



GLOBAL  
INFRASTRUCTURE  
INITIATIVE

By McKinsey & Company

# Voices on Infrastructure: Novel solutions

March 2016







# Table of contents

04	Introduction: New developments from the Global Infrastructure Initiative
08	Breaking the mold: How Crossrail's Innovate 18 program works
12	Managing big projects: The lessons of experience
16	The "Rail plus Property" model: Hong Kong's successful self-financing formula
20	The Brazilian experience in financing infrastructure
26	Remember the people: The foundation for success in 21st-century infrastructure
30	The leadership challenge: Building the future of global infrastructure
34	Financing change: How to mobilize private-sector financing for sustainable infrastructure
42	Improving disaster recovery
48	Videos & Podcasts
	• Video: Building bankable projects
	• Video: Disruptive new delivery models
	• Podcast: Navigating digital: Transforming transport infrastructure
	• Podcast: Enabling innovation in the construction sector



# Introduction:

## New developments from the Global Infrastructure Initiative

**Tony Hansen**

In 2012, McKinsey established the Global Infrastructure Initiative (GII) with the objectives of identifying ways to improve the delivery of new infrastructure and to get more out of existing assets. Our approach has been to stimulate change by convening global infrastructure leaders to exchange ideas and to find practical solutions to improve how we plan, finance, build and operate infrastructure.

To date, GII has hosted three global summits (Istanbul in 2012; Rio de Janeiro in 2014; and San Francisco in 2015), as well as a number of regional roundtables. Over the coming year, we will host a global summit in Singapore in March 2017, and a dozen more roundtables. In addition, we are starting a series of Innovation Site Visits; these will immerse participants in innovative infrastructure approaches. Our first site visit in the third quarter will take participants to Changsha, China, to visit the Broad Group. Broad manufactures modular buildings that are five times more energy efficient than conventional ones, and up to 30 percent cheaper to build. Broad recently built a 57-story mixed-use skyscraper in just 19 days.

To disseminate the GII's best insights and practices, we have printed two editions of *Voices from the Global Infrastructure Initiative* ([also available online](#) at the [GII website](#)). From now on, *Voices* will be published digitally four times a year. Our [report from the 2015 GII Summit](#) is also available on the site, as are related videos and podcasts.

This edition of *Voices* includes articles, interviews, videos, and podcasts that offer novel solutions to improving infrastructure delivery. For example, Andrew Wolstenholme explains how Crossrails's innovation program works, while Heathrow's Andrew Macmillan examines what infrastructure providers can learn from consumer companies. Lincoln Leong of the Hong Kong MTR shows how

that city's rail system makes a profit. McKinsey's Tim McManus offers five ways to improve the chances of megaproject success; other McKinsey experts make the case for tapping private-sector finance for sustainable infrastructure. Short and practical, these and other contributions suggest specific actions that can be applied widely.

We hope that you enjoy this edition of Voices and welcome your thoughts on what you would like to read about in future publications.

Warm regards,  
Tony



**Tony Hansen**

Director of the Global  
Infrastructure Initiative



# Breaking the mold: How Crossrail's Innovate 18 program works

Andrew Wolstenholme

A major project in London figures out how to get new ideas flowing.

**Crossrail is Europe's largest infrastructure project.** The £14.8 billion rail line will link four major London economic centers: Canary Wharf, the financial district, the West End, and Heathrow Airport. It will be integrated with other transport services and increase central London's rail capacity by 10 percent. Scheduled to open in late 2018, Crossrail is running on time and on budget. In short, it is on track to success. One reason for that is Innovate 18, our program to identify and implement new ideas.

The construction industry has historically been slow to pursue innovation and sometimes seems reluctant to encourage it. There are structural issues as well. The industry is fractured, and its procurement processes seldom include incentives for innovation and R&D generally, which are limited by its tight profit margins. Finally, companies tend to see projects not as part of a pipeline but as unique; this mind-set reduces their ability to transfer innovations from one project to another. Many industries invest 5 percent or more of their revenues in R&D; for British construction, that figure is only about 0.5 percent.

However, there are hints of change. During the construction of Heathrow's Terminal 5 in 2008 and of London's 2012 Olympic infrastructure, the clients promoted the idea of creating a more systematic approach to innovation. Because the client was talking, the construction industry listened. Crossrail was in a good position to learn from these experiences—its program director, Simon Wright, worked on the London 2012 games and has also been a senior executive at Network Rail, which maintains and upgrades the national rail infrastructure. (I myself was the program director for Heathrow T5.)

As part of a relentless focus on innovation, we explicitly sought to build on the practices demonstrated in these projects. Working with London's Imperial College, we defined an innovation strategy and processes for implementing it—the first step in what became Innovate 18, the Crossrail innovation program. Its introduction sent a powerful message that it was OK to generate new ideas, something that is not always typical of major construction projects.

At the same time, we took practical steps to engage the most important members of Crossrail's supply chain. We wrote to these chief executives and set out our commitment to innovation and to sharing ideas. We then asked them to pay £25,000 into an innovation fund—and pledged to match each contribution. All our major contractors joined, creating a pool of £750,000. In the context of a £14.8 billion project, this is a modest sum. But by putting skin in the game, we and our suppliers demonstrated our mutual commitment to promoting innovation.

We encouraged our contracting partners to share their intellectual property and to release ideas buried deep within their supply chains, often from small and midsize enterprises. Initially, we asked the contractors to trust that they would benefit from doing so. In this sense, taking part in the program was an act of faith—there were few precedents. But from the start, people were enthusiastic; innovative ideas flowed into the portal. Many early ones focused on safety, but soon people saw the opportunity, and significant innovations began to be submitted in a variety of other fields as well.

Early examples included a first in the United Kingdom: the use of telescopic excavators, which delivered significant financial savings. Also, the first digital ideas began to appear;

they were to bring more significant savings later. These early successes were enough to encourage the supply chain, and with innovation rates staying high, confidence in the program was maintained.

By early 2013, Crossrail's four-person innovation team, which reports to the strategic-projects director, had developed a conceptual model of collaboration, culture, and capabilities. We identified four innovation themes: health and safety, efficiency, digital–physical integration, and sustainable solutions. This approach allowed us to concentrate our efforts and therefore to realize opportunities that we would otherwise have found more difficult.

- **Collaboration.** The innovation team worked with every project in the Crossrail program to establish a network of innovation champions and then helped them set up forums and workshops to support grass-roots efforts.
- **Culture.** We called our philosophy “pinching with pride.” In British English, “pinching” is a slang term for stealing. In the context of Innovate 18, it meant sharing and openness—a willingness to show and tell ideas. The sense that building Crossrail successfully was a collective activity began to pervade our work, in part because all the innovation efforts explicitly encouraged a collaborative approach.
- **Capabilities.** For the innovation program to work, we needed a way to create, share, and challenge ideas and then to govern their development. So the innovation team set up a database where participants could upload and discuss suggestions. A working group and a board decided which ideas to finance and in what order.

Launched in the summer of 2013, the program received an immediate boost from new university graduates joining Crossrail. Within weeks, the spark had caught; ideas began to flow into the Innovate 18 portal. At its peak, more than 1,000 people from every corner of Crossrail were accessing the website and sharing ideas. The database now includes more than 800 of them, more than 300 have been developed, and more than 100 shared among projects and contractors.


These innovations have ranged from basic safety features to new types of engineering facilities, new materials, improved sensor systems, and digital enhancements. The total cost of the program (for Heathrow, contractors, and other partners) was about £3 million; we estimate that the benefits already amount to three times that figure, which will probably double by the time we are done. And we believe that there are also intangible benefits, in the form of improved reputation and collaboration.



The intangible benefits of collaboration, performance, and reputation are significant to a program of Crossrail's complexity and scale. Our experience of the Innovate 18 program was that it transcended contract and other boundaries and encouraged the collective effort to succeed, and that in turn helped to improve our performance and collaboration between colleagues.

One important lesson of the Crossrail experience is that clients need to develop business and commercial models that encourage the supply chain to participate—for example, through contracts that share the benefits of innovation among the parties. If clients take the lead in this way, the construction industry might begin to invest more to make innovation the norm rather than the exception. There is precedent for this. In both the automotive and aerospace sectors, companies have collaborated for years to focus scarce resources on strategic priorities, such as developing engines, so they can share costs and risks and compete more effectively.



The Crossrail innovation program will not end when the ribbon is cut. The Thames Tideway project has adapted our model, and we are sharing our database with other national infrastructure efforts. Completing capital programs more efficiently across the entire life cycle not only adds value but also builds public confidence—and that may be the most important innovation of all. 

**Andrew Wolstenholme** is the chief executive officer of Crossrail.





# Managing big projects: The lessons of experience

Tim McManus

Most big infrastructure projects run late and over budget. Here's how to do better.

**Infrastructure has a problem.** Even for projects that are similar and that many companies have experience building—think of roads, for example—delays and cost

overruns are common. Poor planning and execution, unbalanced contract terms and conditions, inadequate controls, and lack of proper risk management are rife.

According to data from IHS Global Insight,<sup>1</sup> construction productivity in many areas has worsened over the past decade; the IHS Herold Global Projects Database<sup>2</sup> estimates that large infrastructure, mining, and oil and gas projects, on average, cost 80 percent more than budgeted and run 20 months late. Major events like the Olympics and World Cup have to start on time, but in recent decades, have always cost more than the original projections.<sup>3</sup> Finally, some projects meet these goals, but don't work as intended.

Does it have to be this way? Not necessarily. Some projects, after all, are delivered as planned, such as the Alameda Corridor freight rail program in Southern California and Singapore's North East rail line. Based on my experience and research, here are five ways to improve the odds of success.

**Manage more than just time and budget.** For infrastructure projects, the emphasis is usually on completing the project on time and on budget. These matters are important, but they are not everything. A project that is completed punctually but that doesn't work well cannot be considered a success. Think of a new airport or highway that handles less than the planned capacity because of design changes or cut-backs during construction but was completed on time and on budget. These functional elements need to be tracked just as rigorously as the traditional parameters of cost and schedule.

All these factors must be defined, tested, proven, and managed from early planning through commissioning. To do so, the project owner should appoint someone to monitor how well the project meets all requirements. The designer, construction manager, or contractor are usually unable to provide a dispassionate overview. The monitor should have the authority to prevent changes to the configuration of the project during design and construction that could have an impact on the planned operational performance. When a European airport did this, the outside hire helped to significantly reduce capital spending by examining the plans for risk and by working with the airport authorities to increase flexibility for future expansion.

**Apply the appropriate delivery method for each project.** Particularly in the public sector, there is a tendency to opt for the same delivery method—such as design-bid-build, construction manager at risk, or design-build—for all capital projects. This is understandable. Doing the usual is safer than trying something new.

But conditions can differ. It makes much more sense to evaluate each project and then decide which method is most appropriate. This means evaluating a wide array of factors, such as permitting and regulatory status, land-site control, owner priorities, geotechnical

---

<sup>1</sup> Expert interviews; IHS Global Insight 2015 (Belgium, China, France, Germany, India, Italy, Spain, United Kingdom, and United States), [ihs.com](http://ihs.com); World Input-Output Database, 2015, [http://www.wiod.org/new\\_site/home.htm](http://www.wiod.org/new_site/home.htm).

<sup>2</sup> Annual reports; IHS Herold Global Projects Database, November 19, 2013, [herold.com](http://herold.com).

<sup>3</sup> Bent Flyvbjerg and Allison Stewart, "Olympic proportions: Cost and cost overrun at the Olympics 1960–2012," June 2012, Saïd Business School Working Papers, University of Oxford, [ssrn.com](http://ssrn.com).



and subsurface analysis, organizational and supply-chain capacity, degree of risk, and potential for changes. This evaluation can clarify which delivery method fits the risk profile. One North American infrastructure agency uses a “value for money” assessment when it is considering using a nonstandard delivery model. It compares total project costs for each option, thereby verifying that the chosen delivery model was best suited for that particular project. This may sound like an obvious approach; in my experience, though, few agencies do it.

**Balance risks.** Organizations that work with designers and contractors must accept that this is a business relationship fraught with risks—and be willing to share them. Counterintuitively, this may actually lower the risks for everyone and make the project run more smoothly.

Profit margins for infrastructure companies are typically low. Taking a hit on a single big project can jeopardize their financial well-being. Therefore, if the owner tries to shift all or most risks and liabilities over to these companies, the latter will naturally seek ways to cover or hedge them through higher bid costs, additional contingencies, costly insurance policies, or adversarial contract management. This approach may lead to disputes, delays, and failure.

During the construction of Heathrow’s Terminal 5, the parties managed risk more collaboratively. (Terminal 5 opened in March 2008 on schedule and within budget; see “Remember the people: The foundation for success in 21st-century infrastructure” on p. 26) The client, Heathrow Airport, held a comprehensive insurance policy to cover all risk. Instead of a traditional client-contractor relationship, Heathrow treated the different partners like team members. It invited them to work together to solve complex issues during delivery and to help Heathrow find the technical solutions that worked best for the project as a whole. This allowed all the parties to focus on finding ways to keep the project on schedule and within budget. That, in turn, helped the different companies meet their own obligations. This is similar to the successful alliance-contracting approach that has been used extensively in Australia on large projects, in which the project owner, designer, and contractor work under one contractual agreement to jointly deliver the project.

**Involve operations and maintenance experts from the start.** Projects that have progressed smoothly through the design and construction phases still have a chance of hitting a rough patch. This can happen when the people who will ultimately operate and maintain the asset, whether it is a rail system, port, terminal, or highway, are shut out of the decision-making process during design and construction.


Decisions affecting the total cost of ownership—including access and logistics, spare-parts management, and trade-offs of initial versus operating costs—are critical. The costs associated with operating and maintaining infrastructure assets over a 20- to

30-year span run many times higher than the costs for design and construction. Therefore, the costs must be considered in the planning and design. That requires making operations and maintenance experts part of the team from the beginning. Many oil and gas companies use this approach for big capital projects. They have found that doing so means that projects are ready to run on completion and that operations and maintenance personnel are prepared as well.

**Consider the project's legacy.** As previously discussed, a successful infrastructure asset operates as intended. But particularly for public-sector projects, success should have broader benefits as well, such as skills development, job creation, strengthening the local supply chain, and expanding knowledge sharing and capability building for the client. For example, some regions lack experienced staff, so companies commit to training local workers. In London, the Crossrail project (see “Breaking the mold: How Crossrail’s Innovate 18 program works,” on page 8) established the Tunneling and Underground Construction Academy (TUCA) in 2011. TUCA has trained more than 10,000 people in the skills and safety methods required to work in the tunnel network.

The Alameda Corridor freight rail program in Southern California and the Tren Urbano rail project in Puerto Rico provided job and skills training to local people and emphasized working with small and local businesses. Providing such benefits help people, the community, and local businesses. This is much easier to accomplish when it is made a priority from the beginning.



In 2013, McKinsey calculated that the world would need to spend \$57 trillion on infrastructure by 2030 just to keep up with economic growth. While countries are not investing at that rate, there is massive infrastructure investment on the way. Learning from the experience of successful projects—and unsuccessful ones, too—can help to improve outcomes, and improve both the infrastructure industry and the communities it serves. 

**Tim McManus** is a vice president in McKinsey’s Global Infrastructure Practice and is based in Boston.





# The “Rail plus Property” model: Hong Kong’s successful self- financing formula

Lincoln Leong

What can other cities learn from Hong Kong’s approach  
to transit?

**Cities around the world** are building or expanding public-transit systems to cope with population growth and urbanization. But even as metro systems get bigger and serve more people, most continue to lose money.

For more than three decades, though, Hong Kong's MTR Corporation has defied the odds and delivered significant financial and social benefits: excellent transit, new and vibrant neighborhoods, opportunities for real-estate developers and small businesses, and the conservation of open space. The whole system operates on a self-sustaining basis, without the need for direct taxpayer subsidies.

MTR's railway system covers 221 kilometers and is used by more than five million people each weekday. It not only performs well—trains run on schedule 99.9 percent of the time—but actually makes a profit: \$1.5 billion in 2014. MTR fares are also relatively low compared with those of metro systems in other developed cities. The average fare for an MTR trip in 2014 was less than \$1.00, well under base fares in Tokyo (about \$1.50), New York (\$2.75), and Stockholm (about \$4.00).

One important reason the system has been able to perform so well is that the government of Hong Kong has enabled MTR to make money from the property-value increases that typically follow the construction of rail lines. The key is a business model called "Rail plus Property" (R+P). For new rail lines, the government provides MTR with land "development rights" at stations or depots along the route. To convert these development rights to land, MTR pays the government a land premium based on the land's market value without the railway.

MTR then builds the new rail line and partners with private developers to build properties. The choice of private developer is made through a competitive tender process. MTR receives a share of the profits that developers make from these properties; this share could be a percentage of total development profits, a fixed lump sum, or a portion of commercial properties built on the site. By capturing part of the value of the land and property around railway lines, MTR generates funds for new projects as well as for operations and maintenance. That is why it does not need government subsidies or loans. Revenues from R+P developments above stations along MTR's Tseung Kwan O line, for example, financed the extension of that line to serve a new town, which has since grown to a population of 380,000.

MTR has applied the R+P model extensively. Buildings sit over about half of the system's 87 stations, amounting to 13 million square meters of floor area. New projects being planned or developed will add another 3.5 million square meters. A large proportion of MTR's current investment-properties portfolio of more than 267,000 square meters came from the sharing of assets.




The financial advantages of the R+P model have been proved over time. Instead of having to pay construction costs or take on the risks of building a world-class railway, the government collects proceeds from the land premium and profits from its roughly 76 percent stake in the company, which is listed on the Hong Kong Stock Exchange. During the 2014 financial year, MTR paid \$590 million in dividends to the government. The R+P model also allows MTR to implement railway projects relatively quickly because it does not have to compete for public funds.

This model has become more than a source of railway financing; it is a critical part of Hong Kong's urban-development approach. Planners and government agencies seek to make every new railway line or extension into a corridor where well-planned, high-quality communities can flourish.

R+P developments are not featureless places that people want to rush through. They offer amenities that let people meet their everyday needs: buying coffee in the morning, checking email and accessing information over free Wi-Fi, getting laundry done, or picking up dinner. With pedestrian corridors linking railway stations to surrounding buildings and parks, R+P developments anchor compact, pedestrian-friendly, and appealing communities. During Hong Kong's famously heavy rainstorms and typhoons, the residents of R+P developments are prone to boast of how they can commute without getting wet.

Through R+P, Hong Kong has demonstrated how integrating railway expansion with property development can help make public-transit systems financially self-reliant while also promoting sustainable urban growth. Can other cities replicate this model?

R+P works in part because of Hong Kong's specific characteristics. The city's dense population and scarce land make real estate highly valuable, which helps R+P developments generate reasonable profits. People in Hong Kong are accustomed to living close to transit facilities and are inclined to appreciate the convenience of linked railway and property developments. Furthermore, the government's mandate that MTR operate according to prudent financial principles gave both sides a stake in finding a financially sustainable model for developing the city along railway corridors.

Even though Hong Kong is a unique case in many respects, other cities can still draw lessons from MTR's experience with the R+P model. Encouraging commercial and residential development near transit hubs, for example, is something that many cities can do. Another lesson is to consider allowing transit systems to capture some of the value of the real estate along their routes. Profit-sharing deals with developers, partial ownership of new developments, and on-site property rentals can all yield revenue to help pay for new investments in transit. These approaches can ease the financial strain of expanding public transit while making cities better places to live and work. 

**Lincoln Leong** is the CEO of MTR Corporation.



# The Brazilian experience in financing infrastructure

Interview with Joaquim Levy by Rik Kirkland

A former finance minister makes the case for openness and discusses “de-risking.”

**Joaquim Vieira Ferreira Levy**, a former finance minister of Brazil, is the chief financial officer and managing director of the World Bank Group. He spoke with McKinsey’s Rik Kirkland during the 2015 Global Infrastructure Initiative conference on how to encourage the flow of capital to infrastructure projects.



**McKinsey:** What factors need to be in place to attract capital for big infrastructure projects?

**Joaquim Levy:** Over the past 20 years, according to the World Bank Group, Brazil was the country that received the most private investment for infrastructure among emerging markets. Most of Brazil's infrastructure is already run by the private sector—from ports to airports, roads, water, energy, and telecommunications. The Brazilian experience is that a major factor for getting things done right is to have consultations when you do a project, so that people build trust in the process. This is very important because often there are social risks and environmental risks, even in good projects. Interacting with people from all walks of life reduces the overall risk of complex projects. Openness is also crucial in the engineering phase. In Brazil, the government wants to improve the mechanisms to solicit inputs from the design community, with a view to get better, more innovative projects.

**McKinsey:** Are you saying that it reduces risk to spend time up front on consultation?

**Levy:** It does make a difference. Brazil is going to rely more on capital markets as a way to harness savings from domestic and global institutional investors. When you issue a security, a high level of disclosure is required. You have to show the market a good cost-benefit analysis. You have to get good engineering. You have to show that you addressed the concerns of stakeholders. It's more open than when you just deal with a few banks. Relying on capital markets for infrastructure finance is a global challenge—and a global opportunity. The good thing about Brazil is that the country is large and diverse, so anything that works there can be an example for other countries. This is why Brazil has partnerships with the World Bank and other institutions to develop new financing instruments to make it easier for the fixed-income investment community to finance infrastructure. That can have big repercussions in other places.

**McKinsey:** What else do you consider as important to trigger the interest of global capital markets?

**Levy:** It is worth taking a step-by-step approach when you are developing new financial instruments. For instance, Brazil has a multibillion-dollar investment plan for logistics, mostly roads, ports, and airports. Many of these projects are brownfields, such as the replacement of a road. Because a road already exists, the government knows the economic activity around it, the traffic, and the potential profitability of replacing it. And it has the building licenses. That makes these brownfields relatively low-risk projects, making them a good way to pilot a new type of financing. That is exactly what the country is trying to do by starting a program of project bonds with specific guarantees with these investments. You get an enhanced bond that fits well with the risk profile of the infrastructure to be financed.

**McKinsey:** What areas have potential for private investment?

**Levy:** Almost any infrastructure segment can benefit from private investment. Up to ten years ago, Brazil had very little investment in sanitation. Sanitation is not glamorous, and it's a lot of work. And the public sector was cash strapped. Then the government created a reasonable regulatory environment, and more towns started to use the private sector to provide water treatment and sewage in the past four or five years. In this case, where the social side is very important, the secret is to also be mindful of affordability. What you provide and the type of contract adopted have to match people's ability to pay for the service. In Brazil, this has been considered in most cases, and people have been ready to pay for reliable service.

**McKinsey:** Do public-private partnerships (PPPs) have a role?

**Levy:** Yes, especially when a pure cost-recovery scheme is not affordable. However, it has to be done right. In some countries, people jumped into PPPs and were later disappointed, because they realized that, "Well, it's not free. The government will have to pay part of the cost." In Brazil, the government made it clear that the public sector had a financial responsibility. There, PPPs are an on-balance-sheet operation with clear limits on commitments of the public sector. PPPs can be a powerful tool to provide affordable and efficient solutions if done with transparency from the outset.

**McKinsey:** Are you optimistic about infrastructure-backed securities?

**Levy:** I believe there is a strong potential demand for infrastructure bonds. If projects are bankable, they can ensure an income stream that does not fully depend on the government. Of course, any income depends on the overall macro conditions, but project bonds are not just backed by government taxes aimed at financing public expenditure. With infrastructure bonds, you're putting your money on something that will expand productive capacity and generate new income streams. So, it's a smart way to invest money. The beauty of infrastructure is that in the short term, it creates demand, because it generates jobs in the construction sector, and in the medium term it also creates new supply. It expands potential output, which is the way to sustain increases in jobs and income, especially in countries like Brazil.

**McKinsey:** Are private sources of finance, in a sense, under-remunerated for the benefits that the projects create? They're creating a lot of positive externalities, which aren't necessarily reflected in their returns.

**Levy:** Opportunities exist for those who have to manage resources to diversify away from just government bonds, which are paying very low interest and may have fiscal risks in the



future. With project bonds, you have real assets backing your income stream. Therefore, when you look at remuneration, you should think not only about externalities for those benefiting from the infrastructure but also about the diversification obtained by investors.

**McKinsey:** In an era of low and even negative interest rates, it seems strange that there hasn't been more institutional money going into infrastructure. Is it that there are impediments, in the form of regulations, for example, to the flow of money?


**Levy:** It can be a bit puzzling, indeed. In any case, when you look back over the past 150 years, there have been two leading ways to finance infrastructure—government funds and capital markets. Capital markets are the natural way to get long-term finance, and this is what project bonds can do for institutional investors. But you may have regulatory restrictions, such as ceilings in the share of these bonds in one's portfolio or stringent liquidity requirements for those carrying project bonds. It is something to be explored.

In this respect, Brazil has recently changed some of the regulations for the insurance companies and the pension-fund system, allowing them to have a larger share of their investments in infrastructure bonds. However, a government cannot look at financial regulations only. It also has to be conscious of the limits on the risk appetite of institutional investors. A fixed-income investor will require a significant degree of predictability surrounding any investment, independent of the guarantees or enhancements a project bond may have. And governments have to find ways to address that.

This is particularly critical for democratic countries. In some countries, you can talk to a few officials and get a project going with lots of guarantees. You bring the money, and you're happy—or sometimes, not so happy. In countries like Brazil, it's different. There are many actors. So to build a project that is bankable can be complicated. Governments are now focusing on this, ensuring that that licensing will come at the right time, and working with different stakeholders to get a level of risk that is compatible with investors' expectations.

This is important, because a word that you hear a lot in the institutional-investment and asset-management communities is, “de-risking.” You may get this by burdening the public sector with all sort of guarantees, or you can reduce the risk of the project itself by improving the operating environment. I am convinced that a major role for the public sector in infrastructure is to coordinate the large number of actors that are needed to move big projects, including agencies, financial regulators, and others. This means providing not only a vision but also a healthy environment. This has to be the priority.

**McKinsey:** Are there practical ways to do this?

**Levy:** Let's look at energy, which in Brazil has a large degree of participation from private investors. Wind power has had great success in the past few years. And why is that? Because wind power is an activity based mostly in fixed costs. The wind is free. So the key was the ability to provide a long-term contract to support the investment in building the units. Brazil has developed a mechanism to consolidate the demand forecast produced by private distributors and organize the supply of new capacity through structured auctions where producers can bid for long-term contracts. So, investors can manage their main risk. With this mechanism, Brazil has attracted many private investors, who built ten gigawatts in capacity in just a few years. That created a completely new industry and has transformed the way some regions in Brazil get their electricity. The challenge now is to extend these kinds of opportunities to a broader range of long-term private investors. 

**Rik Kirkland** is senior managing editor of McKinsey Publishing, based in McKinsey's New York office.





# Remember the people: The foundation for success in 21st-century infrastructure

**Andrew Macmillan**

Bringing the consumer experience back into the infrastructure discussion.

**Within the infrastructure industry**, there is lively debate about innovation, renewal, and new capacity. What should we be building? How? Where do we find the funding? What

contract structures or regulations will entice private investors? Financiers, designers, and engineers discuss these questions constantly.

But there is something missing from this discussion: the consumer. Ultimately, it is people who use infrastructure and people who pay for it. The consumer experience matters. Infrastructure providers therefore need to tap into the disciplines and insights of great consumer service companies, such as movie studios, retailers, and tech companies. We can also learn from our industry's direct customers, such as airlines and railroads.

All infrastructure businesses know they have to concentrate on the nuts and bolts, literally, of their operations. But the best firms will go beyond the ABCs and add an "S"—for service, stakeholders, and sustainability. These "S words" will be critical for companies to create competitive advantage and to sustain long-term value.

**Service:** In the movies, airports are usually anonymous places where the characters undergo ritual processing. That may be artistic exaggeration, but we have to admit that there is something to it. In some of the focus groups we run at Heathrow, passengers say that airports can feel like machines where they are just cogs.

Of course, efficient and reliable service matters, but it is not everything. Great service businesses recognize that people don't just want to be processed; they also want to feel connected. Infrastructure providers are beginning to understand this. Consider the revamped St Pancras/Kings Cross station complex in London. Integrated into a revitalized neighborhood, the stations include distinctive Anglo-French themed shops (because Kings Cross is the last stop for the Eurostar train between France and the United Kingdom); premium apartments in a restored neo-gothic building adjacent to the station; and even fun cultural touches, such as a Platform 9  $\frac{3}{4}$  (derived from the Harry Potter books). Kings Cross is not only about the trains running on time. It is also a destination in itself—a place to visit, linger, work, and live.

At Heathrow Airport, we are focusing on this wider concept of service. In the new Terminal 2 (also known as the Queen's Terminal), which opened in 2014, we chose a shopping theme of the "best of Britain," accentuated with distinctly British touches, such as illuminated London cabs. The longest sculpture in Europe (79 meters), an aluminium icon known as Slipstream, welcomes people to the building.

Creating an emotional connection means that people providing the service need to connect, too. In opening Terminal 2, Heathrow invested heavily in a program known as "Walking in our Passengers' Shoes" to help us understand our passengers' needs. Everyone from frontline employees to top managers took on personas of key types of passengers – say a family on holiday, or someone in a wheelchair – to experience the airport journey through their eyes. The result was a new level of empathy and insight

that helped us to improve the airport experience, often in details that are hard to track on a dashboard but make a huge difference for a traveller in a busy place like Heathrow. We continue to reinforce that knowledge by constantly accumulating information, including from social media and instant feedback terminals.

As a result, consumer satisfaction is improving. On the Airport Service Quality Survey, Heathrow has moved from a poor position among European hubs to among the highest scoring, with Terminal 2 in particular scoring well. That has real commercial value – in terms of higher retail spending, more efficient operations, and growing numbers of passengers. There is a clear relationship between surveys of passengers' happiness at security and how much they spend in airport stores. A happy passenger is far more likely to unwind in the departure lounge by buying that extra bottle of perfume or whisky. Similarly, a frequent flyer changing planes has a choice as to where they connect for their next trip to Europe. They are more likely to choose the airport that made them feel like a person than the one that harried them from one aircraft to the next.

**Stakeholders:** Many infrastructure businesses—like airports—are a platform for other businesses (airlines, retailers) to serve consumers. Infrastructure is also by definition hard to move and lasts a long time. These factors mean that infrastructure businesses may have to answer to many different stakeholders. For Heathrow, this group includes local residents, unions, companies operating in the airport, commercial leaseholders, airlines, and local and national governments. All can have profound impact on strategy. For example, we do not set prices on our own airport passenger charges, and we must consult with airlines on our own capital investments. Politicians and local residents ultimately decide how big we can grow—as the continuing debate over whether to add a third runway at Heathrow demonstrates.

For a private investor, this might feel intrusive. Being part of this web of obligations, however, can also be a source of opportunity. For example, Terminal 2 implemented the world's first check-in that accepts passengers from different airlines at the same desk. This saves space and costs and adds capacity efficiently. But this change also required dozens of airlines to adapt their global processes—something that was only possible because they had been involved with the design and implementation of the terminal from early on. In effect, Heathrow had to let others help call the shots to provide better service. Fewer than 10 percent of the 76,000 people who work at Heathrow work for the airport company. We can only deliver service as part of a team.

**Sustainability:** Traditional consumer-goods businesses have led the way in developing distinctive leadership on social and environmental issues. But many environmental priorities, such as the transition to lower-carbon power, cleaner transport, and better water management, have obvious relevance to the infrastructure sector. We need to




continue to build infrastructure to support economic growth, but the public will not back projects that do not meet high standards.

Many infrastructure projects are, in fact, seeing big leaps forward in sustainability. For example, the new Terminal 2 reused nearly all of the building fabric, such as steel, brick, and concrete, from the old terminal. We have redeveloped Heathrow's expansion proposals so that fewer people will be affected by aircraft noise than today, even with more flights.

It is vital that we not only make objective progress but also ensure the public can understand how the new project will affect them. For example, we built upon an immersive "Sound Lab" developed for high speed trains to demonstrate aircraft noise scenarios via virtual reality. This has helped noise campaigners, policy makers, and investors to understand the issues and to work together to figure out ways to reduce the impact of noise.



The technical details of financing, design, and construction are important. But so is the human element. Consumers are voters and neighbors. They care about their families and communities. And they will only support development if they believe that their interests will be protected, and their lives enhanced. Remembering that may make building infrastructure more complicated, but it is also essential for success. 

**Andrew Macmillan** is Strategy, Economics and Regulation Director at Heathrow Airport.



## The leadership challenge: Building the future of global infrastructure

**Jordan L. Brugg, Suzanne M. Burns, Arnaud Despierre, Hugh Thorneycroft, and York von Wangenheim**

Diverse stakeholders, complex projects, and straitened budgets: a survey of global infrastructure leaders defines the challenges to the industry—and how to address them.

**What are global infrastructure leaders worried about?** Keeping a step ahead of the pace of change, for one. Managing increasingly complex projects and heightened consumer expectations, for another. And, of course, finding the right talent.

These were the responses from the ten CEOs or chairs of infrastructure companies from Asia, Europe, and North America that Spencer Stuart interviewed; in addition, it surveyed more than 100 senior executives from around the world, asking where they saw the industry advancing with respect to growth, leadership, risk, and strategic trends.

Their answers revealed a number of common elements. For example, there was consensus that new digital technologies, such as computer-aided design, are bringing the “paperless building site” close to reality. Getting there, though, means investing in new equipment and training; electrical and mechanical engineers could become as important, or more important, than civil engineers.

Respondents mentioned budget constraints as a major trend. Because of declining public expenditures in many markets, infrastructure companies are developing new business models that enhance the role of the private sector, most notably through the increased use of public-private partnerships. Noted one American CEO in the aviation sector, “We are moving from a public infrastructure/government mind-set to a strong business mind-set.”

A general concern was that as projects become more complex—and there was no dispute that they are—planning horizons are longer, as is the time needed to recoup investment. “Positioning the right infrastructure at the right time is quite challenging,” one CEO said. “How do you do it in an environment where the future demands you are planning for could be quite unpredictable?”

All this is made even more difficult because infrastructure companies must deal with an increasingly diverse and demanding set of stakeholders, including the general public. These stakeholders can quickly mobilize for or against major infrastructure projects, which can have big, even transformative, effects on local communities. Leaders must therefore be attuned to public opinion and be able to engage hearts and minds. This includes knowing how to communicate effectively through social media and other platforms.

To an extent never seen before, the sector is becoming more consumer oriented. That is an acquired taste for many leaders, but one that they are going to have to get used to. “In infrastructure, it is very hard to win more customers,” one chairman told us, “but easy to lose them if you slip in a minor way in delivering a service. Invisible excellence is taken for granted.”



## Unlocking leadership at all levels

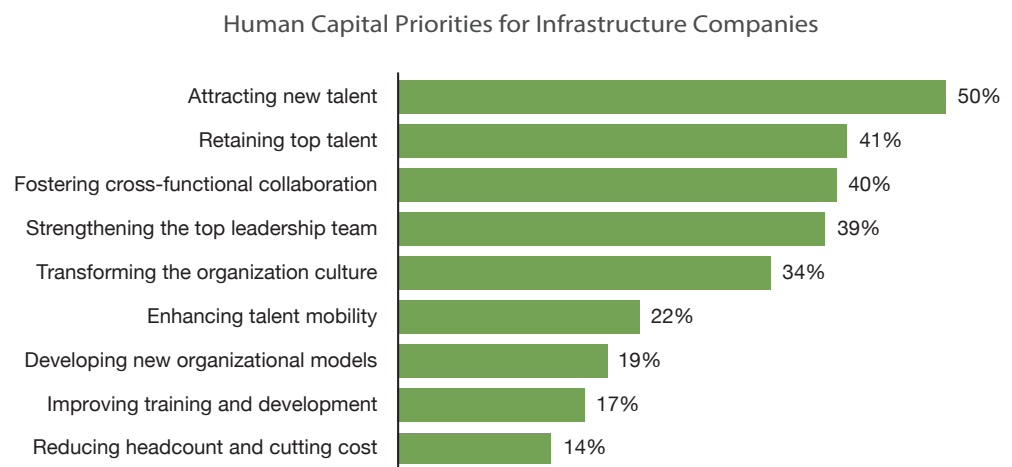
Given the complexity of these issues, the question of who is at the helm is more important than ever. Successful leaders need to be consumer savvy, social-media tuned, and IT capable, while also being mindful of financial and regulatory concerns and adept at meeting the needs of partners and other stakeholders. They must be able to unlock knowledge and capabilities across the entire organization and to lead cultural change that places consumer awareness and social impact high on the agenda. And they need to do all this while working with people across a multitude of disciplines, including bankers, engineers, and lawyers.

That is a daunting list of qualities, and while not every chief executive can have all of them, these do need to exist at different levels of the organization. Given the increasing number of functions and disciplines needed to govern the business, CEOs must build a skilled and agile senior team.

And yet our survey found that across the board, leaders have difficulty attracting and retaining talent with the right mix of leadership and technical skills. The shortage of skills is broad, including the skilled engineers, project managers, tradespeople, and commercial, financial, and technical experts. According to the survey, attracting new talent is the top human-capital priority; retaining it is second (Exhibit).

### Exhibit

Infrastructure leaders rank talent as a top human-capital priority



<sup>1</sup> Respondents were asked, "What do you see as the most important human-capital imperative for your business for the next two to five years?" They could give up to three answers.

Here are several approaches that can help:


**1. Think outside the sector.** Infrastructure companies tend to promote from within the industry. But because the sector is facing change on so many fronts, executives also see a need to strategically recruit from outside the sector. Engineering skills will always be critical, but financial, IT, and legal expertise is also necessary. Bringing in talent from outside can help revitalize companies—but that also means competing against top banks, consultancies, and law firms. This is not easy; doing so, however, will raise the talent bar across the board.

**2. Implement talent benchmarking.** When it comes time to hire or make appointments, talent benchmarking can help immensely, even if the intent is to promote from within. “We like to grow our own timber, but when we promote from within, we often do exhaustive external benchmarking to determine if this person is the best for the job relative to someone outside,” one CEO told us. Benchmarking acts as a safeguard against excessive insularity, while also enforcing high standards.

**3. Foster cross-functional capability.** Cultivating a blend of skills and expertise is necessary, but so is addressing particular pain points. For infrastructure companies, a pressing concern involves the pipeline of engineers, who are on the front lines not only of operations but also of managing technology change. It is not easy, for example, to find construction engineers who are used to working in the digital sphere (or vice versa). Encouraging people to move beyond their core skills is important to foster an adaptable and engaged workforce.

**4. Tell the story.** To address talent shortages and to compete with other kinds of companies, infrastructure companies must build and communicate a solid value proposition. In this, they may actually have an advantage. Building infrastructure is inherently exciting; it also carries a profound sense of purpose. “The best way to attract people is to have great projects,” said one executive. “Money and conditions are important, but the best people want to work on the best projects.”



The global infrastructure industry faces both internal challenges, such as talent shortages, and external pressures, such as keeping pace with technology advancements. To cope with all this, the indispensable factor is to find, hire, and keep skilled people. That is easier said than done—but it can be done. 

**Arnaud Despierre** and **Hugh Thorneycroft** lead Spencer Stuart’s initiatives in the global infrastructure industry; **Jordan Brugg**, **Suzanne Burns**, and **York von Wangenheim** are members of Spencer Stuart’s global infrastructure group.



## Financing change: How to mobilize private-sector financing for sustainable infrastructure

**Aaron Bielenberg, Mike Kerlin, Jeremy Oppenheim, and Melissa Roberts**

Increased interest and commitments from the private sector will reveal stubborn challenges—and also create new economic opportunities.



In 2015, an international architecture for sustainable development began to take shape. Building on the United Nations' Financing for Development Agenda in Addis Ababa and then the formal adoption of the Sustainable Development Goals in September, the year culminated in the Conference of Parties (COP) 21 in Paris. Almost 190 countries, accounting for more than 98 percent of greenhouse-gas emissions, agreed to a global climate-change strategy.<sup>1</sup> Each country submitted a voluntary plan, or intended nationally determined contribution (INDC), that set out how it will move its economy onto a lower-carbon growth pathway. Signatories have agreed to update their progress in 2018, and the terms of the Paris Agreement envisage higher targets for the INDCs over time, beginning in 2020. With this structure in place, attention is shifting toward how to implement and finance more sustainable growth.

While the INDCs will take years to play out, one likely effect is to shift investment, both public and private, toward more sustainable projects, including infrastructure. There are already substantive changes in the financing landscape. Each of the six

## Sidebar

### What is sustainable infrastructure?

In this report, infrastructure includes projects relating to power, transport, telecoms, and water and waste. "Sustainable infrastructure" is projects that are socially, economically, and environmentally sustainable.

**Socially sustainable:** Sustainable infrastructure is inclusive and respects human rights; it is designed to meet the needs of the poor by increasing access, supporting poverty reduction, and reducing vulnerability to climate change. For example, distributed renewable power in previously un-electrified rural areas can increase household income and improve lives by reducing time spent on household chores.

**Economically sustainable:** Economically sustainable infrastructure provides jobs and helps boost GDP. It does not burden governments with unpayable debt or

users with painfully high charges. It also seeks to build the capabilities of local suppliers and developers.

**Environmentally sustainable:** Environmentally sustainable infrastructure mitigates carbon emissions during construction and operation and contributes to the transition to a lower-carbon economy, for example, through high energy-efficiency standards. It is resilient in the face of climate-change risks such as sea-level rise and the possibility of extreme-weather events. It also addresses local environmental challenges, especially regarding water provision and air quality.

Sustainable infrastructure can also employ different ways of meeting infrastructure service needs, such as demand-side management systems and responsive power grids.

<sup>1</sup> CAIT Climate Data Explorer, World Resources Institute, [cait.wri.org](http://cait.wri.org).

<sup>2</sup> "Delivering climate change action at scale: Our commitment to implementation," Joint Statement by the Multilateral Development Banks at Paris COP21, [worldbank.org](http://worldbank.org).

<sup>3</sup> Mission Innovation: Accelerating the Clean Energy Revolution, [mission-innovation.net](http://mission-innovation.net).

major multilateral development banks, for example, has committed to significantly increasing its allocations to climate finance, by as much as two to three times.<sup>2</sup> The 20 governments that represent 80 percent of current global clean-energy research and development have pledged to double such investment in the next five years.<sup>3</sup>

This has been matched by increased interest and commitments in the private sector. A coalition of corporate leaders from around the world, the Breakthrough Energy Coalition, has pledged to invest billions in research and development of green energy.<sup>4</sup> Major institutional investors have pledged to decarbonize their investment portfolio and to assess the carbon footprint of their assets as part of the Portfolio Decarbonization Coalition.<sup>5</sup> As these commitments reverberate through the markets, they will reveal stubborn challenges—and also create new economic opportunities.

How countries build and operate infrastructure will be a major factor in whether they can deliver on their INDCs. In light of Paris, many countries are likely to scale up their investment in sustainable infrastructure—defined as infrastructure that is socially inclusive, low carbon, and climate resilient. Given the scale of investment required, creating the right conditions for private-sector investment is essential.

From 2015 to 2030, global demand for new infrastructure could amount to more than \$90 trillion, according to the New Climate Economy's 2014 report, *Better Growth, Better Climate*; the value of the world's existing infrastructure is \$50 trillion. In a sense, then, we will be literally building our world—for better or worse. Doing it sustainably will likely increase up-front capital costs by 6 percent or more for individual projects. Over a project's life cycle, however, sustainable infrastructure can save money and generate healthy economic returns, while reducing risks and negative externalities at the local and global levels.<sup>6</sup>

Current infrastructure spending of \$2.5 trillion to \$3 trillion a year is only half the amount needed to meet the estimated \$6 trillion of average annual demand over the next 15 years. More than 60 percent of this financing gap is likely to be concentrated in middle-income countries—those with per capita incomes between \$1,045 and \$12,745—and more than 50 percent in the power sector. Domestic capital markets will be pivotal to financing investment, particularly the banks, pensions, and insurance companies that are growing fast and hold more than 80 percent of institutional assets under management (AUM) in middle-income countries.

The financing gap for sustainable infrastructure is in large part the result of poor policies, institutional failures, and lack of investor familiarity with greener technologies and projects. Because infrastructure has strong public-good characteristics, typically requires large-scale capital mobilization, and is highly sensitive to local politics, governments have always played a central role. However, the scale of infrastructure

---

<sup>4</sup> Breakthrough Energy Coalition, [breakthroughenergycoalition.com](http://breakthroughenergycoalition.com).

<sup>5</sup> "Allianz, ABP join Portfolio Decarbonization Coalition, aligning portfolios with low-carbon economy," United Nations Environment Programme News Centre, December 7, 2015, [unep.org](http://unep.org).

<sup>6</sup> Shannon Bouton, David Newsome, and Jonathan Woetzel, "Building the cities of the future with green districts," May 2015, [mckinsey.com](http://mckinsey.com).

spending required over the next 15 years, coupled with widespread public-sector fiscal constraints, means that private finance will be increasingly important. A positive “enabling environment”—that is, one characterized by sound policies, effective institutions, transparency, reliable contract enforcement, and other sector-specific factors—makes it easier to mobilize private finance. Conversely, a poor enabling environment—one characterized by distorting subsidies, unreliable counterparties, and flawed procurement processes—can raise the cost of private finance to the point where infrastructure projects are no longer economically viable.

Encouraging enough private-sector investment in sustainable infrastructure at reasonable cost will require overcoming or removing five major barriers:

- **Lack of transparent and “bankable” pipelines:** Even in the G-20, only half the countries publish infrastructure pipelines.
- **High development and transaction costs:** Thirty percent of investments in new clean-energy capacity go to small-scale projects such as rooftop solar; such projects do not naturally generate the economies of scale that can keep costs down.
- **Lack of viable funding models:** Up to 70 percent of water provided by utilities in sub-Saharan Africa is leaked, unmetered, or stolen; therefore not enough revenue is generated to maintain or expand the system.
- **Inadequate risk-adjusted returns:** Investors may be willing to take on sustainable infrastructure but want higher returns to compensate them for the perceived risks. Infrastructure projects are also notoriously prone to corruption, creating significant additional risks.
- **Unfavorable and uncertain regulations and policies:** Basel III and Solvency II regulations could have the effect of reducing investment in infrastructure at the global level; uncertain tax policies can do the same at the national level. The fact that sustainable-infrastructure projects typically have higher up-front capital costs makes them even more sensitive to the cost and availability of capital.

To build sustainable infrastructure on the scale needed, all kinds of investors have to increase the quantity and quality of their financing—the private sector most of all. Right now, private investment accounts for up to half of total infrastructure spending—\$1 trillion to \$1.5 trillion a year; 65 percent to 75 percent of that comes from corporate actors, and the rest from institutional investors, such as private equity (PE) and pension funds. Private institutional investors could fill up to half the financing gap—provided that they can identify projects that are bankable and sustainable (Exhibit).

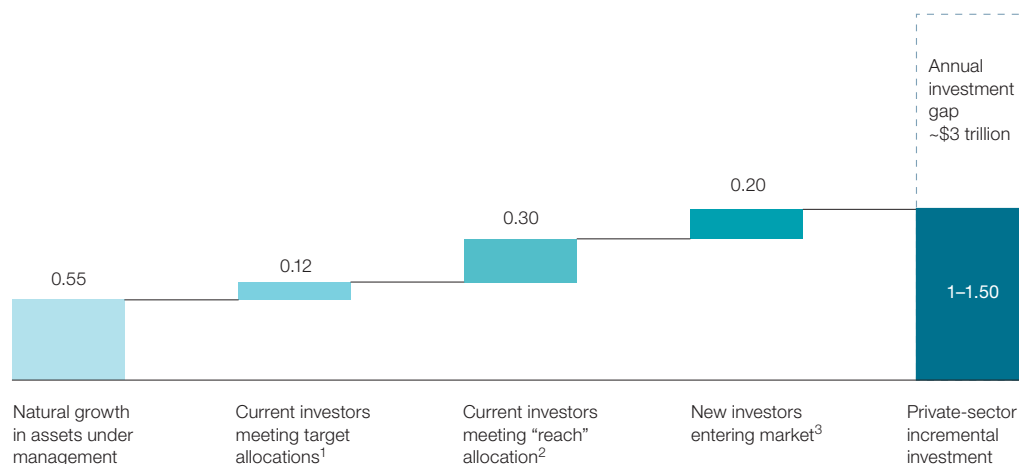


## Exhibit

Private institutional investors could fill up to half of the financing gap.

### Private institutional investors could fill up to half the financing gap.

Potential incremental annual spending from private institutional investors,  
\$ trillion



<sup>1</sup>Weighted average target allocation = 5.96% across investor groups.

<sup>2</sup>"Reach" allocation defined as 8% weighted average across investor groups.

<sup>3</sup>Assumes 60% of non-infrastructure investors begin investing at level comparable to peer current allocations.

Source: Preqin Infrastructure Online, Funds and Limited Partnership Investors, June 2015

There are a number of ways this investment can be made more efficient and effective. A critical first step is to strengthen the enabling environment and to reassure investors that policies will be consistent. Second, actions that improve underlying institutional performance, especially around procurement practices, will boost confidence.

This is particularly important in regard to cross-border finance, which carries extra risk because of exchange-rate movements. Finally, every project needs to fulfill a social need with economic benefits that are greater than the project costs. If these conditions are not met (at least to a first approximation), no amount of fine-tuning the design of financial instruments will make a difference in changing the risk perceptions of private investors.

While capital markets exist to mobilize large-scale investment, they are naturally skeptical about sectors and asset classes that they are unfamiliar with or where they perceive high political risks or project failure. There are six ways to encourage more capital to go toward sustainable infrastructure:

- **Scale up investment in sustainable project preparation and pipeline development.** Governments and development banks should focus investment on project-preparation facilities and technical assistance to increase the "bankability" of project pipelines (meaning those that have an attractive economic profile). This is the


highest-risk phase of the project life cycle; it is critical to get right; and it is subject to significant rent-seeking conduct. Given a chronic shortage in many developing countries of the right developer equity/expertise, this is an arena in which the right financing facilities could have disproportionate returns.

- **Use development capital to finance sustainability premiums.** Encourage development banks and bilateral-aid organizations to provide financing for the incremental up-front capital spending required to make traditional infrastructure projects sustainable, in economic, social, and environmental terms. Attract private-sector financing by demonstrating that risk-adjusted returns can be competitive with those of traditional infrastructure, even if the policy settings and prices do not fully reflect the total benefits of greater sustainability.
- **Improve the capital markets for sustainable infrastructure by encouraging the use of guarantees.** Increase development-bank guarantee programs for sustainable infrastructure by expanding access to guarantees. Insofar as these guarantees price in sustainability benefits, they could help to overcome the policy-sensitivity of these investments, reducing risks for private investors.
- **Encourage the use of sustainability criteria in procurement.** Governments should strengthen sustainability criteria in both public-procurement processes and public-private partnerships.
- **Increase syndication of loans that finance sustainable-infrastructure projects.** Encourage development banks to expand loan syndication and create a larger secondary market for sustainable-infrastructure-related securities. This would increase institutional-investor familiarity with the asset class, reduce transaction costs, and allow the recycling of development capital.
- **Adapt financial instruments to channel investment to sustainable infrastructure and enhance liquidity.** “Yieldcos” or “green bonds” have characteristics similar to traditional investment instruments, but with an emphasis on sustainability. Increasing use of these instruments could unlock investment from previously restricted investors, lower transaction costs, and reduce barriers to entry.

Provided that countries are putting the prerequisites of better policies, institutions, and project-development practices in place, there are opportunities to improve the speed, scale, and pricing with which private capital could flow into sustainable-infrastructure investment. If capital markets were perfect or could respond instantaneously, then it is possible that some of the actions proposed in this report would be redundant. However, in the real world, there is ample evidence of pervasive imperfections in the capital markets, partly due to policy and regulatory rules (for example, which result in risk mispricing or excess capital weighting for specific asset classes) and partly

due to institutional conduct and agency factors. Given their limited direct exposure to infrastructure risk, institutional investors are naturally cautious about increasing their exposure to this asset class. That is why a muscular set of nudges and risk-sharing instruments are required: they can shift perceptions and get capital to flow.



If the world is serious about meeting the Sustainable Development Goals, including climate goals, accelerating the flow of private capital into sustainable infrastructure has to be part of the answer to building and sustaining urban, transport, water, and energy systems that the world needs. This report examines how to make that possible. 

**Aaron Bielenberg** is an associate principal in McKinsey's Washington, DC, office, where **Melissa Roberts** is a consultant; **Mike Kerlin** is a principal in the Philadelphia office; and **Jeremy Oppenheim** is a director in the London office.





## Improving disaster recovery

Ben Cheatham, Anne Healy, and Becca O'Brien Kuusinen

When natural disasters strike, governments step up. Here's how they can improve the odds of a successful long-term recovery.

**We live in a world** where natural disasters are increasing in frequency and severity. A large proportion of disaster-related losses are borne by governments: for example, estimates suggest that the United States has a disaster-related unfunded liability that could be even greater than that of Social Security (up to \$7.1 trillion versus \$4.9 trillion).<sup>1</sup>

---

<sup>1</sup> Kate Sheppard, "Flood, rebuild, repeat: Are we ready for a Super Storm Sandy every other year?," *The Atlantic City Lab*, July 29, 2013; J. David Cummins, Michael Suher, and George Zanjani, "Federal financial exposure to natural catastrophe risk," in *Measuring and Managing Federal Financial Risk*, ed. Deborah Lucas, Chicago: University of Chicago Press, February 2010. Range depends on assumptions of growth and discount rates.

And governments across the world increasingly share the common challenge of having to design and lead expensive and complex recovery efforts that often take years.

Yet the elements of recovery coordination—aligning internal stakeholders, getting input from stakeholders, allocating and managing public resources, and delivering services and benefits—are functions governments perform every day. So why does disaster recovery seem so difficult? We examined lessons learned from working with governments around the world at all levels, and found that governments face four common challenges in the aftermath of disasters: heightened political pressure and public scrutiny to “get money out the door,” the time it takes to receive and spend recovery money, being confronted with a magnitude of resources and complexity of tasks that leaders are (appropriately) unprepared to administer, and an aversion to making bold organizational changes that are required for effective recovery governance.

The short answer is that because disasters are, by definition, unexpected and extraordinary, they place complex demands on public agencies. By applying our global experience to disaster recovery efforts in the United States, we have identified clear lessons for how governments can act in the immediate aftermath of a disaster to maximize the odds of a successful long-term recovery.

### Nine steps to successful long-term recovery

Getting the first several months right in the aftermath of a disaster contributes significantly to the odds of a successful long-term recovery. Why? Implementation time lines are longer than the public expects and require periods of preparation during which progress is invisible to the public. Completing this preparation before public scrutiny becomes too critical allows implementing governments to demonstrate visible progress much sooner. Moving swiftly also helps mitigate staff burnout by avoiding build-up of pressure associated with unmet expectations.

In the early days following a disaster, governments can set the stage for a successful long-term recovery by taking nine critical actions covering four dimensions of recovery: organizational capabilities, strategic focus, aligned execution, and community engagement. While no major US recovery effort to date has managed success across all dimensions, those recoveries with the best outcomes—the least public and media criticism and the fewest management challenges—have taken some combination of these steps. And while all nine actions are critical, their sequencing and timing also matter. Some actions, such as strategically phased procurement of recovery services (for example, case management for housing recovery, grant management IT systems, application processing services) are only successful to the extent they proceed from a prioritization framework aligned on by a core recovery leadership team.


1. [Appoint a strong, experienced leadership team and establish an integrated governance body.](#) Governments must quickly establish an organization to coordinate and deliver recovery programs. This organization should have direct accountability to the governor's or mayor's office to ensure rapid access and the high-profile executive sponsorship to remove or appropriately circumvent agency-level or interagency obstacles. Leadership of this organization should consist of a board and a high-level executive, ideally a chief recovery officer (CRO) experienced in complex program management in a highly regulated environment.
2. [Conduct a thoughtful, phased approach to strategic procurement of external expertise and implementation support.](#) Even when the government has established a recovery-management organization staffed with excellent public servants, every large-scale disaster requires the procurement of significant external support, especially for large, complex programs such as housing reconstruction or major-infrastructure recovery. Conducting these procurements well is critical for securing high-quality, cost-effective external contractors who deliver effective recovery programs. The consequences of poor management of procurements can be severe, and nearly every disaster-recovery effort experiences them: for example, a more effective procurement process could have accelerated one government's housing recovery time by as much as a year and reduced program delivery costs up to \$120 million.
3. [Establish a strong, dedicated recovery-management organization with a dual coordination-implementation mandate and hard-charging, performance-driven staff.](#) One of the first tasks a CRO often confronts is to build up a recovery-management organization (RMO) from scratch. An effective RMO has four critical features: independence, a mandate to both coordinate and implement recovery efforts, senior staff to manage specific areas of recovery programming and cross-cutting functions, and performance-driven staff.
4. [Develop a framework for prioritizing recovery needs to guide sequencing of rollout.](#) Recovery is an extraordinarily high-stakes environment, with many urgent needs. Developing a framework to prioritize those needs is critical for two reasons: certain needs are more immediate than others, and recovery funds are typically released gradually and may ultimately be insufficient to meet all needs.
5. [Develop a truly integrated budget based on the prioritization framework.](#) The prioritization of recovery needs should form the basis for a comprehensive road map of programs and an integrated budget for funding those programs. Development of this road map and budget is a complex task that requires a dedicated, public-finance-savvy team early in the process—state and local governments facing recovery should

establish a strong financial leadership team, identify and incorporate additional sources of funding, and build a system for tracking expenditures.

6. [Plan for and develop creative solutions to mitigate capacity constraints that the scale and urgency of the recovery will impose.](#) A large-scale disaster requires delivery of services at a scale and urgency very few governments are prepared for. Bringing on external vendors to run programs typically does not fully address the capacity constraints associated with this scale and urgency, and two types of capacity constraints are often especially problematic: government functions, where federal-program requirements or other constraints may prevent outsourcing of some areas of program implementation; and specialized skills, where certain skill sets simply may not exist in sufficient quantities at the local level.
7. [Invest early in developing a data infrastructure and reporting cadence.](#) Recovery organizations can truly balance recovery goals, like timeliness, fraud prevention, and cost-effectiveness, only if they have a performance management system that captures the right data, generates easy-to-understand reports on a frequent basis, is closely linked to decision-making processes, and is fully operational at an early stage of program implementation. While legal and regulatory compliance is important in the recovery context, often data platforms and reporting processes are focused too narrowly on serving a compliance function, rather than also enabling program managers to improve programs continuously based on real-time data.
8. [Implement bold innovations in the design of recovery programs and processes that move beyond traditional models for a better balance of the potentially competing goals of recovery.](#) In designing recovery programs and processes, state and local governments are faced with myriad potential goals that often may compete with one another. Every government engaged in a recovery process will face the challenge of having more demands than resources available. One critical approach for managing resource constraints in any setting, whether in the public or private sector, is through process innovation; disaster recovery should be no different.
9. [Make a meaningful commitment to community engagement and public communication.](#) Too many governments mistakenly treat a strong community-engagement strategy as a “nice to have,” rather than a critical component of their recovery efforts. With limited staff and massive programs to design and scale, decision makers may understandably view allocating time and resources to public engagement as a lower priority. But an early, meaningful commitment to engagement is critical to the success of recovery efforts, because it helps manage public expectations, fosters trust, and generates innovative ideas for recovery.





State and local government officials facing the daunting task of recovering from a major disaster can benefit from lessons learned by others. Setting the stage for recovery in the immediate aftermath of a disaster may be difficult for officials facing the more urgent needs of response, but the effort is critical for long-term success. State and local leaders should understand the most critical actions on the path to recovery. 

*The authors wish to thank current and former colleagues Sabrin Chowdhury, Ed Barriball, Katie Douglass, Justin Erlich, Garo Hovnanian, Shannon Peloquin, Ishanaa Rambachan, Amar Shibli, Jared Webber, and John Willey for their important contributions to this article.*

**Benjamin Cheatham** is a director in McKinsey's Philadelphia office; **Anne Healy** is an alumna of the Washington, D.C., office, where **Becca O'Brien Kuusinen** is an associate principal.

# Videos & podcasts

---

Our videos and podcasts help connect you with the leading voices in infrastructure today. Join the conversation: Click on an item and you can view and listen on our website.

We look forward to future conversations on these and other issues.

See more at [GlobalInfrastructureInitiative.com/voices](https://GlobalInfrastructureInitiative.com/voices)

## Videos



Building a pipeline of  
bankable projects →



Disruptive new  
delivery models →

## Podcasts



Navigating digital: Transforming  
transport infrastructure →

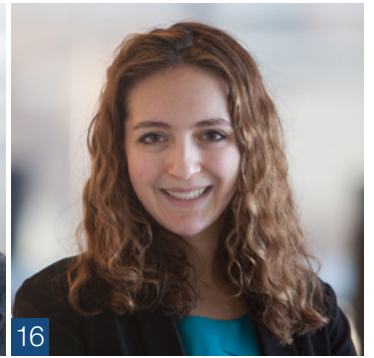


Enabling innovation in the  
construction sector →

# Authors

- 1. Aaron Bielenberg** is an associate principal in McKinsey's Washington, DC, office.
- 2. Jordan L. Brugg** is a member of Spencer Stuart's global infrastructure group.
- 3. Suzanne M. Burns** is a member of Spencer Stuart's global infrastructure group.
- 4. Ben Cheatham** is a director in McKinsey's Philadelphia office.
- 5. Arnaud Despierre** coleads Spencer Stuart's initiatives in the global infrastructure industry.
- 6. Tony Hansen** is Director of McKinsey's Global Infrastructure Initiative.
- 7. Anne Healy** is an alumna of McKinsey's Washington, DC, office.
- 8. Mike Kerlin** is a principal in McKinsey's Philadelphia office.
- 9. Rik Kirkland** is the senior managing editor of McKinsey Publishing, based in McKinsey's New York office.
- 10. Becca O'Brien Kuusinen** is an associate principal in McKinsey's Washington, DC, office.
- 11. Lincoln Leong** is the chief executive officer and a member of the Board of Directors and the Executive Directorate of Hong Kong MTR.
- 12. Joaquim Vieira Ferreira Levy**, a former finance minister of Brazil, is the chief financial officer and managing director of the World Bank Group.
- 13. Andrew Macmillan** is Strategy, Economics and Regulation Director at Heathrow Airport.
- 14. Tim McManus** is a vice president in McKinsey's Global Infrastructure Practice and is based in Boston.
- 15. Jeremy Oppenheim** is a director in McKinsey's London office.
- 16. Melissa Roberts** is a consultant in McKinsey's Washington, DC, office.
- 17. Hugh Thorneycroft** coleads Spencer Stuart's initiatives in the global infrastructure industry.
- 18. York von Wangenheim** is a member of Spencer Stuart's global infrastructure group.
- 19. Andrew Wolstenholme** is the chief executive officer of Crossrail.





## McKinsey & Company

Founded in 1926, McKinsey & Company is a global management consulting firm committed to helping institutions in the private, public, and social sectors achieve lasting success.

With consultants in 109 locations in 61 countries, working in every industry and function, McKinsey brings expertise to clients around the world.

## How McKinsey supports infrastructure

McKinsey's Capital Projects & Infrastructure Practice is a leading advisor on the planning, financing, delivery, and operation of infrastructure, real estate, energy, and resource assets. The practice helps clients by combining McKinsey's proven business problem-solving skills with engineering, construction, and technical expertise to make informed decisions on how to deliver and operate these assets faster, better, and at a lower cost.

Our reach spans all geographies, project stages and asset classes, including transport and logistics, city planning, oil & gas, chemicals, mining, and utilities. Our offering combines a global network of capital project and infrastructure experts with an extensive understanding of local markets and global trends. Leveraging our collective experience, proprietary tools and databases, we ensure world-class capital performance. Since 2010, we have served more than 600 clients on over 2,000 engagements, including work on 150 mega-projects, collectively valued at over one trillion dollars.

## Global Infrastructure Initiative (GII)

Our research suggests that up to 40 percent of global infrastructure investment is poorly spent because of bottlenecks, lack of innovation, and market failures. McKinsey established the Global Infrastructure Initiative to address these issues, promote economic growth, and contribute to more resilient and secure communities. GII is a separate entity and collaborates with infrastructure leaders from around the world.

While GII operates independently from the Capital Projects & Infrastructure Practice, McKinsey provides access to the Firm's skills, resources, and convening power. McKinsey and GII are committed to improving infrastructure, because we believe it is our responsibility to work on the world's biggest challenges. Developing and operating great infrastructure helps all of us — our clients, our people, and our societies.

[www.globalinfrastructureinitiative.com](http://www.globalinfrastructureinitiative.com)

Global Infrastructure Initiative  
March 2016



[GlobalInfrastructureInitiative.com](http://GlobalInfrastructureInitiative.com)



[info@giiconnect.com](mailto:info@giiconnect.com)