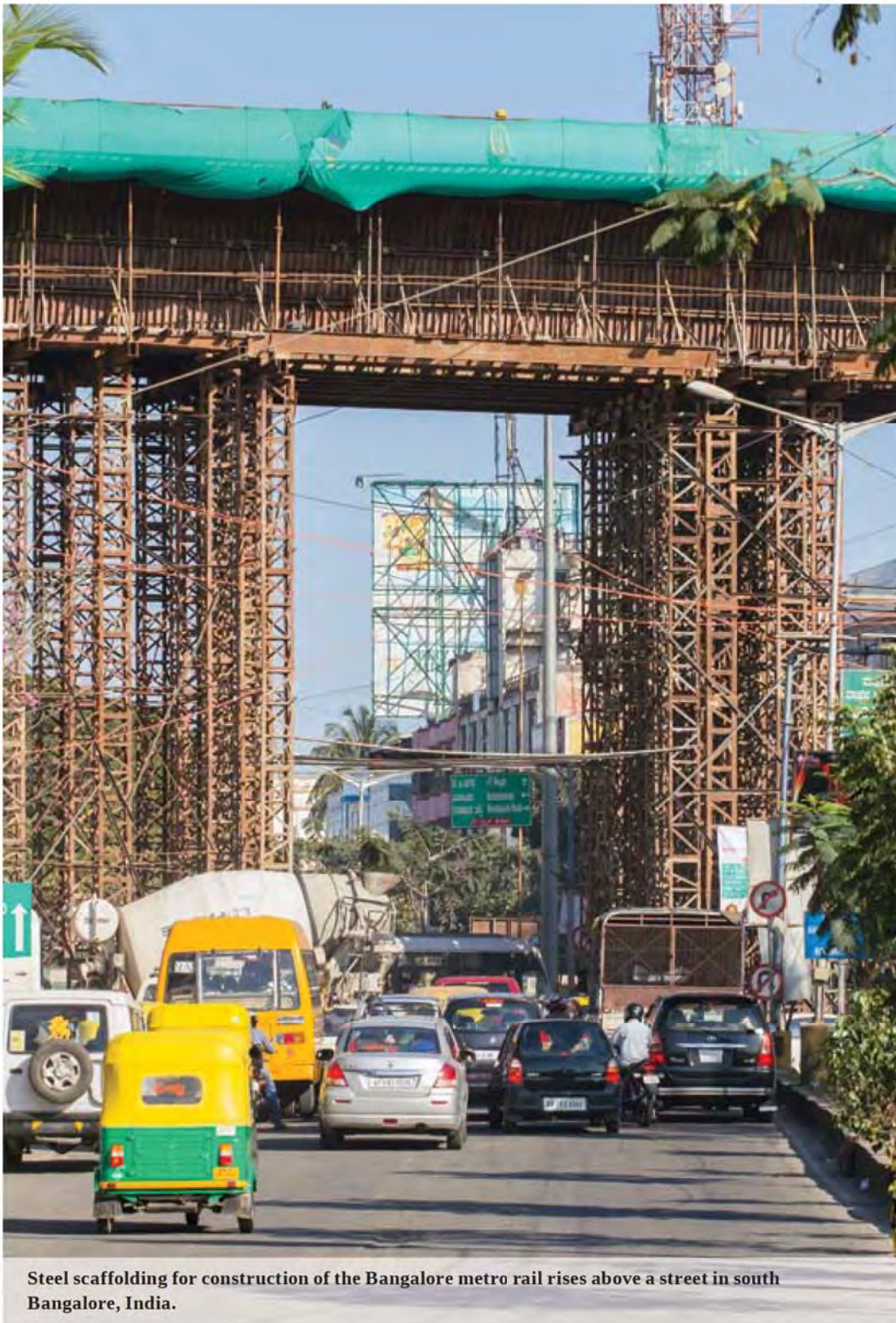
Japan's dependence on foreign oil, coupled with growing antinuclear sentiment following the Fukushima reactor accidents, places new

urgency on finding renewable-energy alternatives. The Japan Renewable Energy Foundation is working toward creating a high-voltage supergrid to supply not only Japan, but also other Asian countries. Its first project is a 300-MW wind farm in Mongolia's Gobi Desert set to become operational next year. Japan is also putting a lot of resources into tapping deep-water natural gas resources.

India

In India, "indisputable need" and "significant potential" collide with inefficiency, corruption, and unbridled population growth and urbanization.

For all its high-profile infrastructure projects in recent years—a national highway system connecting its four largest cities; modern airports; subways in New Delhi, Bangalore, and soon Mumbai as well as Hyderabad; and a score of major power projects—the country chronically struggles to meet the needs of an economy that has been growing at a heady 7 percent annual clip. In fact, analysts suggest that infrastructure bottlenecks prune gross domestic product (GDP) by at least 2 percent annually.



Steel scaffolding for construction of the Bangalore metro rail rises above a street in south Bangalore, India.

Major Needs

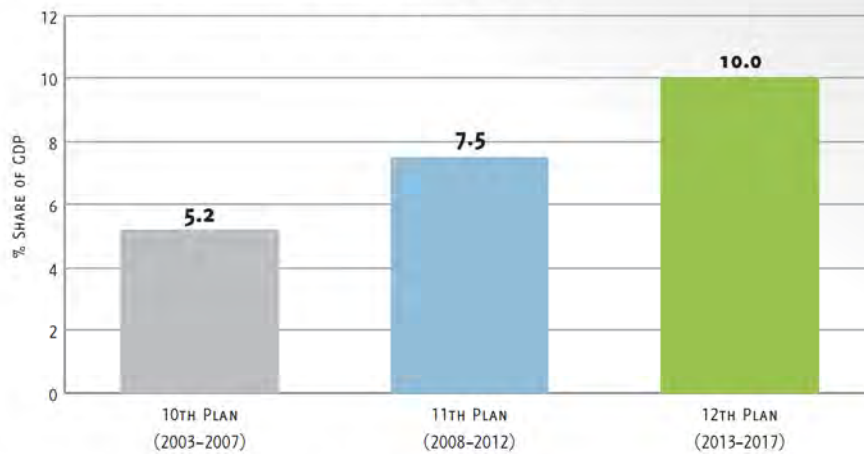
New Delhi alone is adding 1,400 new cars a day on road systems unable to handle current volumes, while the city's ten-year-old, world-class underground approaches overcapacity.

Factories across the country endure almost-daily power outages—backup generators are a business necessity in a land where a summer 2012 blackout put 700 million people in the dark after a demand spike shorted three antiquated power grids. Rutted roads lead to new

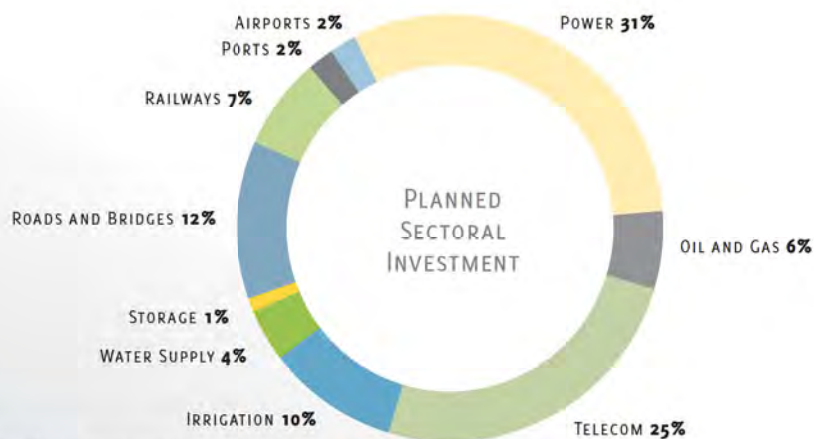
India Plans to Increase Investment in Infrastructure

Energy and Telecom Lead the Way

Infrastructure Investment in India as a Share of GDP



Sectoral Investment Planned in 12th Five-Year Plan



Source: Ernst & Young, India Infrastructure Summit, 2012.

office complexes and residential developments without water lines or power connections, while oversaturated rail lines clog shipments of commodities and produce moving between rural areas, ports, and population centers.

Among its biggest challenges, India needs to build expansive new urban areas with adequate municipal services. Tens of millions of people are moving from the countryside into informal settlements in cities every year, as they look for work and a path out of poverty. By 2030, about 40 percent of the country's population—close to 600 million people—will be living in cities, according to estimates.

The cost to build out roads, transit systems, power grids, and water/sewage treatment

lines to manage massive population requirements and limit squalor will be significant. "In order to catch up—and then stay ahead of the curve—we need a long-term plan and vision to work on all issues in a comprehensive way, bringing together all public and private stakeholders," says an interviewee. "That's not happening yet, but it's working better than it used to."

Private Involvement

Against undeniable headwinds, including "a rambunctious" multiparty democratic political tradition that discourages top-down federal imposition (in contrast to China's approach), the government of India is implementing a

next-phase, five-year, \$1 trillion infrastructure investment plan targeted at overcoming deficiencies and buttressing continued economic advances. The policy counts on expanding the PPP concession model used to build new roads and significant new investment from the private sector to upwards of 50 percent of the cost, including an infusion from offshore players.

But foreign infrastructure funds are finding it hard to break through in a system where “a handful of domestic conglomerates control the economy.” Policy risk, meanwhile, raises particular hurdles and creates uncertainty, hamstringing private initiative—various agencies and authorities vie with state and federal ministries for control in counterproductive turf battles. “Land rights, eminent domain, and an every-man-is-an-island” approach to obtaining government approvals “can tie things up for years.” About 42 percent of a total 564 infrastructure projects have been delayed, and the average PPP initiative takes about five years to gain approval.

Since 2007, private companies have pumped about \$225 billion into India infrastructure projects, with sometimes “disappointing” results. For example, some publicly listed domestic infrastructure firms have experienced severe share-price declines and banks confront a bevy of workouts. According to the *Economist*, Chennai’s new airport terminal, Delhi’s smart airport, an express-rail link in Delhi, and one of the nation’s biggest power plant constructions in the northwest of India have all generated unwelcome red ink for private interests. Bureaucratic snafus, poorly structured contracts, and overbidding based on unrealistic revenues and expenses have all contributed to these disappointments.

As part of a recent push to overcome hurdles and doubts from foreign capital, the government enacted economic reforms late in 2012 to make it easier for offshore players to operate and invest, and some interviewees find the new policy landscape more enticing, with potentially less red tape. Implementing transactional safeguards and appropriately

calculating “a [higher] risk profile for PPPs in India,” investors need to intelligently weigh the rewards of working in an economy that “will grow at multiples of any Western country” and has a more familiar system of law, against “everything taking a long time,” with reliable, local partners needed to have any chance at success.

Priorities

High-profile projects in India include the following:

- **New roads.** The country is constructing 20,000 kilometers of new and upgraded roads over the next five years.
- **Industrial corridor between Mumbai and Delhi.** The creation of an ambitious industrial corridor between Mumbai and Delhi, financed in conjunction with Japanese companies, will develop as many as six new cities in a multidecade undertaking. Initial projects include power and desalinization plants and a dedicated freight-rail line.
- **Mumbai investments.** In Mumbai, an elevated freight-rail corridor, a new airport, and a trans-harbor link are in the works.
- **Rapid transport connecting to Delhi.** Two rapid-transit corridors are being built to improve travel between neighboring states and Delhi.
- **Transport.** Construction of 120 bridges and the completion of other road improvements will help connect rural areas to Chennai, the capital of the southern state of Tamil Nadu, where a subway system is scheduled to open by 2015.
- **Energy.** Investments worth \$250 billion in electric plants and power grids are being made throughout the power-starved country.

Australia

Like most developed countries, Australia is coping with the costs and inevitable political hurdles inherent in enhancing and reworking its aging infrastructure, which is straining to meet expanding 21st-century industrial and demographic demands.

Unremitting traffic snarls in major cities like Sydney, Melbourne, and Brisbane and various port bottlenecks threaten to sap productivity, and inadequate transit systems add to the strain. Ensuring water for a growing population in a notoriously water-scarce continent raises increasing challenges. In addressing climate change concerns, the government appears determined to push utilities away from reliance on coal-based power plants to cleaner fuels, primarily natural gas.

Even with the past 20 years of strong economic gains and low unemployment, supported by an export-oriented mining boom, the country must confront the large gap between available government funds and costly infrastructure needs. A recent slowdown, linked to weaker growth in China, may make government spending on infrastructure more difficult—especially at the state level, where Queensland and New South Wales in particular suffer from large deficits.

National Priority

To its credit, the federal government has taken the initiative over the last half-decade to prioritize needs through the Infrastructure Australia authority, fund a \$37 billion (\$A36 billion) National Building plan, and marshal private financing through the Infrastructure Partnerships Australia program. As a result of this national commitment and a history of innovation in project finance, interviewees say that “Australia is one of the best countries for undertaking PPPs,” having fashioned an “accepted model” and attained “a comfort level” in working between the public and private sectors.

Since 2007, federal infrastructure spending per capita has increased from \$145 (A\$141) to \$277 (A\$269), and the country’s privately managed superannuation (pension) funds have allocated between 5 and 10 percent of total assets into infrastructure investments—well above the levels of pension plan sponsors in other countries, which range from under 2 percent in the Eurozone to below 1 percent in the United States. However, these invest-

ments have not targeted domestic infrastructure. Unlocking this funding pool remains one of Australia’s biggest challenges—and opportunities.

Infrastructure Australia also has identified \$206 billion (A\$200 billion) in government assets—ports, airports, rail terminals, and power and water utilities—that can be privatized to help fund infrastructure shortfalls, reduce debt, and improve operational productivity. So far, 124 projects, totaling more than \$62 billion (A\$60 billion), have been contracted through PPPs. For example, a recent decision to lease two ports—Botany and Kembla—to private operators should improve efficiency in moving container shipments through the facilities.

Over the near term, high-priority national transport initiatives focus on augmenting connectivity between major cities and ports, concentrating freight on railways, relieving intracity congestion, and reducing greenhouse gas emissions.

High-profile projects include:

- **Highways.** Dual-carriage highways linking Brisbane, Sydney, and Melbourne are being built.
- **Rail improvements.** Investments include rebuilding and modernizing a third of the national freight-rail network to help reduce truck traffic, and constructing an underground rail line through Brisbane. The country’s longest and deepest rail tunnels are being bored near Sydney.
- **Investments in Melbourne.** Intracity road chokepoints are being addressed in Melbourne, and the city’s metro capacity is also being increased.
- **Sydney airport.** Planning for a second airport to handle expected increases in jet traffic into Sydney’s global gateway is continuing.

Indonesia

Indonesia’s burgeoning middle class and expanding economy—now Southeast Asia’s largest—lead the government to address obvious infrastructure shortcomings to sustain growth.

Towering cranes at the Brani Terminal in Singapore help make the city-state home to the most productive ports in the world.



Clogged roads and bottlenecks plague Jakarta's roadways. Like other local governments in emerging markets, Jakarta relies on less-capital-intensive bus rapid transit solutions (which cost about \$4 million per kilometer to build) to help relieve congestion as alternatives to expensive light rail or subways (which cost about \$50 million per kilometer). An attempt to build a monorail system was aborted five years ago, leaving rusting base supports in its wake. Since 2004, the city has built 11 bus rapid transit lines, which now move 350,000 riders daily—still a small fraction of the 20 million who live in its environs.

The country wants to finance as much as \$250 billion in new roads, ports, railways, and power plants over the next five years, and the central government plans to increase infrastructure spending by as much as 15 percent in 2013. Opportunities, meanwhile, have been attracting PPP investors from Japan, India, South Korea, and the United States, looking at power, water, and rail projects.

Other Countries in the Asia Pacific Region

A regulatory framework is taking shape in the **Philippines** to finance badly needed infrastructure improvements through PPP structures that can attract offshore partners.

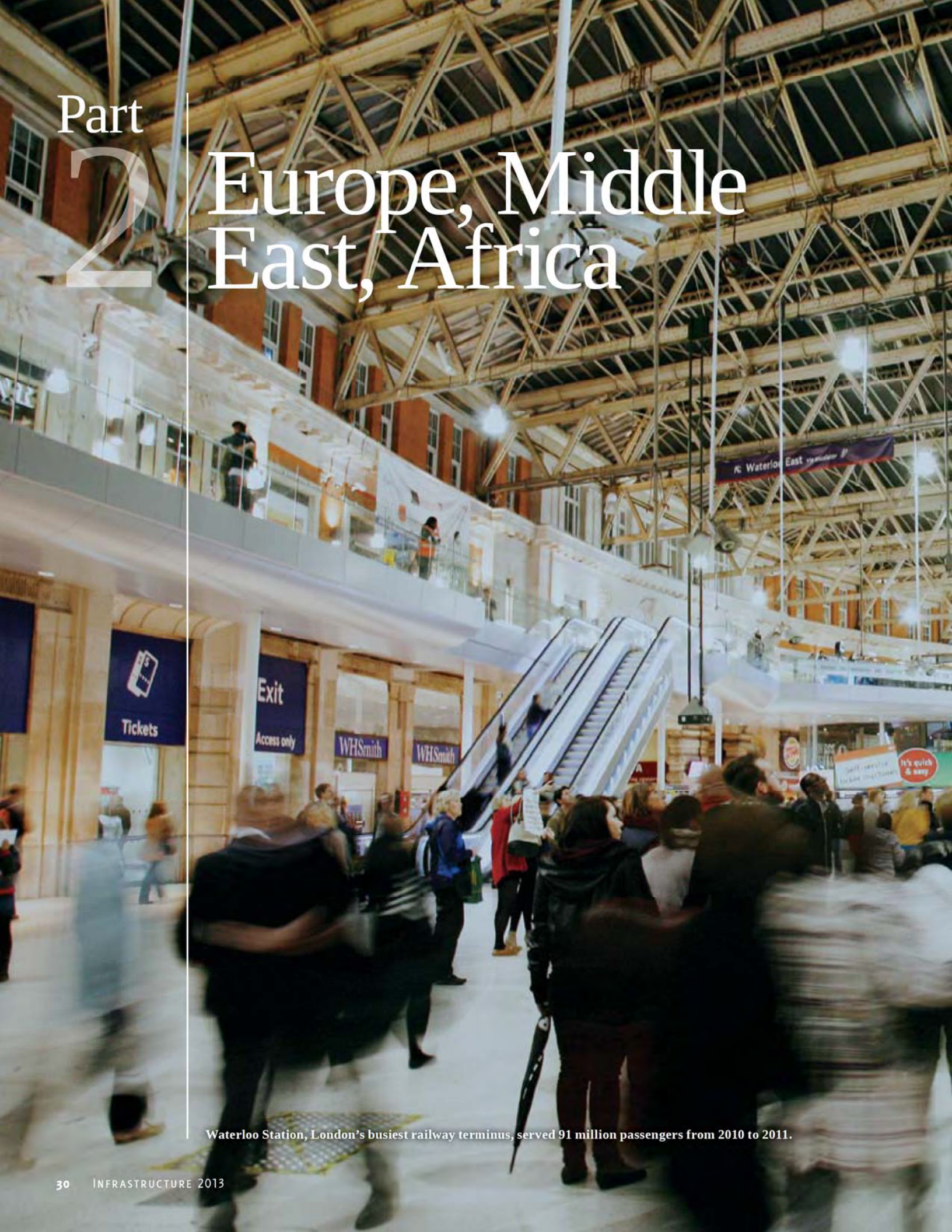
Bankrolled by domestic institutions, companies in **South Korea** are exporting their skill sets “in road building, power, and civil engineering” to regional neighbors.

Singapore boasts some of the world's most advanced ports and airport facilities. The government has adopted the classic British PPP structure for long-term management agreements on hospitals, schools, and other social infrastructure, including a sports/entertainment development that comprises a stadium and arena.


Part

2

Europe, Middle East, Africa



Waterloo Station, London's busiest railway terminus, served 91 million passengers from 2010 to 2011.



“In the specific case of Spain, the crisis is burning down all investment plans that the government may have.”

“High national debts and the difficult political situation in some European countries are affecting infrastructure investment.”

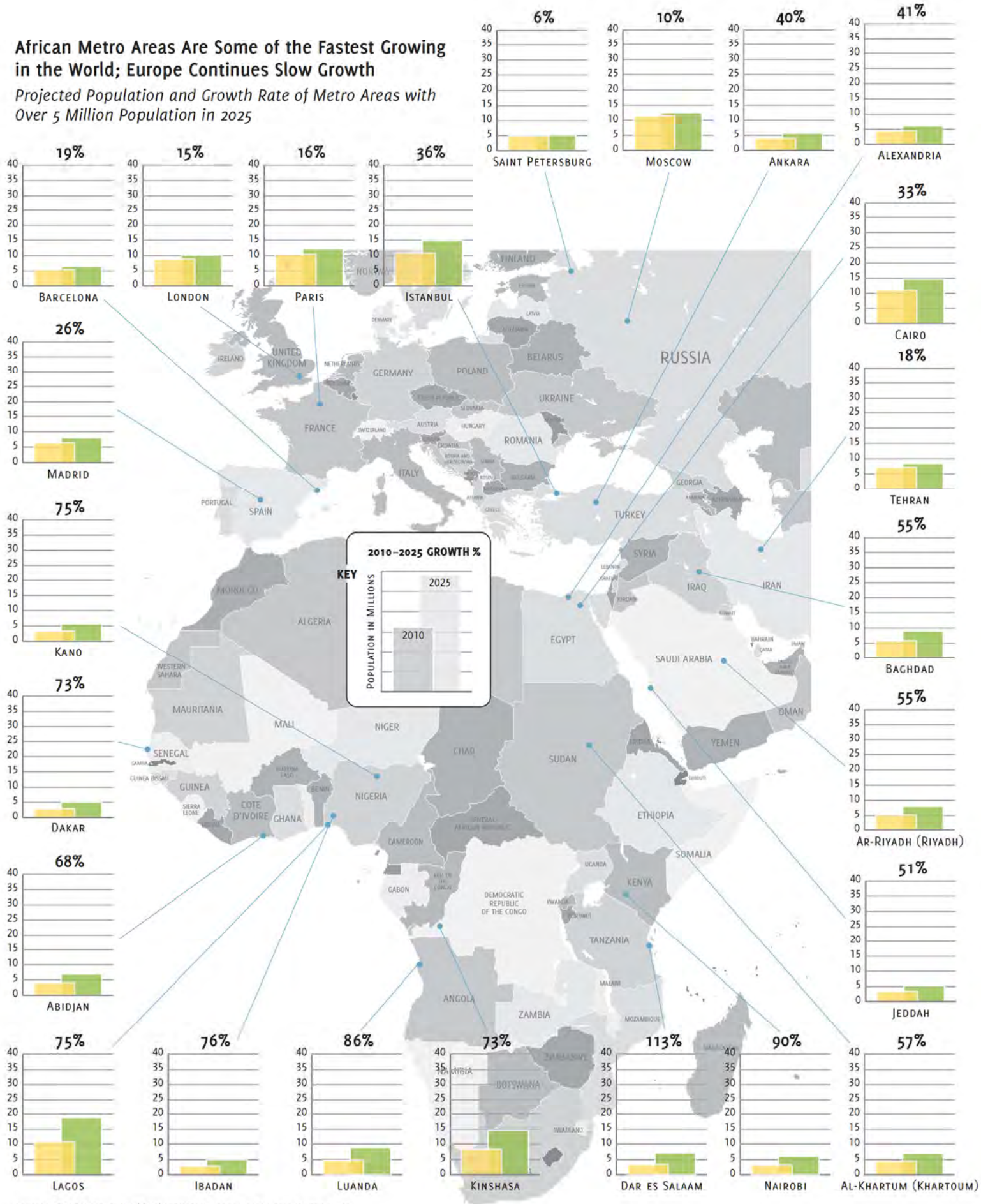
“Climate change is not taken into account enough in infrastructure development. There is still a long way to walk until governments make climate change a priority in their programs.”

“Despite the U.K. government drafting a National Infrastructure Plan, very little in the way of implementation has been achieved.”

“We are seeing investments in city centers that encourage jobs. Examples include Liverpool and Copenhagen, with their green and smart city agendas and low-carbon emphasis.”

African Metro Areas Are Some of the Fastest Growing in the World; Europe Continues Slow Growth

Projected Population and Growth Rate of Metro Areas with Over 5 Million Population in 2025



Source: United Nations, *World Urbanization Prospects: The 2011 Revision*, 2012.

Momentum behind infrastructure funding has dissipated in most European countries—at least for the time being—as the region copes with severe government debt problems by slashing budgets and postponing many infrastructure projects.

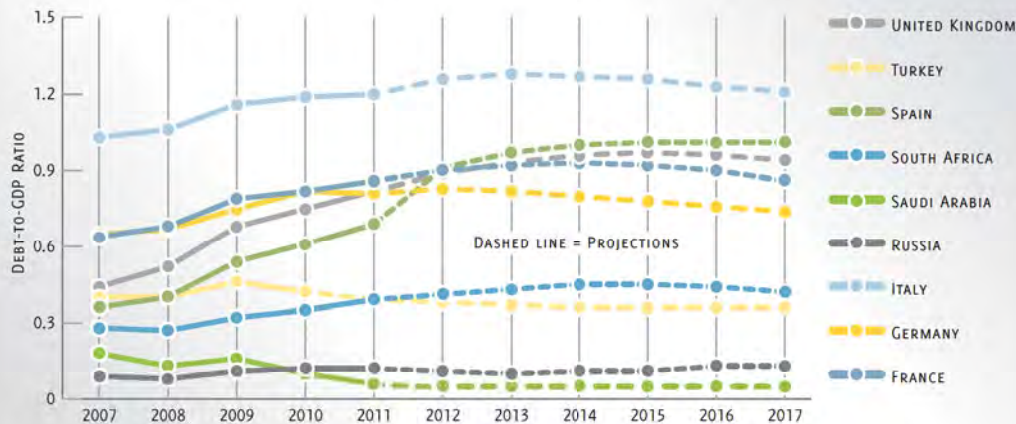
The EU is continuing to fund its program aimed at connecting member states through freight-rail, high-speed passenger rail, motorway, canal, and port terminal projects. Unlike the United States and most Asian nations, the EU stipulates that transport initiatives address energy efficiency and climate change despite potentially higher costs. Renewable energy and broadband communications capability also remain high priorities.

But it may be difficult to deliver on upfront financing to meet the \$1.9 trillion (€1.5 trillion)

investment goals through 2020. As a barometer of current activity, “the size of the market has really shrunk” for concessions and PPP deals, says an interviewee. “It’s maybe 50 percent of what it was.”

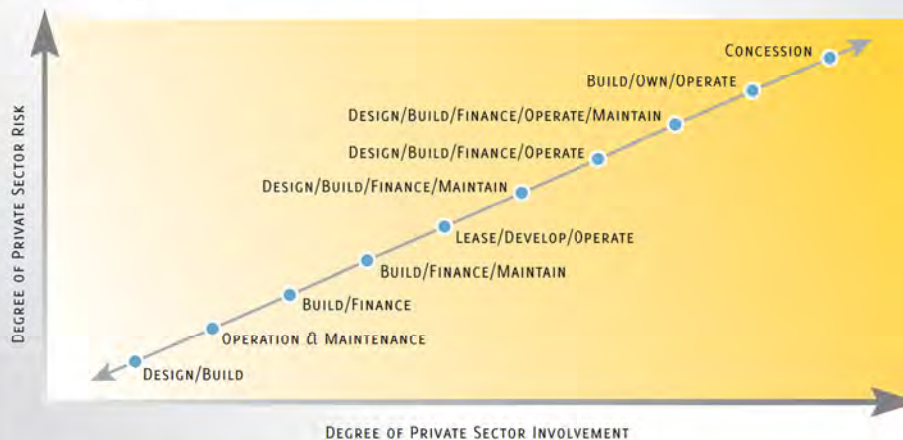
Players hope that “austerity runs its course and government balance sheets are addressed, but people need to get back to work” for conditions to generate enough tax revenues to support infrastructure spending.

Debt-to-GDP Ratios: Europe, Africa, and the Middle East (2007–2017)



Source: International Monetary Fund, World Economic Outlook Database, October 2012.

PPP Models Vary According to Degree of Private Sector Involvement and Risk Transfer



Source: Ernst & Young LLP.

Insights about Europe, the Middle East, and Africa from *Infrastructure 2013* Interviewees

PPPs are a critical part of the infrastructure puzzle, but innovative models and approaches are needed.

A key trend is the chance for governments to refurbish or to build new infrastructure with third-party investments or PPPs.

There is a need for innovative financing, and [for] setting up capital funds to take equity in projects and financing projects where there is a clear potential for a positive return on investment.

New financing models must be designed, and they must reach more regions. New grant structures and more capital market financing must be used so development can be accelerated through PPPs, with their advantages in terms of fast provision of investments.

Even with public/private partnerships, government plays an important role.

Getting funding without government guarantees or support is becoming very difficult.

A challenge is long approval processes that hinder investments or raise infrastructure investment costs.

There is a sense in the U.K. that German and French firms have been better supported by their respective governments. These firms appear to have better relationships with their governments, and get a better forward view of the investment pipeline, enabling them to make better long-term plans and investment decisions.

Interviewees from the U.K. vary in their views of the availability of private capital for infrastructure.

Direct infrastructure investment from private investors has slowed considerably, and this has had a negative impact on growth in the industry.

There is plenty of capital in the system, but investors want certainty that schemes will proceed and assurance that risks are manageable.

The main challenge facing the infrastructure industry is being able to raise capital upfront, which is a prerequisite to infrastructure projects commencing.

Pension funds are not proving to be the solution for the funding crisis because they don't like the uncertainties and risks around procurement and performance.

Spain's infrastructure investment has hit a wall.

In Spain, government spending on infrastructure has been dramatically cut. Few new projects are being introduced, and current works are being delayed.

In Spain, we are suffering from a lack of funding for the big PPP projects we are engaged with. There is just a handful of banks willing to be lenders, but they won't take on too much risk. Big projects are on standby or are being carried out slowly.

Where will funding come from?

The U.K. government has laid out big plans for infrastructure spending, with a particular focus on transport and power. But it is not clear where the money will come from.

United Kingdom

In the United Kingdom, infrastructure spending gains favor with the public—"once one of the first areas slashed in troubled times, it's now better protected." After the success of the 2012 Summer Olympics, the anticipation of London Crossrail, and the convenience of high-speed rail connections to Europe, voters have grown to view major public works expenditures "as a good way to fix the economy, create jobs, and inject capital into society," while adding to the "nation's strategic asset base."

In turn, the government has developed an extensive, top-down National Infrastructure Plan (NIP), which "lays out big plans—averaging more than \$44 billion [£30 billion] in out-

lays annually and has identified 550 projects totaling \$471 billion [£310 billion] to 2015 and beyond," with "a particular focus on transport and power." But how to fund the ambitious plan remains a concern.

High Speed Rail 2, a \$45 billion (£30 billion) project planned to zip riders from London to Scotland, would take pressure off increasingly congested motorways and constricted airspace around Heathrow, but remains in a "talk but no action" limbo. The \$36 billion (£24 billion) Crossrail, scheduled to open in 2018 and connect London's east and west suburbs by underground commuter trains through the center city, is the "only big project that has seen any action."

Housing—"the best way to drive economic growth"—sees "little activity," although hos-

There are opportunities for innovation, both in tariff mechanisms and in collection of fees for services provided to users. All of this follows a pay-for-use trend.

Across the region, an understanding of the need for resilience to climate change is growing.

There is much more public awareness and discussion regarding the risk and effects of flooding, and also about where better infrastructure can mitigate risks, and how we can reduce environmental impacts generally.

The energy sector is probably behind the curve on climate change adaptations, compared with the water industry, which has done much more work, such as putting in flood defenses.

Energy remains a work in progress.

The price of energy is still not high enough to drive economic behaviors. Much behavior around the green agenda is still politically driven.

A lot of work needs to be done to adapt to the low-carbon agenda in the U.K.—for example, moving from the grid to the smart grid.

The energy sector is being looked to for growth opportunities—in solar energy, nuclear energy, and liquefied natural gas importation and exportation.

European cities are trying for catalytic infrastructure investments, but some are missing out.

The London Olympics brought a number of transport projects forward by ten years or more.

Urban areas in the U.K. demand the most focus because

that is where most people live. In particular, London deserves a disproportionate share if it is to be sustainable.

Across Europe, countries are making big investments in airports. For example, Berlin is consolidating its airport capacity to boost city competitiveness.

London needs more hub airport capability, as the United Kingdom is a highly aviation-dependent economy. Aviation capacity remains a major issue.

Investment in third-tier cities, where infrastructure is necessary to facilitate development, is problematic.

The United Kingdom faces a critical infrastructure skills gap.

The U.K. has lost all of its manufacturing capability in infrastructure-related industries. Letting this happen was a poor decision—this was an important source of jobs and was exportable.

Successive U.K. governments have presided over a decline in capability and skills.

There is a skills issue for the whole sector in the United Kingdom. Skilled workers can take years to train.

Technology and connectivity are key parts of the modern infrastructure story.

Tenants and shoppers now expect information and connectivity always, everywhere.

U.K. transit passengers are becoming savvy, particularly in their use of technology. Transit systems anticipate that more transactions will soon be made by mobile technology than by desktop internet.

pitals and schools will receive funding from members of parliament eager to meet local constituent needs. Many decisions about power strategies are getting caught up in debates about choices between nuclear, gas, and wind generation, although parliament pushes a long-term \$152 billion (£100 billion) energy plan to protect the economy and reduce carbon emissions.

Public/Private Partnerships

Since the public purse is constrained, initiatives increasingly must rely on private capital sources to move ahead. But a parliamentary review of the PPP program, the Private Finance Initiative, now called PF2, “has caused a big pause to many projects.”

Complicating matters, government reluctance to provide guarantees on greenfield initiatives “adds uncertainty and makes attracting funders more difficult.” Risk-averse pension funds in particular “are not coming to the table as hoped.”

Many of the PF2 reforms “make sense” to control costs and emphasize life-cycle maintenance where each stage of development, construction, and operation is coordinated and handled by the most appropriate party (whether government or private sector), with “zero tolerance” for overruns in budgets and missed schedules. “The success of the Olympics demonstrated the skills and capability in the U.K. when the conditions are right and red-tape barriers are removed,” but “the tension

London's Olympic Park helped transform a formerly dilapidated area into a new city district. New commercial, recreational, and housing development will be connected to greater London through transit built for the 2012 Summer Olympic Games.



between localism [planning prerogatives] and central control [bureaucratic overreach] has not been resolved.”

Interviewees also lament the U.K.’s loss of manufacturing capacity, engineering skill sets, and jobs in the rail sector (rolling stock, signaling, and other technology) as well as other industries supporting infrastructure development. “Greater emphasis needs to be placed on highlighting engineering and infrastructure as a career” to overcome the country’s expertise and experience gap.

In addition, the arm’s-length relationship between the government and infrastructure providers makes things more challenging. “German and French firms have better relationships with their governments, enabling them to make more informed long-term plans and investment decisions” in the procurement process, which can lead to innovation and lower costs.

Expectations are growing among policy makers that motorways may require privatizing to pay for new roads and maintenance, but few politicians expect the public to provide support for tolling schemes on the country’s mostly free highway network. A cheap but efficient way to expand lanes without widening roads is letting drivers use shoulders during rush hours.

Infrastructure Priorities

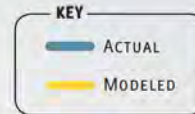
In recent moves, the government has implemented reforms to speed up various energy infrastructure plans, established a Green Investment Bank to help finance \$4.5 billion (£3 billion) in large-scale offshore wind and energy-from-waste projects; started construction on four new highways; committed \$14 billion (£9.4 billion) to invest in the country’s rail network through 2019 (“the biggest railway modernization since the Victorian era”); and accelerated the delivery of superfast broadband to ten “super-connected” cities.

“Wider acceptance of the importance of London to the U.K. economy” generates discussion about further expanding Heathrow and/or the city’s four other nearby airports to avoid potential airspace gridlock. Forecasts anticipate that greater London’s population will increase through 2020 by approximately 1 million people. Accommodating this growth from both offshore and domestic in-migration will necessitate augmenting transport systems and facilities—rail, roads, and mass transit—and providing additional housing.

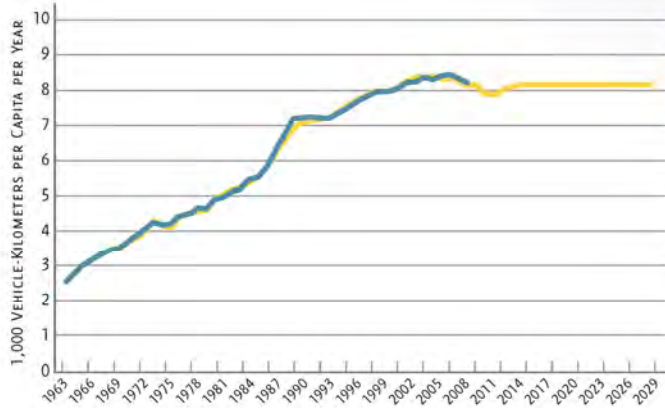
An immediate need may be building more bridges to access the city from east of the Tower Bridge. The ongoing transformation of

High-Income Countries around the World Are Hitting “Peak Car”

Projections Indicate Flat Growth for per-Capita Vehicle Travel



United Kingdom



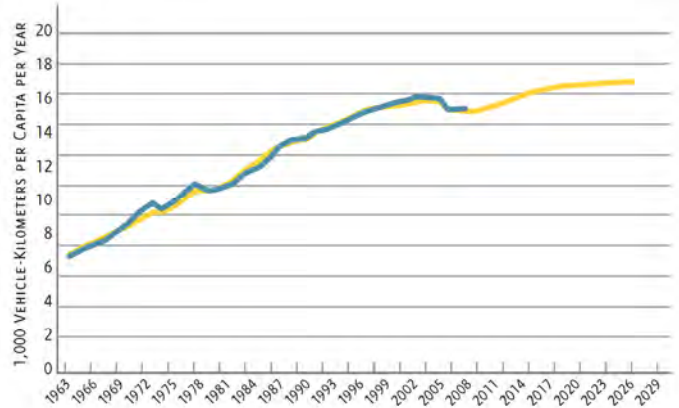
Australia



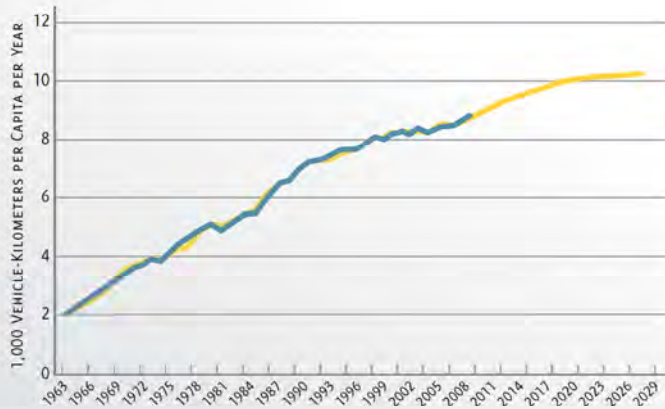
France



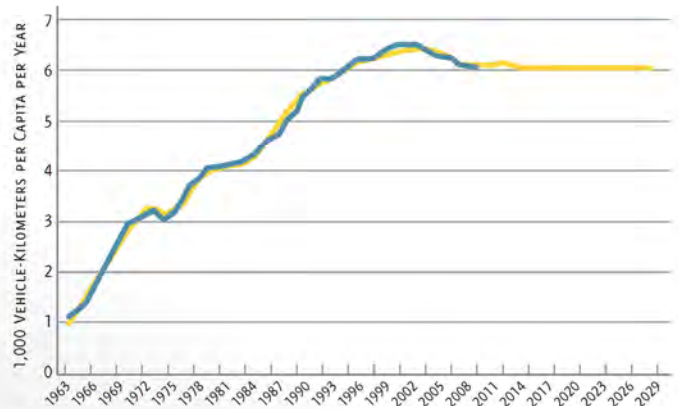
United States



Germany



Japan



Source: Australian Department of Infrastructure and Transport, *Traffic Growth: Modelling a Global Phenomenon*, 2012.

the Olympic Park site—formerly a dilapidated area in East London—into a new city district also takes on added significance. By design, the \$13.4 billion (£9 billion) Olympics site will evolve into an expanse of recreational areas and entertainment venues with a commercial center and housing for 8,000 families in five planned neighborhoods—all connected to the London rail and underground system through extensive new transit lines built for the competition. Olympic facilities in other boroughs, including athletes’ housing, are also serving to help regenerate once-downtrodden districts and absorb some of the city’s expected population increases.

France

The cash-strapped government’s limited capacity to fund major projects outright leads to some cutbacks and postponements and greater reliance on PPP funding. Currently, PPP initiatives priced at \$43 billion (€33 billion) are in the infrastructure pipeline through 2020, and a stimulus program provides \$13 billion (€10 billion) for financing of up to 80 percent of infrastructure projects.

Despite the fiscal constraints, France is moving forward with expanding its already world-renowned high-speed rail lines (building out routes from Tours to Bordeaux and Bretagne to Pays de la Loire), constructing a high-speed airport rail link in Paris, approving a new motorway concession between Bordeaux and Bayonne, and awarding contracts on a 60-mile (96 km) canal project connecting the Rhine-Scheldt waterway in Germany to the Seine.

The new socialist government is paring back investment in nuclear power, the nation’s primary energy source, and looking to gain efficiencies from energy-saving technologies, equipment, and systems as well as promoting green power alternatives.

Germany

Europe’s economic powerhouse, Germany is one of the few countries in the world that can afford to back off infrastructure initiatives.

Germany is benefiting from its already built-out infrastructure systems, which feature

some of the world’s best rail (both freight and high-speed passenger) and road networks as well as efficient power grids and modern water facilities. As a result, the country does not require significant infrastructure expansions, except for projects to hasten the transition away from nuclear energy to renewable sources of power.

Most outlays are directed at upgrading existing roads—some Autobahns are approaching the end of 50-year life cycles and require ongoing capital for preservation and enhancement. Others are being directed at closing the remaining gaps in the intranational Autobahn infrastructure. Railway projects are also focused on maintenance, although the \$8.4 billion (€6.5 billion) Stuttgart 21 rail project will build out 35 miles (56 km) of high-speed rail track, the latest leg of an intercountry European Union route connecting Paris to Bratislava, Slovakia. Major airport expansions are underway in Munich and Frankfurt, and the new Berlin-Brandenburg Airport will open in the fall after cost overruns and delays.

These projects will cement Germany’s place as the hub of central Europe’s transport network and primary connection point for international travel as well as freight delivery.

Spain

Spain’s big-budget infrastructure building binge is hitting the wall—EU bailouts are keeping the government afloat but require significant spending reductions, including the mothballing of many road and rail projects. Interviewees call for a “more proactive role from the government in developing infrastructure,” lamenting that “last year was an empty and lost year for the sector.”

On the bright side, recent work by the country has upgraded transport systems dramatically. Spain now features 8,750 miles of motorways and dual carriageways—more than any other European country. Its rail network has expanded to more than 9,000 miles. The government remains determined to complete buildout of the longest high-speed passenger-rail system in Europe (second only to China’s

worldwide), with more than 6,000 miles of lines connecting all major cities, by 2020. The latest high-speed rail milestone, a new line now links Barcelona and Madrid to Paris.

But severe budget cutbacks are hitting local projects (water, sewer, highway repairs) and rural areas where road conditions remain poor, and the country's electricity transmission system requires new investment. After a spate of bankruptcies in the road sector attributable to changes in expropriation laws and lower-than-expected vehicle traffic, the government plans to toll roads and increase energy tariffs to help raise money.

Italy

In Italy, austerity budgeting underfunds and delays government development plans, which focus on upgrading deficient infrastructure—roads, rails, energy, and water—in the historically neglected southern region. Credit concerns over the country's high debt-to-GDP ratio raise borrowing costs for private investors and further compromise attempts to finance initiatives.

Most prominent among sidelined projects is the long-sought-after suspension bridge across the Messina Straits to connect Sicily and the mainland—at least the government has allo-

cated monies for additional “exploratory work” on the massive span.

Major rail routes and tolled motorways receive generally high marks for service and management, but provincial tracks and back roads tend to suffer from years of underinvestment. At the beginning of last year, the government hiked road tolls by nearly 3 percent to help private concessionaires fund maintenance.

Also moving forward is the construction of a high-speed rail line from Turin, Italy, to Lyon, France. The \$11 billion first phase will begin in 2014 and involve boring a tunnel underneath the Alps at the border. When completed in 2021, the new line should help reduce travel time between Paris and Milan from seven to four hours.

Other government priorities include building enhanced cross-border passenger- and freight-rail links to the Netherlands, Sweden, Germany, and England.

Russia

Russia is focusing on readying \$50 billion in facilities and public works for the 2014 Sochi Olympics, including airport and railroad terminals and hundreds of miles of new roads. But officials vacillate on moving ahead with desired high-speed rail projects, lacking the money.



A container port in Istanbul, Turkey—a historic crossroads between Europe and the Middle East—is seeking to capture the benefits of trade between the two regions by upgrading infrastructure.



People wait in line for an arriving train on the platform at Mar Giris in Cairo, Egypt.

President Vladimir Putin would like to redirect \$3.3 billion in overseas investments from the country's sovereign wealth fund into bonds that would back domestic projects building roads, bridges, and ports, as much of Russia's transport infrastructure dates from the Soviet era and badly requires overhauling.

Turkey

Turkey is increasingly taking advantage of its strategic crossroads position in energy markets between European consumers and Middle Eastern/Russian gas producers, which helps boost the economy.

The country is undertaking a host of major projects to deal with road congestion, including a high-speed rail link between Istanbul and Ankara, completion of a third Istanbul airport, a new tunnel under and a third bridge over the Bosphorus Strait, and numerous port and power plant initiatives.

The government is looking to attract private capital through PPP structures focusing on privatizing ports and airports, including green-field projects.

Africa

Across Africa, substandard infrastructure constricts growth by as much as 2 percent

annually. Estimates peg the continent's annual infrastructure funding gap at anywhere from \$30 billion to \$90 billion. The lack of safe drinking water and a huge power deficit continue to hamper economic development.

But investors may be lured by favorable demographics, improvements in some nations' political and regulatory environments, and the promise of the continent's rich natural resources. Although the global financial crisis recently dampened offshore interest, China is continuing to partner opportunistically with mineral-rich countries like Nigeria, Angola, and Kenya. The Asian powerhouse is using its own contractors to build new roads, rails, and port facilities, with the goal of speeding shipments of various precious metals and commodities destined for manufacturing centers back in China.

Angola, Nigeria, and Ghana have established sovereign wealth funds to finance projects, while Namibia and Cameroon make infrastructure funding high priorities in long-term planning.

In 2012, South Africa launched a \$430 billion (R4 trillion), 15-year National Infrastructure Plan with 18 specific integrated strategic projects for transport, energy, water, and sanitation. Since the government has limited capacity to support these projects, many will depend on uncertain foreign financing.

The Arab Spring likely will deter foreign investment temporarily in other countries on the northern edge of Africa, like Egypt and Libya, until political stability returns.

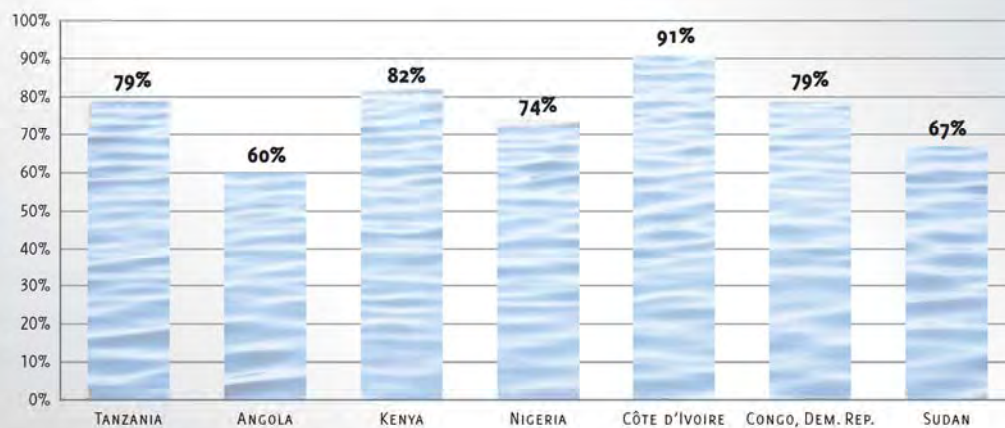
Middle East

Led by oil-rich Saudi Arabia and the United Arab Emirates (UAE), countries that make up the Gulf Cooperation Council (GCC) are spending rapidly on infrastructure to modernize and help diversify their heavily dependent, hydrocarbon-based economies and deal with parched desert climates. Other GCC members include Qatar, Oman, Bahrain, and Kuwait.

In this part of the world, money and private financing requirements simply do not present the same hurdles as elsewhere. Priorities concentrate on building desalinization plants and delivery of water supplies, developing the potential for solar power to support growing populations, and connecting primary cities with modern roads and rail systems. A \$25 billion GCC pan-Gulf rail network should be completed by 2017, extending nearly 1,300 miles through six countries. Other efforts in the UAE work to drive up tourism and gain revenues from conferences and other events.

Access to Improved Water Sources Varies Greatly among African Countries with the Most Rapidly Growing Cities

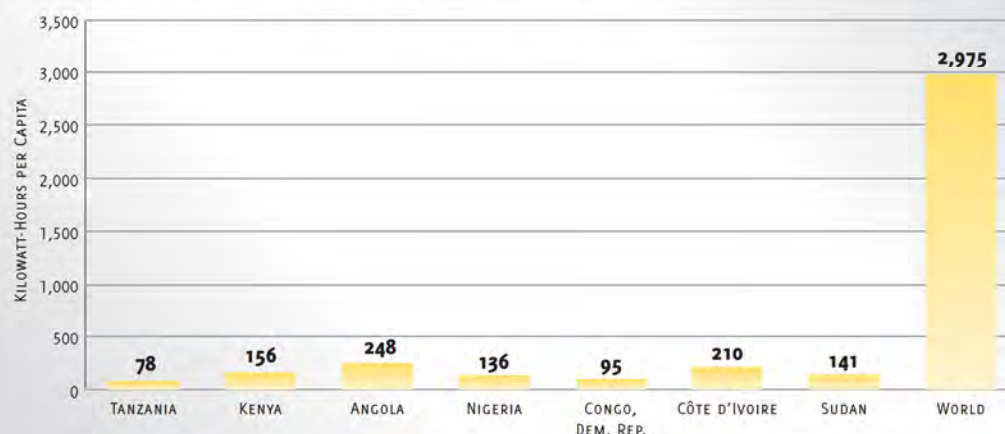
Percentage of Urban Population with Access to an Improved Water Source, 2010



Source: World Bank Group, *World Development Indicators*, 2012.

Even in African Countries with Rapidly Growing Cities, Electric Power Consumption Lags Far Behind the World Average

Electric Power Consumption per Capita, 2010



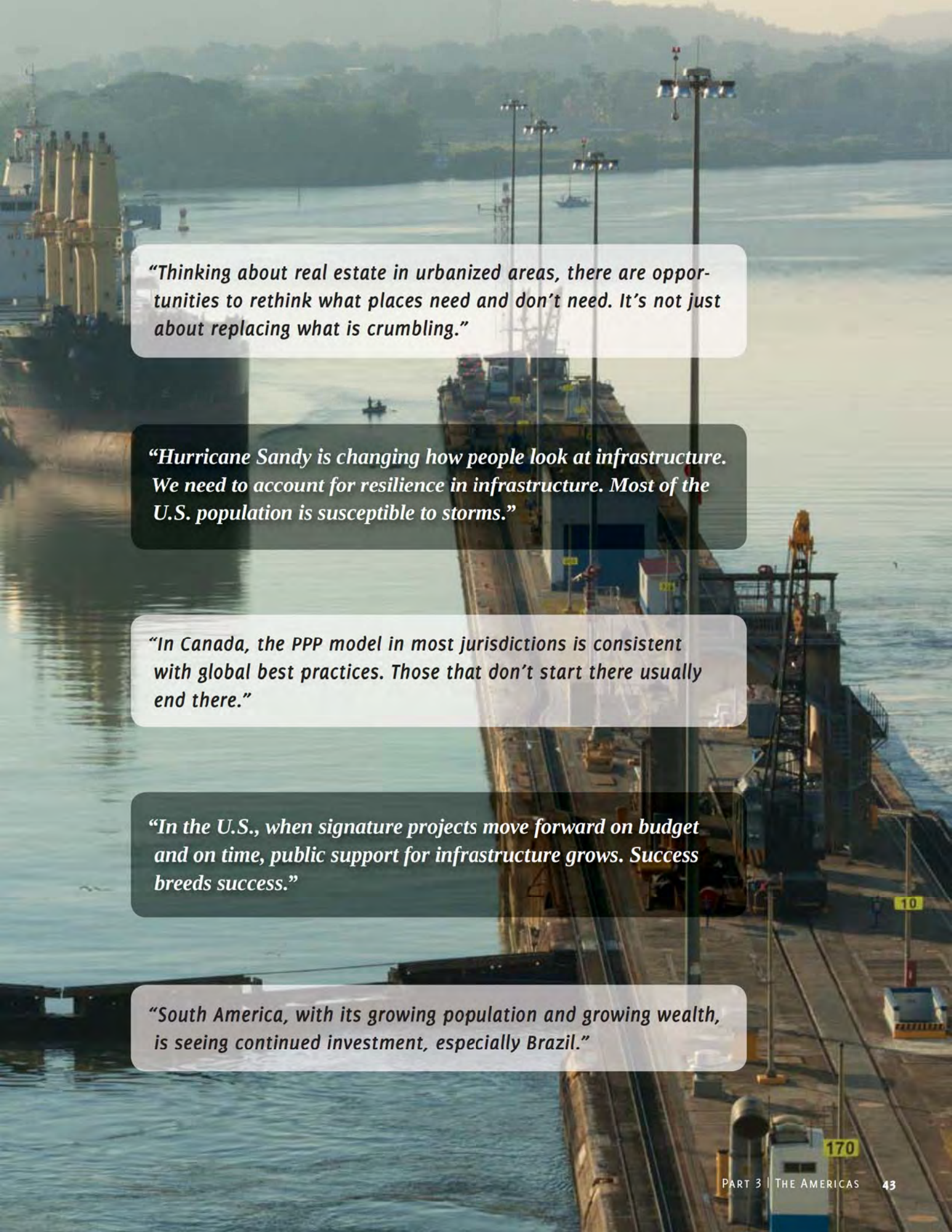
Source: World Bank Group, *World Development Indicators*, 2012.

Part 3

The Americas



A tugboat guides a tanker through one of the locks in the Panama Canal.



“Thinking about real estate in urbanized areas, there are opportunities to rethink what places need and don’t need. It’s not just about replacing what is crumbling.”

“Hurricane Sandy is changing how people look at infrastructure. We need to account for resilience in infrastructure. Most of the U.S. population is susceptible to storms.”

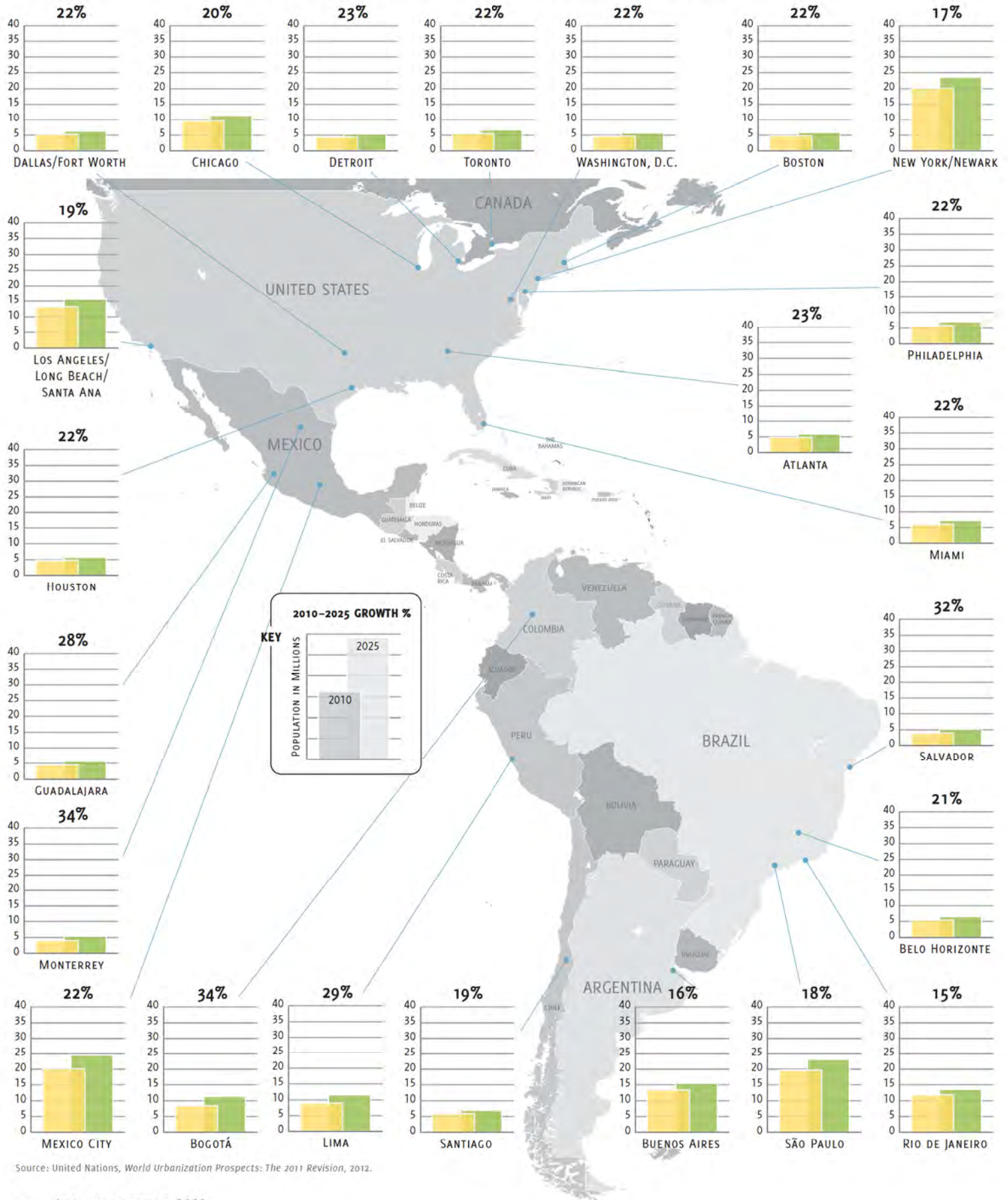
“In Canada, the PPP model in most jurisdictions is consistent with global best practices. Those that don’t start there usually end there.”

“In the U.S., when signature projects move forward on budget and on time, public support for infrastructure grows. Success breeds success.”

“South America, with its growing population and growing wealth, is seeing continued investment, especially Brazil.”

Metropolitan Areas throughout the Americas Expect Moderate Growth

Projected Population and Growth Rate of Metro Areas with More Than 5 Million Population in 2025



Source: United Nations, *World Urbanization Prospects: The 2011 Revision*, 2012.

From north to south, the Americas represent the full spectrum of national ambitions, struggles, strategies, and approaches for dealing with challenging and expensive infrastructure requirements necessary to facilitate future economic growth.

Canada is successfully deepening its use of public/private partnerships to help finance and build a range of transportation, water-sewage treatment, and social infrastructure projects, offering a body of experience that the United States could adapt to its own financial, jurisdictional, and political setting. Both Canada and the United States need to retool aging road networks and advance mass transit projects.

Mexico's recent attention to connecting its primary urban and industrial centers with new expressways and expanding its ports is starting to pay dividends in supporting a rapidly enlarging manufacturing base. Brazil is seeking to reignite heady economic expansion by moving forward with a much-anticipated Rio de Janeiro-to-São Paulo high-speed rail project, major intercity road building, airport modernizing, and power plant construction.

Whether rich, poor, emerging, or maturing, all the region's countries face funding shortfalls and a gap between what they can pay and what they want or need to accomplish.

United States

Budget constraints and a lack of consensus regarding the federal role in key infrastructure sectors "present an [ongoing] challenge" in trying to plan for public investment. Some progress came with the passing of a federal transportation reauthorization bill, but the legislation's two-year time horizon means that thinking about the next one will need to start right away.

With federal infrastructure contributions holding steady and with declines generally expected, especially as the sequester takes hold, most state and local governments are moving into a "a self-help" mode—they must rely more heavily on alternative funding sources and postpone some desired projects. "It's hard to scrape together new infrastructure money" at a critical time when many systems are reaching the end of their life cycles.

Infrastructure spending as a percentage of GDP has shrunk to about 2.4 percent from its peak of more than 3 percent during the 1960s. States and local governments account for about 75 percent of all infrastructure spending, including capital and operations and maintenance, with the federal government contributing the remaining quarter of infrastructure spending.

In 2012, Congress enacted new authorizing legislation for transportation. The new bill, Moving Ahead for Progress in the 21st

Insights about the Americas from Infrastructure 2013 Interviewees

In the United States, the funding picture is uncertain, and state, regional, and local governments are taking the lead.

As a two-year bill, new U.S. transportation legislation MAP-21 still doesn't provide stable, long-term funding.

All revenue forecasts are more uncertain now. People are inherently more conservative.

We see strong state and local support in the U.S. for sales taxes dedicated to certain bundles of projects.

People are making hard decisions about where to prioritize investment, and where NOT to rebuild.

Public/private partnerships in the United States remain challenging, with approaches that vary across the country.

In the U.S., where the PPP model is developing in many jurisdictions, innovation will be required to adopt key principles of successful PPP projects into different procurement processes, legal frameworks, and regulatory and political environments. This will require sponsors to be more flexible in their approach.

In the U.S. market, most projects are carried out at the state and local levels. That means that the U.S. is really at least 50 countries, plus all of the cities and public authorities. Nonetheless, many of the states and localities have economies that are larger than [those of] most nations.

The risk to a business in the U.S. is trying to identify which of the many potential projects will be real and proceed, and ensuring that you pursue those projects, as opposed to wasting significant time and money pursuing projects that don't materialize.



Debt-to-GDP Ratios: Americas (2007–2017)



Source: International Monetary Fund, World Economic Outlook Database, October 2012.

Canada remains a PPP leader, but even there funding is not guaranteed.

Canada is at the top of the global PPP list, driven by robust processes. You know when you start a project what it will look like. This certainty, with template documents, makes bidding so much easier.

In Canada, municipalities need to embrace PPP/alternative financing and procurement (AFP) approaches the way the provinces have.

In Brazil, spurred by economic growth and upcoming games, the infrastructure picture is evolving fast.

In Brazil, the priority is investment in infrastructure, supported by the government through programs aimed at the country's growth. Events like the World Cup 2014 and the Olympics in 2016 help spur infrastructure investment.

Brazil has a unique opportunity at hand. The mobilization behind investment has occurred largely because of Brazilian sporting events, specifically the World Cup at a national level, and the Olympics in the city of Rio de Janeiro.

Brazilian infrastructure investments should prioritize projects that reduce social inequality, starting with education and sanitation, followed by projects related to urban mobility.

Project planning should not be done from the perspective of the real and immediate need, but with a forward-looking, long-term point of view. This is a changing concept in Brazil. There should be the dissociation between election calendar and planning calendar.

It is necessary to maintain the position that the government is the one responsible for providing the infrastructure service, although it is not necessarily the provider of that service.

Severe weather and climate change are growing considerations.

Superstorm Sandy had a profound impact on public awareness. The United States now needs more adaptive design, but this is also a big political issue as it involves making communities resilient and possibly moving people out of vulnerable areas. There is a need for large-scale infrastructure projects to protect communities.

Century (MAP-21), requires performance measures, consolidates numerous highway and mass transit programs, allocates \$1 billion for projects of national and regional significance, and expands the popular Transportation Infrastructure Finance and Innovation Act (TIFIA) credit-support program. The TIFIA program has a lending capacity of \$750 million in FY 2013 and \$1 billion in FY 2014, representing about \$17 billion in lending capacity, but funding has been slow to go out the door.

However, at current rates of expenditure, the Highway Trust Fund will become insolvent in several years. Reliance on a stagnating revenue source—the federal motor fuels tax—is undermining long-term thinking about critical highway and mass transit investments nationally. An urgent need is to determine the future of the Highway Trust Fund amid spending reductions and cries for “no new taxes.”

As federal support becomes increasingly uncertain, states and local governments are seeking solutions on their own. Worried about the potential for infrastructure failures, more and more governors and mayors are advocating sales and gas tax increases or new tolls and higher user fees to pay for vital initiatives like bridge replacements and new water treatment plants. In Virginia, a hard-won, nationally watched compromise between the legislature and the governor aims to solve the state's chronic transportation funding woes.

Public leaders have tried to gain support among constituencies by emphasizing how infrastructure projects can create new jobs

The Expanded TIFIA Loan Program Attracts Mostly Highway Projects in the United States

TIFIA Letters of Interest, July 2012 through February 2013

Potential Applicant	Project Name	Estimated Project Cost (Millions)	Type of Instrument
HIGHWAY PROJECTS			
Central Texas Regional Mobility Authority	183 S	\$896	Direct Loan
Virginia Department of Transportation	Route 460	\$1,465	Direct Loan
North Carolina Department of Transportation	I-77 HOT Lanes	\$545	Direct Loan
Knik Arm Bridge and Toll Authority (Alaska)	Knik Arm Crossing	\$1,022	Direct Loan
Texas Department of Transportation	State Highway 288	\$272	Direct Loan
Texas Department of Transportation	State Highway 183	\$876	Direct Loan
Texas Department of Transportation	Grand Parkway (State Highway 99)	\$2,551	Direct Loan and Line of Credit
Texas Department of Transportation	Interstate Highway 35 East	\$1,415	Direct Loan
North Carolina Department of Transportation	Mid-Currituck Bridge	\$611	Direct Loan
New York State Thruway Authority	Tappan Zee Bridge	\$5,900	Direct Loan
Georgia Department of Transportation	Northwest Corridor	\$960	Direct Loan
Indiana Finance Authority	East End Crossing (Ohio River Bridges)	\$1,276	Direct Loan
Kentucky Public Transportation Infrastructure Authority	Downtown Crossing (Ohio River Bridges)	\$1,227	Direct Loan
Louisiana Department of Transportation	I-49 North	\$631	Direct Loan
Louisiana Department of Transportation	LA 1 Toll Road	\$371	Direct Loan
Ohio Department of Transportation	Portsmouth Bypass	\$653	Direct Loan
Cameron County Regional Mobility Authority	South Padre Island	\$694	Direct Loan
Pennsylvania Turnpike Commission	Southern Beltway	\$651	Direct Loan
Delaware Department of Transportation	US 301	\$570	Direct Loan
Florida Department of Transportation	I-4 Ultimate Improvements	\$2,746	Direct Loan
City of Bakersfield (California)	Thomas Roads Improvements	\$868	Direct Loan
Subtotal		\$26,201	
TRANSIT AND URBAN STREET IMPROVEMENTS			
Chicago Department of Aviation	Consolidated Rental Car Facility and Automated Transit System	\$765	Direct Loan
Chicago Department of Transportation	Riverwalk	\$440	Direct Loan or Loan Guarantee
City of Kansas City, Missouri	Kansas City Streetcars	\$102	Direct Loan
City of New Orleans	Treme Iberville Project	\$157	Direct Loan
Metropolitan Washington Airports Authority	Dulles Metrorail	\$5,999	Direct Loan
Southeastern Tours Inc.	Southeastern Tour Buses	\$1	Direct Loan
LA Metro	Westside Subway and Regional Connector	\$3,908	Direct Loan
Sound Transit	East Link	\$4,038	Direct Loan
Subtotal		\$15,410	
Total		\$41,611	

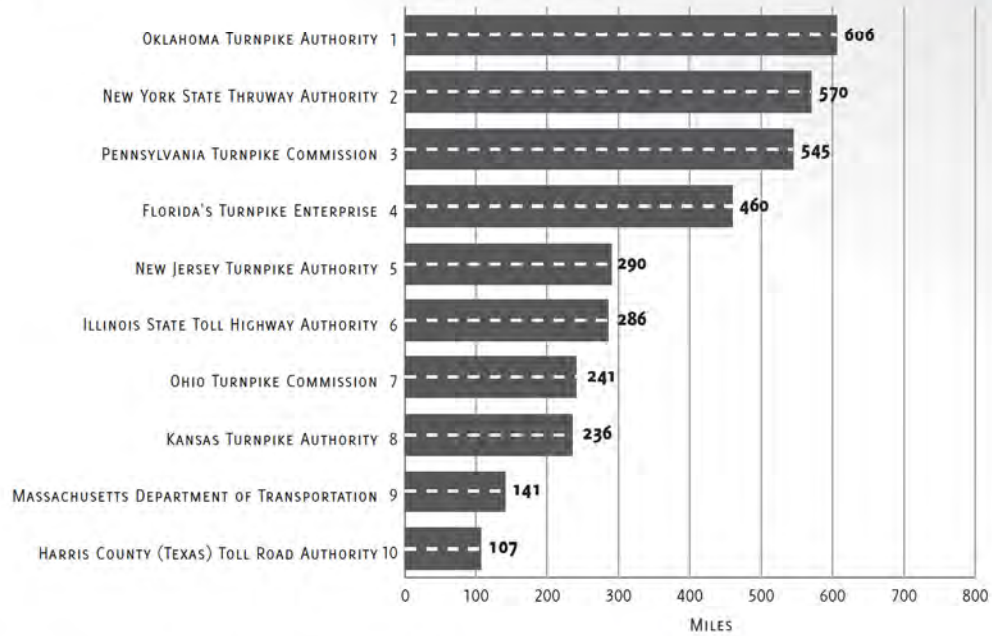
Source: USDOT, Federal Highway Administration, 2013.

at a time when unemployment rates remain stubbornly high. But these arguments run up against public sentiment that questions the expenditure of billions of dollars without clear

evidence of benefits. Ultimately, the United States will need to develop the ability to pick infrastructure projects more carefully, execute them on time and on budget, and figure out

In the United States, 34 States and Puerto Rico Have Toll Roads or Crossings
Top Ten Toll Agencies

By Mileage



By Annual Revenue in Millions of U.S. Dollars



Source: IBTTA, *The US Tolling Industry: Facts in Brief 2012, 2013.*

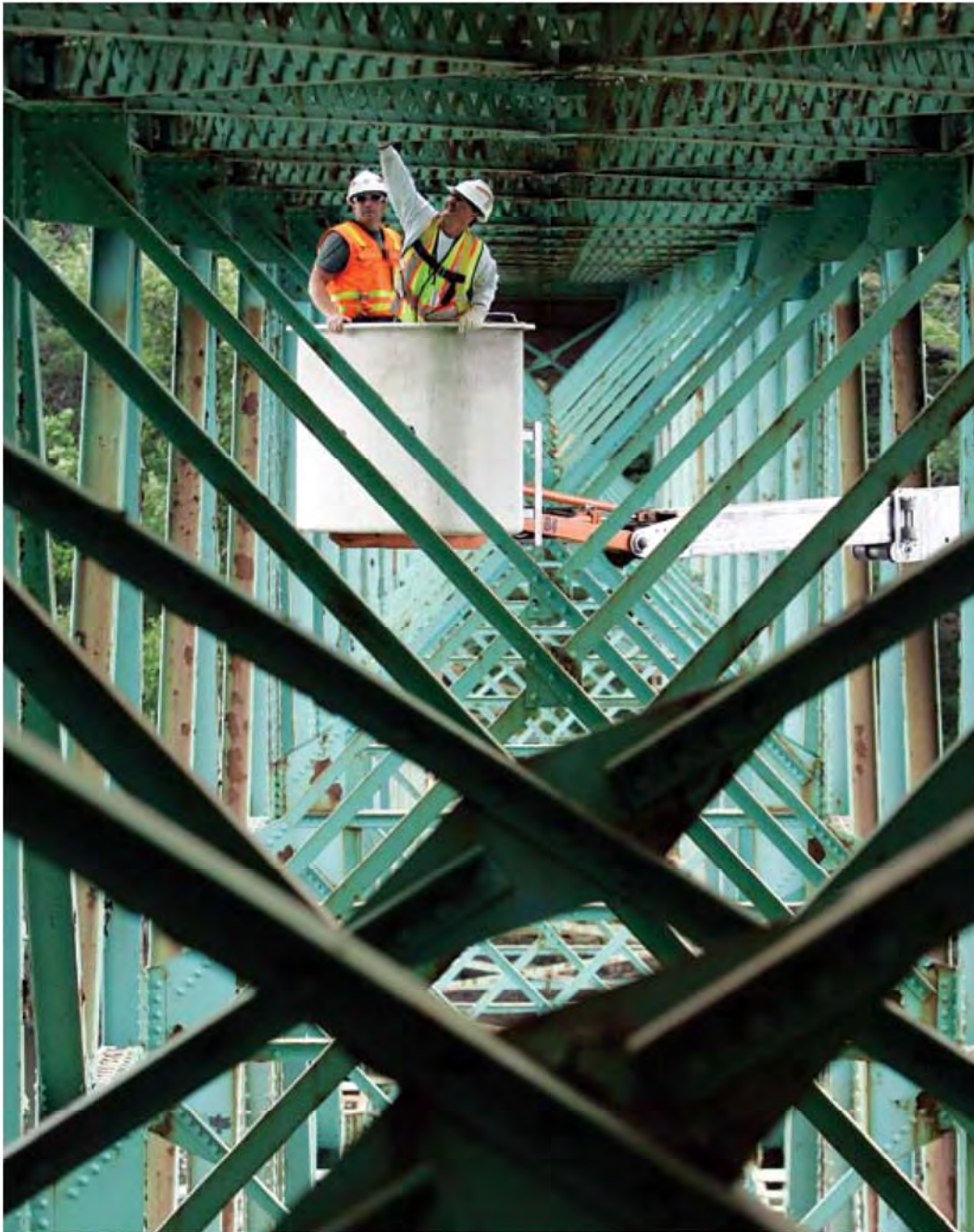
how to tell the story of the impact that these investments are having on system performance outcomes.

The Promise of Public/Private Partnerships

More state governments are beginning to embrace PPP financing to help pay for new projects and improve operations. Interviewees

say “an enormous pipeline is developing” and “confidence is growing.” The challenge remains to demonstrate “value for money,” given the inherently lower cost of capital arising from public owners financing projects using tax-exempt debt rather than equity and taxable debt.

As noted earlier, MAP-21’s significant increase in the TIFIA loan program at the U.S. Department of Transportation has the potential



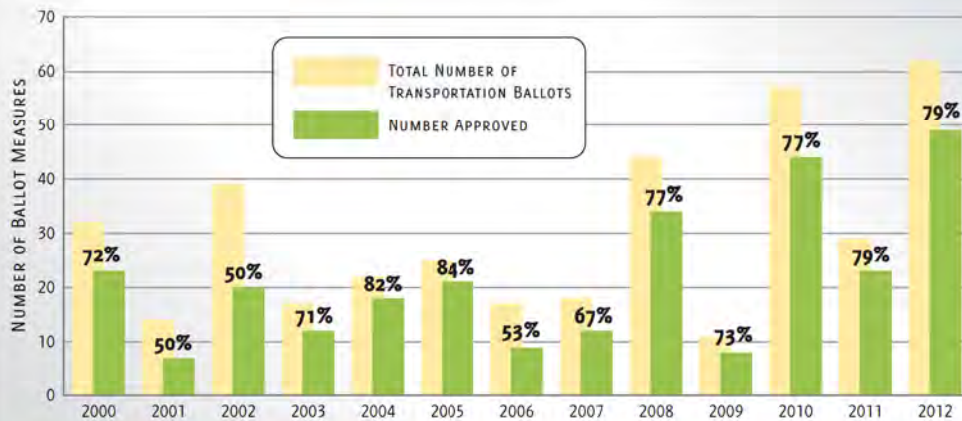
Bridge inspectors check the condition of the Back River Bridge in Georgetown, Maine. (©Associated Press / Robert F. Bukaty)

to unlock more PPP transactions by making their cost of capital more competitive with traditional infrastructure financing methods in the United States.

Availability payment structures—increasingly employed in recent PPP transactions—may be helpful in addressing concerns regarding private control over rate setting, and allowing agencies with extensive outstanding debt

to contract with private entities for building and operating major projects. Revenue risks associated with usage volume and rate setting are accepted by government partners, while responsibility for timely, on-budget project delivery, future operating and maintenance costs, and long-term performance are assumed by the private partner. Florida, Colorado, New York, New Jersey, and California are setting

Again in 2012, Transportation Ballots Overwhelmingly Win with American Voters
Percentages Represent Success Rate in Year



Source: Center for Transportation Excellence, 2012.

examples for best practices in undertaking availability payment transactions.

In south Florida, for example, the Port of Miami tunnel project to detour truck traffic away from downtown was procured “at half the state estimate” and transferred significant tunnel boring technology risks to a private entity. The I-595 expressway reconstruction and managed-lanes project is ahead of schedule and on budget and was procured at under the engineer’s estimate using an availability payment structure. Virginia’s I-495 Express Lanes project, which cost \$2 billion, was delivered on time and on budget, and was financed and built through a PPP. The state is moving ahead with a series of other PPP toll road procurements.

Conservative public pension funds and other institutional investors may see the opportunity for higher yields but remain “skittish” about providing capital for greenfield projects during the development phase. Recent transactions suggest a strong institutional investor appetite for projects that have progressed beyond the bidding stage and are well into construction, and pose limited or no revenue risk. Investors struggle with projecting investment performance based solely on traffic and revenue forecasts. Interviewees expect that institutional investor interest will grow as more projects are completed and register solid returns, particularly in the managed-lanes

category. A growing track record may help overcome concerns arising from a handful of early toll road projects where revenues did not meet targets.

In a positive sign, several large public pension plan sponsors like the California Public Employees Retirement System are leading the way in investing in infrastructure.

Positive Trends

Some state and local officials not only are wisely considering needs for short-term fixes—shoring up “what is crumbling” today—but also are making critical assessments about necessary investments for the future. They are realizing that “what we need now may not work tomorrow.” Some are shedding 20th-century thinking rooted in building more exurban expressways and are considering ways to support denser land use in urbanizing environments, using light rail, streetcars, and bus rapid transit as catalysts for concentrating development.

More states and cities, like Chicago, are considering establishing infrastructure banks to enable more creative financing of local projects. However, the business model for such strategies remains murky due to governance and tax-exempt finance complications.

At the regional level, various city, county, and town jurisdictions find they can achieve more by pooling resources for “scarce dollars”

rather than fighting at cross purposes. “To get things done, we need lots of jurisdictions to agree and cooperate, doing things in new and different ways.”

And in a promising initiative for regional cooperation along the Pacific coast, California, Oregon, and Washington have joined forces with British Columbia in Canada to explore funding strategies for upwards of \$1 trillion in shared infrastructure projects to promote growth over the next three decades. Regional network studies, such as multijurisdictional managed-lane systems in south Florida and the San Francisco Bay Area, are near-term initiatives with potentially ground-breaking opportunities for governance and financing.

Ambitious new light-rail line systems for Los Angeles, Denver, Charlotte, and Minneapolis, which won the backing of voters with local leaders making the case for long-term benefits, are proceeding. The Denver transit system’s expansion, however, has hit a wall—with funding needs exceeding the amount approved by the voters by \$1 billion, the region must come up with more money or accept delays in the delivery of the network. As these

transit systems come on line, the public can experience how mass transit lines can help in transforming car-dependent metropolitan areas into more efficient and dynamic 24-hour urban environments.

Other projects to watch in 2013 include the following:

- **Georgia Multi-Modal Passenger Terminal.**

Atlanta is planning a \$1.2 billion downtown multimodal (subway-bus-streetcar-passenger rail) terminal. This 120-acre PPP project will help expand the city’s mass transit network and anchor private redevelopment of the surrounding district into a “reimagined” commercial center, following successful train terminal redevelopments in Washington, D.C. (Union Station), San Francisco (Transbay Transit Center), and Denver (Denver Union Station).

- **Union Station.** Chicago is also considering a makeover of its Union Station as a catalyst for new commercial projects and increased property values that would help finance the renovation.

Workers restore a section of storm sewer about 25 feet below ground in St. Louis, Missouri.

(©Associated Press / Christian Gooden)



- **Seattle's Alaskan Way Viaduct.** Seattle is moving forward on replacement of a decrepit downtown viaduct with a \$3 billion, 1.8-mile toll tunnel, which will dramatically revamp the city's waterfront, reduce center-city congestion, and pave the way for new commercial projects.
- **Tappan Zee Bridge.** After fits and starts, New York State approves building a new \$4 billion Tappan Zee Bridge next to the corroding, nearly 60-year-old existing span. The state is making an allowance in the design for the addition of a future mass transit crossing, which remains currently unaffordable.
- **California High-Speed Rail.** California is moving forward with the development of a San Francisco-to-Los Angeles high-speed rail line, using a modest federal appropriation for first-phase construction in an underpopulated area. But completing the multibillion-dollar project remains dependent on private financing and additional federal aid, which has not been secured.
- **Streetcar systems across the country.** Encouraged by transit-oriented development successes in Portland, Oregon, cities across the United States are building small-scale, street-running rail systems to link neighbor-

hoods and provide transit connectivity. Dallas, Fort Lauderdale (Florida), Atlanta, Charlotte (North Carolina), Arlington (Virginia), and other municipalities are advancing systems, while the District of Columbia is launching a procurement for a 22-mile system (eventually growing to 37 miles) that would be the most comprehensive in the country.

Water and Ports

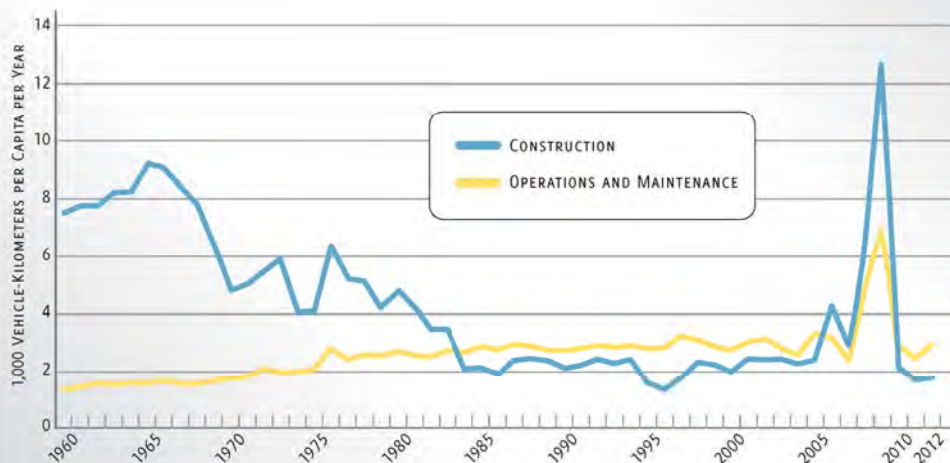
State infighting gets particularly nasty over water rights to sustain growth and development in drought-threatened regions. In the arid Southwest, California and its neighbors—Arizona, Nevada, Utah, and Colorado—battle for shares of declining Colorado River flows, while Texas and Oklahoma dispute supplies from the Red River.

In the Southeast, even after a recent U.S. Supreme Court decision favoring Georgia—Georgia, Florida, Alabama, and Tennessee continue to skirmish over precious watershed rights, which affect homebuilders, commercial property owners, fishermen, farmers, and power companies—each state vies to protect its own interests, potentially at the expense of overarching regional concerns.

But the biggest infrastructure contest between states continues to unfold in the

In the United States, Federal Water Resources Infrastructure Spending in Recent Years Has Been Driven by One-Time Spending after Crises

U.S. Army Corps of Engineers Appropriations, 1960–2012, in 2012 Dollars



Source: National Academy of Sciences, *Corps of Engineers Water Resources Infrastructure: Deterioration, Investment, or Divestment?*, 2012.

A cargo ship loads up at Port of Miami in Florida. Miami, along with many East and Gulf Coast ports, is making upgrades to help it compete for increased port traffic expected with the Panama Canal expansion.



buildout of port facilities and transport links to attract an expected surge from Pacific Rim shipping traffic along the East and Gulf coasts once the Panama Canal widening is completed next year. Various jurisdictions pour money into terminal, rail, and road projects in a competition that will have winners and losers eventually dictated by the market. “It would be a much more efficient way to spend taxpayer dollars on the two or three best-positioned ports” for handling the supersized, post-Panamax container ships, which require deep harbors for their 55-foot drafts (only Baltimore and Norfolk, Virginia, currently meet those depths).

Nevertheless, Miami completes its port tunnel and harbor dredging; the Port of New York allocates \$1 billion to raise the Bayonne Bridge to accommodate taller ships; Savannah, Georgia, spends \$650 million to deepen its river channel; nearby Charleston, South Carolina, builds new terminals and dredges its harbor; and Virginia constructs a \$1.4 billion toll road and reroutes rail lines into the Port of Virginia serving the Hampton Roads area and Norfolk. At the same time, Baltimore, Houston, and New Orleans all vie for more freight business with various multimillion-dollar schemes.

Canada

Over the past decade, Canada has made shoring up aging infrastructure systems a top priority. The country’s \$32.5 billion (C\$33 billion) federal Build Canada Plan and highly effective implementation of PPPs at the provincial level have been hallmark efforts.

A recent report card from the Canadian Construction Association, however, points to significant remaining needs, noting that half the nation’s municipal roads require substantial repairs and a quarter of water treatment plans need upgrading or replacement.

With Build Canada expiring in 2014 and the country’s fiscal outlook tempering, leaders and infrastructure players are focusing on next-phase actions to maintain momentum in addressing pressing civil infrastructure needs, which total well over \$167 billion (C\$170 billion) by some estimates. As the fiscal condition of several provinces—Ontario in particular—“has deteriorated,” some governments are considering raising money through stepped-up sale-leasebacks of infrastructure assets, as well as outright dispositions of properties like Ontario Place, a shuttered lakefront entertainment park in Toronto.

The push to further develop the nation’s vast mineral wealth and energy resources,

which helped buffer Canada's economy from recent global financial distress, is also escalating. These investment activities, which could total between "C\$150 billion and C\$200 billion," extend from Alberta oil sands' pipelines to potash mining in Saskatchewan, potential liquefied natural gas reservoirs in British Columbia, iron ore and precious metal mines in Quebec, and offshore drilling in the Maritime Provinces.

PPP Leadership

Canada's high standing as an exemplar of best practices for executing PPPs stems from "a certainty of process." Governments have developed a "sophisticated understanding about how and when to use the tool and whether or not to employ user fees." They drive very competitive procurement bidding, giving private operators confidence about "schedules for what will come to market."

The large provinces also have established central agencies to coordinate bidding, stipulating standards and procurement documents, which are increasingly used across the country down to the municipal level. Templates and agreements all look the same, which "makes bidding so much easier" and more efficient, avoiding costly and cumbersome ad hoc submissions.

The federal government's PPP Canada—a crown corporation established in 2009—also has gained a foothold, "really starting to exert authority" by providing expertise to help smaller provinces and municipalities gain traction on PPP procurement and leverage federal dollars to best advantage, especially on smaller projects like water and wastewater facilities.

But foreign operators and investors have trouble attaining scale and finding opportunities—"It's a relatively tiny market dominated by active domestic pension funds, making it harder for outsiders to break in."

Priorities

Major projects are advancing from coast to coast, including a new bridge linking Canada to the United States. Canada is footing the \$3.8

billion bill for a much-needed new six-lane international bridge with expanded capacity between Windsor, Ontario, and Detroit, the primary road crossing for trade into the United States. To overcome opposition from cash-strapped Michigan voters, Canada will even pay for a \$550 million interstate connection on the U.S. side, intending to recoup all its costs eventually through tolls and benefits generated for Ontario's nearby manufacturing centers, which depend on efficiently supplying markets south of the border.

Construction has already begun on a \$1.4 billion parkway extension into the new bridge, which finally will get underway in 2014 after years of litigation in U.S. courts by the private owner of the existing nearby toll crossing (built in 1929) seeking to protect its monopoly.

In Montreal, authorities are considering a PPP for the replacement of the rusting Champlain Bridge, the country's most heavily trafficked span, which could price out between \$3.4 billion (C\$3.5 billion) and \$4.9 billion (C\$5 billion). Construction could start in 2016. Toronto's light-rail system is moving ahead with an \$8.2 billion (C\$8.4 billion), 32-mile (52 km) extension into the suburbs; completion is slated for 2021. The next phase of construction for the privately operated Highway 407, Ontario's only toll road, which circumvents Toronto to help speed east-west traffic, is beginning.

Ottawa, meanwhile, begins its first light-rail project, including a tunnel under downtown and 13 stations. Calgary and Vancouver have enjoyed significant success from new light-rail lines—Calgary's 32-mile (52 km) system carries 300,000 passengers daily and boasts the highest per-capita light-rail ridership in North America. Vancouver is also looking to add tram extensions to its light-rail system.

The Port of Vancouver recently finished the consultation phase of a major new terminal, while Saskatchewan expands its global distribution freight hub in Regina with a 565,000-square-foot intermodal facility, operated by Canadian Pacific.



A bus competes with pedestrians and shops for space in the dedicated bus lane in Mexico City, Mexico. (©Associated Press / Agencia el Universal)

Mexico

Buoyed by a revived manufacturing base, its energy sector, manageable government debt, and an expanding middle class, Mexico has rebounded from recession relatively quickly even in the face of ongoing drug wars, helped by strategic infrastructure spending to create jobs and buttress growth prospects.

In fact, President Felipe Calderón left office last year choosing to characterize his term as the “presidency of infrastructure.” Since Calderón embarked on a \$230 billion National Infrastructure Program in 2007, the country has undertaken a massive highway upgrading and building initiative to create two north-south and two east-west expressway corridors.

Under this program, modernization projects covering more than 10,000 miles of roads have significantly improved mobility and linked previously disconnected regions. A crowning achievement was the construction of the Western Hemisphere’s longest and highest expressway crossing—the Baluarte Bridge (opened in 2012), along a new 140-mile toll road that now links the important Pacific port of Mazatlán to Durango’s interior highway hub with connections throughout the country.

Travel time over the route has been cut from seven to less than three hours, which should enhance shipping activity and reduce freight costs for many businesses.

Another signature project opening last year was a \$2 billion subway line in Mexico City, one of the world’s most populous gateways and the country’s financial center. The new line helps cut some suburban commutes in half and improves the region’s air quality by getting 860 buses off the road.

To maintain momentum, President Enrique Peña Nieto, Calderón’s successor, now wants to increase infrastructure spending by as much as 56 percent, focusing on intercity rail and urban mass transit projects as well as enhancing ports, building more water and sewage facilities, and investing more in oil and gas platforms. He is looking to attract greater public/private partnership activity to help finance projects, employing pension fund and foreign capital, enabled by recent PPP legislation to encourage investment.

Bidding has started for concessions on a series of passenger-rail projects including lines between Mexico City and two neighboring cities, Querétaro and Toluca. Two urban transit systems target expansions in Chalco and Guadalajara.



The Itaipu Dam on the border of Brazil and Paraguay provides electricity for both countries. Brazil may have to tap its large hydroelectric potential to meet its increasing energy needs.

Looking for Port Traffic

Mexico is also looking to compete with various U.S. ports in serving new logistics supply chains reaching markets throughout North America by rail and truck as well as to support increasing export activity for its manufactured goods and commodities. Between 2001 and 2011, about \$6 billion in public and private investment was targeted at modernizing and expanding major Atlantic and Pacific ports.

Significant port projects on the drawing boards include expansions at Veracruz on the Atlantic, priced at more than \$3 billion, and at Guaymas, the closest port to the United States along the Pacific, while terminal additions are underway at Manzanillo, Lázaro Cárdenas, and Altamira, which all feed the Mexican heartland around Mexico City. The government has reached out to major Asian investors and experienced operators to participate in the expansions.

Separately, technical studies have been completed for the construction of a 25-mile toll road to help speed traffic directly from the Port of Guaymas to the U.S. border.

Brazil

Hobbled by a sudden economic downturn attributable to reduced exports and lowered commodity prices, Brazil plays the stimulus card with a heavy dose of infrastructure spending to prepare for the fast-approaching World Cup, to be held in 2014, and the Summer Olympic Games, slated for 2016.

The country works to sustain its membership in the roster of nations emerging as the global elite, upgrading systems to help propel—and then maintain—renewed GDP expansion and to impress visitors and media attending the sporting events from around the world.

Despite a decade of mostly rapid growth and substantial offshore investments from the United States, Canada, China, and the Eurozone, Brazil is experiencing difficult growing pains and is dealing with current inadequate infrastructure.

Breakdowns include power blackouts, which point to a need to make investments in the energy sector. The country's major cities and ports still lack modern motorway and rail connections. Outmoded airports and air traffic control systems require enhancements to handle expected increases in traffic volume.



Passengers come and go in a metro station in Rio de Janeiro, Brazil. The country is spending heavily on upgrading infrastructure and urban transit in preparation for the World Cup in 2014 and the summer Olympics in 2016.

To address these issues, the government is pursuing an ambitious \$66 billion plan to double the nation's highway and railway networks, supported by education initiatives to train more homegrown engineers. Selling concessions and offering tax breaks on PPPs could help speed improvements—the airports in São Paulo, Brasília, and Campinas are being turned over to private operators, and concessions are planned for 6,000 miles of new railways and 4,600 miles of toll roads.

A \$3.5 billion regional airport infrastructure investment plan covers 270 airfields with a goal of providing service for 96 percent of the population living within 60 miles of a facility. Another \$26 billion targets alleviating bottlenecks at 20 sea and river ports.

After some false starts, bids are expected later in the year for the nation's first high-speed rail line, linking São Paulo, Rio de Janeiro, and Campinas over a 300-mile route, including 120 miles of bridge and tunnel construction. The project could price out at \$17 billion or more and would not be completed until late in the decade under the most optimistic scenarios.

Bureaucratic snafus, coupled with shoddy construction and a lack of skilled labor, have

compromised some schedules and construction outcomes on recent projects. But a 105-mile beltway around São Paulo is slated for completion next year to help connect major roads more directly to the airport and deal with mounting traffic congestion. In 2014, Porto Alegre should also open Phase I of its \$1.1 billion metro rail. And around the country, 12 stadium projects rush toward completion in time for the World Cup as local governments clear slums to make way for new roads and urban rail lines to move fans between hotel districts and sports/entertainment venues.

Meeting the energy needs of Brazil may ultimately involve tapping “the world's largest hydroelectric potential” from its vast interior river systems, including the Amazon. But damming waterways creates its own controversial environmental consequences, and federal officials are wrestling with sorting out regulatory complications for various small and large power projects.



Passengers await the metro in Lima, Peru. The system, which began operating in 2011, was two decades in the making. (©Associated Press / Richard Hirano)

Other Countries in the Americas

A new group of countries in the region is emerging as Latin America's "new tigers." Characterized by youthful populations and a growing middle class, these countries are attracting more capital from international investors.

Fortified by recently enacted legislation to facilitate PPPs, **Colombia's** infrastructure agency looks to award \$27 billion in contracts and concessions for new roads and rail lines, including an \$8 billion Prosperity Highway project for a 550-mile road network to connect its major cities with ports on the Pacific and Caribbean coasts. Bogotá's airport is also expanding. Overall, Colombia aims to spend \$100 billion over the next decade on infrastructure to promote growth.

In **Peru**, PPPs will finance a new 17-mile subway line in Lima, while a planned \$532 million toll road concession will connect downtown to the Port of Callao and the Lima airport.

And in **Panama**, ambitious upgrades to the canal are changing the game of trade around the world.

Notes

CURRENCY

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

QUOTES

ULI and Ernst & Young conducted interviews and discussion groups with industry experts from around the world for this report. All unattributed quotes are from these conversations.

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