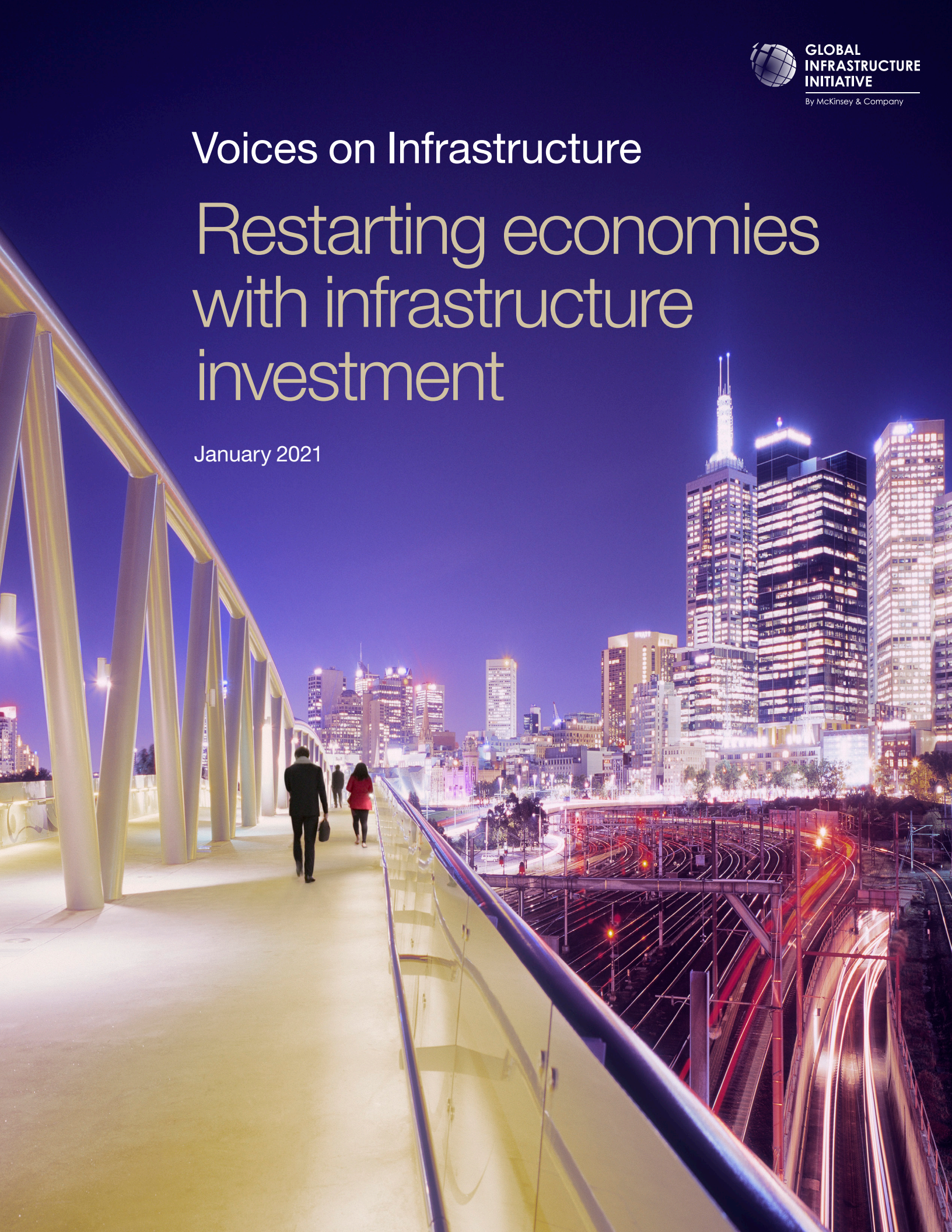
GLOBAL INFRASTRUCTURE INITIATIVE
By McKinsey & Company

Voices on Infrastructure

Restarting economies with infrastructure investment

January 2021



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Introduction

Aaron Bielenberg
Partner, Washington, DC
McKinsey & Company

Rob Palter
Senior Partner, Toronto
McKinsey & Company

Welcome to the January issue of *Voices on Infrastructure*, a collection of insights on **restarting economies with infrastructure investment**.

Infrastructure investment is an important tool to support growth, create jobs, propel economic recovery, and position our economies for sustainable growth. More than ever, many countries are faced with the need to invest in updated infrastructure to support growing populations; address inequities in the distribution of infrastructure services, from transportation to healthcare; and decarbonize their industries.

COVID-19's impact on the global economy has exacerbated the need for governments to identify investment programs that will stimulate economic recovery and create sustainable jobs. The pandemic has also highlighted the weaknesses in our core social and physical infrastructure that have hampered our response to COVID-19—and that will make recovery that much more difficult.

However, the immense fiscal challenge of COVID-19 recovery has created competition among a long list of worthy spending options. To plug near-term operating budget gaps, government willingness to borrow is at an all-time high, but what is the case that prioritizing infrastructure investment will deliver the necessary economic support for near- and long-term recovery? History has shown it possible, but governments will need to prioritize projects, deploy stimulus funding in an impactful way, and take advantage of alternative funding sources—including the trillions of dollars in private capital waiting on the sidelines. It will also be important to consider the ripple effects that stimulus funding will create several years down the line, as the operation of this new infrastructure will require increased maintenance spending.

In this issue, we debate the role of infrastructure investment in economic recovery, including how to select the right projects, create jobs, and build sustainable infrastructure for the future. We also explore the long-term effects of stimulus spending on infrastructure. We hope that this issue of *Voices* and GII's supporting events on this topic will allow us collectively to convert the hardship of COVID-19 into an opportunity for renewal by building the infrastructure of the future to catalyze sustainable economic recovery.

News from the Global Infrastructure Initiative

Tony Hansen

Director of the Global Infrastructure Initiative, McKinsey & Company

Thank you for reading this January 2021 edition of *Voices*, a collection of insights on **restarting economies with infrastructure investment**. The economic and health impacts of COVID-19 have stretched the resilience of our physical and social infrastructure to the limit. As we reset amid the pandemic, governments are evaluating where best to spend money to restart their economies. Historically, infrastructure spending has proven to be a good source of economic stimulus—but there is no silver bullet. In this issue, we explore the role of infrastructure investment in supporting economic recovery and the tangible actions required to ensure that we rebuild better and more equitably.

More than 350 C-suite leaders from across sectors and geographies have signed up to attend our seventh GII Summit, taking place virtually in Montréal April 6–8, 2021. Our theme will be the project of the future, delving into how infrastructure and capital projects must evolve to tackle emerging challenges and seize opportunities during a post-COVID-19 recovery. We anticipate reaching capacity soon and encourage those invited to secure their place. For more details on the agenda and participants, please visit our Summit page.

Our GII virtual roundtables resumed in the fourth quarter with a Paris event on the next normal in construction, a North America event on reimagining transport infrastructure for resilience, and a United Kingdom event on reimagining the UK's transit infrastructure. Throughout 2021, we will continue with our virtual roundtables and site visits, transitioning to in-person events as soon as it is considered safe. Please visit our roundtables and innovation site visits pages for recaps of past events and details on forthcoming events.

Starting in the second quarter of 2021, we plan to move *Voices* to shorter, monthly editions to enable us to stay in more frequent contact with our audience. Our format of concise, actionable-themed insights will continue, but the increased cadence will give us the benefit of covering more themes over the year. We hope you enjoy this issue, and we welcome your thoughts on any of our GII programs. If you have comments or would like to subscribe a colleague to *Voices*, please contact us at info@giiconnect.com.

Debate: Funding infrastructure investment in a post-COVID-19 economy

Harvard economists Larry Summers and Ed Glaeser debate how to fund infrastructure investment in a post-COVID world.

Motion:
Increased federal infrastructure spending is necessary for post-COVID-19 economic recovery.

For:

Larry Summers

President Emeritus and
Charles W. Eliot Professor,
Harvard University

Against:

Ed Glaeser

Fred and Eleanor Glimp
Professor of Economics,
Harvard University

Infrastructure investment has long been viewed as an important part of economic-crisis recovery because it creates jobs and revitalizes communities. It is already on the post-COVID-19 stimulus agenda. But is that the right approach, and how can governments ensure that investment actually pays off?

In 2017, the Brookings Institution hosted a debate between two Harvard economists about infrastructure's role in long-term economic growth and how projects should be evaluated and funded. Several years later, in a pandemic-ravaged global economy, McKinsey asked Larry Summers and Ed Glaeser to weigh in again.

Opening statement

Larry Summers

I believe that infrastructure investment from both the public and the private sector, on the basis of careful analysis, has to be an important part of any post-COVID-19 economic recovery strategy. And this is an ideal time for increased federal spending on infrastructure—indeed, government borrowing costs are extremely low.

A striking feature of the current economic reality is what I've referred to as "secular stagnation." Today's extraordinarily low real interest rates are projected to persist; inflation is low and expected to remain low; projected growth is relatively slow; and unemployment is likely to remain abnormal. In the wake of the pandemic, the economy has excess capacity and the cost of labor is very low—much of the incremental labor will likely come from people who would otherwise be idle and collecting unemployment insurance.

This is coupled with abundant examples of inadequacies in our infrastructure:

— Vehicle repairs due to potholes in roads and highways are extremely costly for US drivers; a 2016 study found such repairs totaled $15 billion over five years.[1]

— Children in the United States have, in very recent times, been exposed to chemicals in their drinking water that have reduced their IQs.[2]

— The United States lags in digital access, which has been to the great detriment of many children during the COVID-19 period.

— We have an air traffic control system that at crucial moments relies on paper, thumbtacks, and oak boards. And, critically, a system that operates without GPS.

Investing in these areas would have great return, including social benefits, especially with costs as low as they are. We need to invest more and deploy infrastructure more wisely, procure it more efficiently, and site it more quickly. That will mean more and better infrastructure in the post-COVID-19 era.

Opening statement

Ed Glaeser

We agree on the value of infrastructure spending and that America deserves better infrastructure, but I don't believe federal investment is critical for post-COVID-19 recovery. Seeing infrastructure as a counter-recessionary move stands in the way of taking the time and seriousness to think about doing infrastructure well. Rather, we should see it as a sensible investment for the future of this country.

I keenly believe that there is no area in which it is easier to waste tens of billions of dollars than infrastructure, which makes doing projects for the wrong reasons phenomenally costly. Detroit still watches the near-empty People Mover monorail glide over near-empty streets because someone in Washington thought that monorails would be the future. What Detroit's children needed were safer streets and better schools.

[1] "Massachusetts infrastructure overview," The American Society for Civil Engineers, 2017, infrastructurereportcard.org.
[2] Wasserman, G.A., Liu, X., Lolacono, N.J. et al. "A cross-sectional study of well water arsenic and child IQ in Maine schoolchildren," *Environmental Health*, April 2014, 13, Article 23, doi.org/10.1186/1476-069X-13-23

The more that infrastructure investment is guided by delivering value to the users, as opposed to some other ephemeral aim such as putting people to work, the more likely it is that the benefits will exceed the costs. We should start by asking, "What do Americans need to move around?" It's not high-speed rail in the American West. It's likely to be smart ways of using new technology and similar initiatives that provide user value.

The user-fee funding model helps ensure projects are maximizing the benefits and minimizing the costs. Many forms of our infrastructure, such as airports, are used disproportionately by the richest Americans or the richest people throughout the globe. It cannot possibly make sense to tax the poor to subsidize the rich, particularly at a time when the pandemic-fueled crisis has widened the gaps between rich and poor. And it makes little sense to subsidize carbon-intensive activities, such as driving longer distances, at a time when we fear climate change.

Rebuttal

Larry Summers

Ed suggests that countercyclical infrastructure investment is likely to be a mistake. I disagree with him in two important respects. First, there's much that can be done quickly. Our infrastructure is hugely undermaintained, and there's no reason not to do a proportionate share of repairs at moments when labor is more available. It's not smart to hastily build large and complex systems because of a temporary economic downturn, but there are substantial and straightforward repair opportunities.

Second, the secular stagnation argument suggests that, for the foreseeable future, capital costs are lower, and economic slack is likely to persist. That abets the opportunity cost of the labor that's employed in infrastructure and lowers capital costs. Just as more people choose to build homes when interest rates are low, it is entirely appropriate that more public projects be undertaken when interest rates are low.

We could have a user-fee agenda for US infrastructure that is far more ambitious than the current one.

Nonetheless, it is important to recognize that, particularly with respect to large infrastructure, there are vast externalities. Northern Virginia is a thriving area in the United States. It would not have happened without Dulles Airport, which many people believed for decades was a quintessential white elephant. That suggests that being overly risk averse is a mistake.

Subsidies exist, but we certainly should not have a principle that infrastructure has to pay for itself. I suspect that the New York City subway system paid for itself only very poorly for the generation after the tunnels were first dug, but it made possible today's New York City. Visionary infrastructure ideas are worthy of government subsidy, including investments in clean, green technology. It would be a very serious error for us to leave that to the private sector. It is unlikely that we'll make the right choices—for instance, in the twin revolutions of electric vehicles and self-driving vehicles—without a substantial public role.

Rebuttal

Ed Glaeser

There are projects where private provision makes sense, but that does not exclude a public role. You actually need a stronger public sector to oversee private providers. And I agree there are some exceptions to the user-fee model. It's entirely reasonable to think that we're always going to subsidize those cases where infrastructure is very targeted to employment and access for poorer Americans, and I'm comfortable with that.

There are also creative configurations of the user-fee model, for cases when entities other than users benefit. In our previous debate, I referred to Hong Kong's mass-transit example, which pays for its low-cost acess to its trains by building large towers on top of those train stops. Some form of local property value capture is appropriate, especially when the cost of maintaining and operating an asset is close to the cost of using it.

The classic case against user-fee financing is that there are instances where the fixed cost is so high that the average cost of using the infrastructure is much greater than the marginal cost. Consequently, charging riders the marginal cost means that revenues are too low, and charging them the average cost can result in fewer riders. Those instances are rarer than they would seem. In the case of highways, the marginal cost of providing highway services, particularly for trucks, is actually not substantially lower than the average cost. The depreciation that large trucks cause on highways is large enough that, if you wanted to have them take on those costs, you could charge them at roughly the average cost.

I worry about the claims of widespread externalities from infrastructure. If we're suggesting a subsidy for externality-based reasons, I want to know very clearly what those externalities are, and I want to be able to put a clear dollar number on it. Today's low interest rates and low cost of labor would all be part of the cost-benefit analysis, of course, but the bigger question is whether you believe there's some sort of large-scale macroeconomic effect that's going to create value.

In terms of post-COVID-19 economic recovery, I'm concerned about place-based project selection. If you are designing an infrastructure program that's supposed to aid in recovery, shouldn't that go to hardest-hit regions, such as in eastern Kentucky or West Virginia? We have a good track record with the Appalachian Regional Commission and many infrastructure investments in declining places. Eastern Kentucky doesn't need more highways. It needs better vocational training, better schools, more entrepreneurship, and a better-designed social safety net that does more to encourage work. Those are things the federal government can invest in.

Closing statement

Larry Summers

Ed and I agree you should do cost-benefit analyses around infrastructure projects. We also agree that there's a tendency for advocates to overemphasize externalities. However, I think taking a narrow, financially centric view would have led to the rejections of the Interstate Highway System and the First Transcontinental Railroad, and it has indeed led to an air traffic control system that needs improvement.

Ed is right to distinguish between regional policy and infrastructure policy, and often the right policy for depressed regions—and those hit by the pandemic-fueled recession—does not primarily involve infrastructure. But infrastructure spending should be judged as an investment, and crucial parts of necessary infrastructure are typically in thriving areas.

And as I look at America's problems, I do not think the principal problem—or even a terribly important problem—is that we have invested in too many white elephants or that we need better procedures to stop white elephants. The important problem is the task at hand: We need to enable a mid-21st-century economy. And what better time than now—with high unemployment and epically low interest rates—to initiate a major effort in that direction and boost economic-recovery efforts.

Closing statement

Ed Glaeser

The question going forward is not how to have more or less infrastructure but how to have better infrastructure. That means taking on the challenges that Larry discussed—for instance, getting to an air traffic control system that's actually effective. With pandemic-induced travel restrictions and physical-distancing requirements making it hard to send people to do infrastructure jobs, now is a great time for planning and rethinking infrastructure systems and envisioning a new and better public sector in the United States—one that delivers far more value for the dollars that we are spending.

Like Larry, I think it is an outrage that American children are unable to log into their classes right now and that there are people in Flint, Michigan who are poisoned by public water. It is vital that we make sure that this never happens again. It is

also vital that we invest in infrastructure that is health-related, which will, crucially, help make sure that we are more protected against any future pandemics.

We agree the federal government needs to be engaged—and engaged mightily—with the prospect of creating better American infrastructure in the 21st century. A strategy that says we know exactly what to do—write bigger checks—is likely to be the last thing in the world that we need. It is vital that, before those checks are written, we have systems in place to make sure that the vision that Larry shared is one that actually will be turned into reality.

Voices *highlights a range of perspectives by infrastructure and capital project leaders from across geographies and value chains. McKinsey & Company does not endorse the organizations who contribute to* Voices *or their views.*

Ed Glaeser is the Fred and Eleanor Glimp Professor of Economics at Harvard University, where **Larry Summers** is President Emeritus and the Charles W. Eliot Professor.

Reimagining public infrastructure investment in the United States

Infrastructure agencies need to prepare for two very different scenarios—a sharp rise in funding or a precipitous drop.

Jared Katseff
Associate Partner, Philadelphia
McKinsey & Company

Shannon Peloquin
Partner, San Francisco
McKinsey & Company

Michael Rooney
Consultant, San Francisco
McKinsey & Company

Todd Wintner
Partner, Washington, DC
McKinsey & Company

The need for more and better infrastructure in the United States is acute. In 2016, the American Society of Civil Engineers estimated that the United States had an unfunded infrastructure gap of more than $2 trillion (Exhibit 1).[1] And that figure may now be an underestimate: federal, state, and local spending on infrastructure was only 2.3 percent of GDP in 2017 (the latest year for which figures are available)—a record low.

Closing this gap can both create jobs and generate a positive return for the economy. The McKinsey Global Institute estimates that fully closing the infrastructure gap could translate into 1.2 percent more jobs across the economy, or roughly 13,000 job-years for each $1 billion invested,[2] while the Congressional Budget Office estimates that every dollar spent on infrastructure brings an economic benefit of up to $2.20.[3]

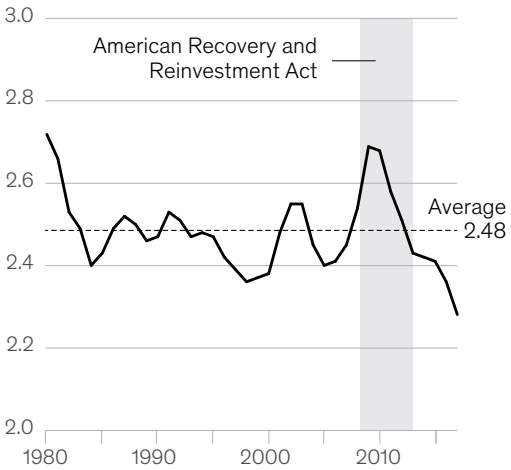
While Congress has passed five separate relief packages (totaling more than $3 trillion) to address the economic consequences of the COVID-19 crisis, the vast majority of funding supports operating expenses and revenue losses; no funding has yet been specifically designated for capital infrastructure projects. By contrast, China, the European Union, and Japan have all announced stimulus programs with infrastructure investment as a key component; like these markets, the United States could take advantage of low interest rates and available labor to rebuild and renew the nation's physical assets.

[1] *Failure to act: Closing the infrastructure investment gap for America's economic future*, American Society of Civil Engineers, 2016, asce.org.
[2] "Employment impacts of highway infrastructure investment," US Federal Highway Administration, June 18, 2020, fhwa.dot.gov.
[3] *Estimated impact of the American Recovery and Reinvestment Act on employment and economic output in 2014*, Congressional Budget Office, February 20, 2015, cbo.gov.

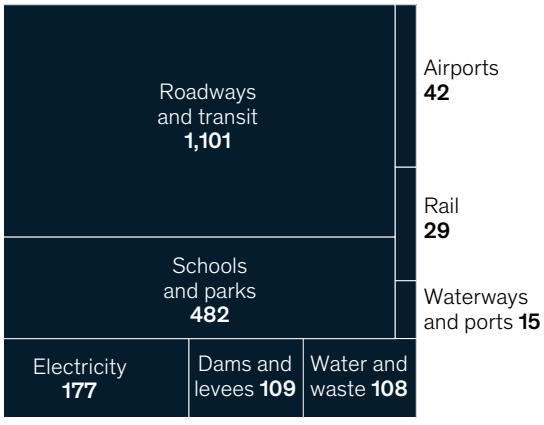
Exhibit 1

Public-infrastructure spending has fallen, and there is a backlog of more than $2 trillion.

Public spending on water and transportation infrastructure, 1980–2017, % of GDP



Estimated 10-year infrastructure-funding gap by asset type, 2016–25, $ billion



Total **$2.1 trillion**

Source: *2017 infrastructure report card,* American Society of Civil Engineers, March 2017, infrastructurereportcard.org; *Public spending on transportation and water infrastructure,* 1956–2017, US Congressional Budget Office, October 2018, cbo.gov

President-elect Joe Biden has pledged "to build a modern, sustainable infrastructure,"[4] and there does appear to be bipartisan support for more stimulus. When and if this will happen, however, is uncertain. US infrastructure agencies therefore need to be ready to face one of two scenarios.

In the first, Congress passes a stimulus plan that includes spending specifically designated for infrastructure. This could unleash a rapid surge of capital deployment. In the second scenario, there is little or no dedicated infrastructure-stimulus spending from the federal government. Capital budgets would come under economic pressure, forcing a reevaluation of priorities.

Below are suggestions for how infrastructure agencies can reimagine their futures—whether they get stimulus funding or have to do without.

Scenario 1: Federal-stimulus spending bolsters capital budgets

In the first scenario, the Biden administration is successful in passing major infrastructure stimulus legislation. Public agencies would be expected to put funding to work immediately on projects that can help to revitalize local economies and improve service. The 2009 American Recovery and Reinvestment Act (ARRA), passed in response to the financial crisis, demonstrated that, given funding, infrastructure agencies can quickly complete many state-of-good-repair projects. However, ARRA focused on shovel-ready projects—those that can be completed in three years or less. Few large-scale, strategic projects were undertaken.

To get the most out of federal stimulus dollars, agencies should consider balancing projects that provide an immediate economic boost with ones that have transformational impact. To do so, they should consider the following principles:

— ***Be strategic about state-of-good-repair investments.*** With large maintenance backlogs prevalent throughout the United States, reinvesting in existing assets to ensure that they operate at peak levels is one of the quickest strategies for generating economic impact.

— ***Prioritize investments that reduce the cost of existing operations.*** Examples include automating workflows, replacing high-maintenance assets, investing in contact-less service operations, and upgrading energy efficiency.

— ***Accelerate transformational investments.*** To balance quick economic relief with long-term capital stock gains, agencies can focus stimulus funds on advancing projects that are in the final stages of development—for example, by finalizing environmental reviews, segmenting work into smaller, discrete work packages for early construction, and working with contractors to accelerate delivery.

— ***Capitalize technology investments.*** Digital investments can reduce the total cost of asset ownership and improve user outcomes without pouring any concrete—an integral and cost-effective component of capital budgets.

— ***Incorporate decarbonization.*** Stimulus spending on infrastructure could offer an opportunity to improve environmental performance and reduce greenhouse-gas emissions when proper carbon accounting is part of the decision-making process.[5]

One way to quickly allocate funds to their highest and best use is to adopt the "capital-portfolio optimization" methodology. This process entails ranking proposed projects based on their estimated benefits and prioritizing funds accordingly. Using this approach, one major US airport reduced its more than $20 billion capital budget by 40 percent.

Project benefits must be quantifiable and measurable against an agency's stated strategy.

[4] *The Biden plan to build a modern, sustainable infrastructure and an equitable clean energy future*, accessed December 4, 2020, joebiden.com.
[5] Hauke Engel, Alastair Hamilton, Solveigh Hieronimus, Tomas Nauclér, David Fine, Dickon Pinner, Matt Rogers, Sophie Bertreau, Peter Cooper, and Sebastien Leger, "How a post-pandemic stimulus can both create jobs and help the climate," May 27, 2020, McKinsey.com.

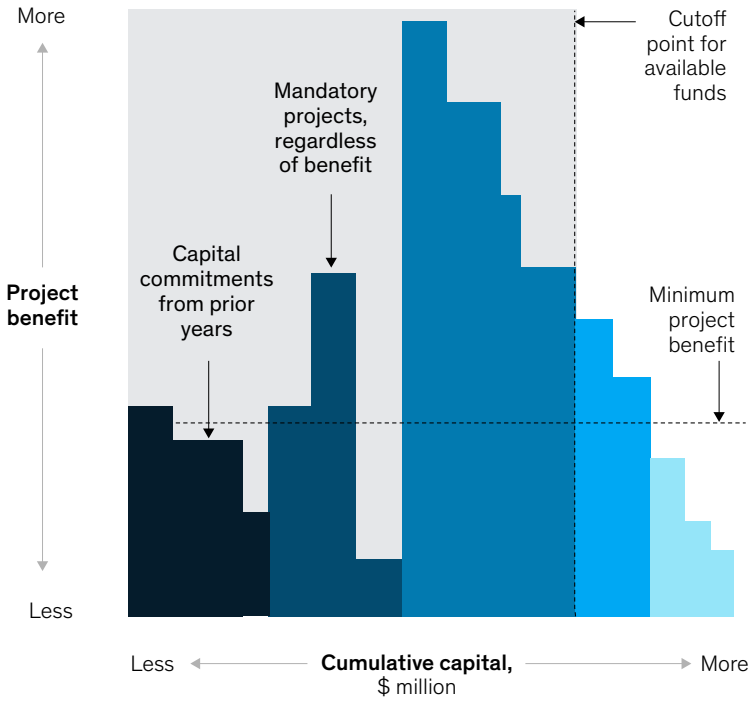
In addition, the benefits must be time-weighted by when the project will become operational—the public gains more from projects that will finish sooner. Funding is then allocated based on the expected project benefit compared with those of all other available options (Exhibit 2). The cutoff point between funded and unfunded discretionary projects depends on how much money is available.

Quantifying project benefits can, of course, be challenging. Measures could include operational or service metrics, financial goals, equity aspirations, environmental targets, and user-experience objectives. In the context of recovery from the COVID-19 crisis, agencies may also want to consider metrics around system resiliency and economic equity. Vulnerable communities in particular have borne the brunt of both the pandemic and past environmental discrimination; these same communities could see some of the highest benefits from infrastructure investments.

Exhibit 2

The cutoff point between funded and unfunded discretionary projects depends on how much money is available.

Scenario 1: Portfolio optimization with stimulus funding



Approved projects
Previously allocated funding

- Fully funded and authorized
- Underway

Compliance projects
Required, regardless of project benefit

- Required by regulation or safety related
- Often has nonfinancial return

Funded projects
Highest-benefit projects for capital

- Candidate for full funding allocation
- Delivers maximum public benefit for available funds

Unfunded projects
Next projects to receive capital

- Not funded at this time
- Top candidate if additional capital becomes available

Eliminated projects
Projects not meeting benefit thresholds

- Not pursued unless benefit increased
- Removed from capital plan

Source: McKinsey Capital Excellence Practice

Scenario 2: Capital budgets come under pressure because of poor economic conditions and no stimulus funding

If the Biden administration is not successful in passing major infrastructure stimulus legislation, agencies may face additional financial pressure, given likely downturns in the tax and user revenues that are important to their budgets. During the 2008 financial crisis, those revenue sources remained depressed for three to four years.[6] This could be exacerbated by longer-term changes in user behavior from COVID-19—such as more time spent working from home—that further reduce infrastructure asset income. In such circumstances, it is critical to use what capital there is for the greatest benefit. Agencies can still use the portfolio-optimization process but may need to reweight certain criteria to favor projects that increase asset resiliency and decrease the total cost of ownership.

On this basis, agencies may choose to delay projects that are not core to operations, eliminate those that may decline in value over the next decade, and take a broader view of what qualifies as a capital project (such as digitization). It may become prudent to defer some low-benefit projects that have been approved—or even for which early construction has begun—and shift that capital to higher-benefit priorities. Additional project delivery improvements through innovation, market improvements, and process redesign could further optimize infrastructure spending by up to 38 percent.[7]

Agencies can take steps to reposition capital budgets over the next 12 months to refocus on evolving priorities and improve operational resiliency. Four priorities can help prepare for the next normal while managing current budget constraints:

- ***Enhance the user experience.*** Modernize service offerings to attract users back and manage future capacity needs.
- ***Transform operations.*** Use advanced analytics and flexible models to reduce life-cycle costs and increase asset productivity.
- ***Improve delivery.*** Take advantage of lower interest rates and accelerate projects to benefit from reduced asset utilization.
- ***Consider innovative revenue models.*** Look into alternative delivery mechanisms to unlock new revenue streams and consider the use of public–private partnerships to stretch funding.

How to apply these actions will vary depending on the type of asset and how its utilization has been affected by the crisis.

The road to full recovery after the COVID-19 crisis will likely be long and difficult. Whether there is substantial federal stimulus or not, US agencies have the chance to reimagine the country's infrastructure and create a more resilient and efficient future. This is a critical time that could define America's infrastructure for the next generation.

This article is adapted from a longer version, published on McKinsey.com.

Jared Katseff is an associate partner in McKinsey's Philadelphia office; **Shannon Peloquin** is a partner in the San Francisco office, where **Michael Rooney** is a consultant; and **Todd Wintner** is a partner in the Washington, DC, office.

The authors wish to thank Erikhans Kok and Ali Lauzon for their contributions to this article.

[6] *2019 state expenditure report: Fiscal years 2017–2019*, National Association of State Budget Officers, November 2019, nasbo.org.
[7] Jonathan Woetzel, Nicklas Garemo, Jan Mischke, Priyanka Kamra, and Robert Palter, *Bridging the infrastructure gaps: Has the world made progress?*, October 2017, McKinsey.com.

What infrastructure stimulus investments could be the most important for governments to pursue now and why?

Industry leaders weigh in on what infrastructure stimulus investments governments may want to prioritize in the near term as they consider economic recovery.

Sir Danny Alexander

Vice President and Corporate Secretary, Asian Infrastructure Investment Bank

Infrastructure is the backbone of a healthy economy. Done right, infrastructure stimulus investments can not only hasten recovery from the effects of the COVID-19 pandemic but also accelerate progress in addressing the effects of climate change. Two types of such investments stand out: those that entice private-sector participation and those that put green infrastructure at the forefront.

As public-debt levels have increased dramatically through the COVID-19 crisis, it is important for governments to stretch stimulus dollars as far as possible. One way to do this is by deepening capital markets and developing incentives for the private sector to play a bigger role in infrastructure financing—for example, by creating an enabling environment for public–private partnership investment. Unless government guarantees and regulatory and institutional reforms are in place, the private sector is unlikely to participate. In addition to reducing the funding gap, deepening capital markets and mobilizing private-sector capital can enhance knowledge transfer, improve the quality of projects, and, importantly, mitigate risks—in terms of the structuring of project design and technical agreements, taxation, financing, and returns.

Furthermore, government stimulus programs can take this as an opportunity to direct public and private funding toward sustainable, resilient, green infrastructure—accelerating progress on shoring up infrastructure vulnerable to climate change. For instance, initiatives can aim to assess an issuer's level of alignment with the objectives of the Paris Climate Agreement: climate-change mitigation, adaptation, and low-carbon transition. Aligned portfolios can deliver a potential financial impact by benefiting from any future repricing of climate-change risks—caused, for example, by hurricanes, droughts, and floods—and opportunities in the capital market. This arrangement would allow investors to systematically include in their investment portfolios both top-tier issuers, such as those that are already performing well on all three objectives, and second-tier issuers, which are those moving in the right direction. And in so doing, second-tier issuers would have an opportunity to transition to align with the objectives more fully, thus strengthening market capacity and growing the green agenda in a sustainable way.

While governments continue to stimulate infrastructure investments, there continues to be a multi-trillion-dollar financing gap due to the lack of bankable projects. Particularly in Asia–Pacific, demand far outweighs supply. The private sector will likely play a crucial role in filling these gaps, and multilateral banks should work together to help create a suitable enabling environment by working with governments to scale up operations, streamline procedures, and deepen capital markets.

Sir John Armitt

Chair, UK National Infrastructure Commission

During the first months of the COVID-19 crisis, governments across the world reached for rapid-response plans to invest in infrastructure to help shore up their economies. Australia planned a series of fast-track projects worth A$3.9 billion ($2.7 billion).[1] In the United Kingdom, we saw the launch of a £2 billion Green Homes Grant program to subsidize insulation and other energy-efficiency work in homes—and thereby support jobs.

Such steps are understandable and, in most cases, welcome. But governments have found there are not enough "shovel ready" projects to adequately stimulate economies during such a seismic shock. Still, economies run on confidence, and governments have a pivotal role to play in instilling this among investors. So, where do they start?

Committing to large infrastructure-delivery projects

The United Kingdom is unusual among large countries in that significant parts of key national infrastructure—including energy production and distribution, water, and digital communications—are privately owned and managed. In such a context, government can create the conditions for a market-led recovery by making firm commitments to large infrastructure-delivery projects in areas where the private sector is unlikely to move. These commitments send a strong signal about future opportunities.

Setting a clear strategic direction for infrastructure sectors

Beyond promises regarding spending, a clear strategy is the most important direction governments can offer. Clear objectives should help build consensus across political divides and ensure longevity, which, in turn, enables investors to orient their portfolios. And as such, the objectives should achieve shared goals, such as achieving net-zero emissions or, as in the United Kingdom, reducing regional productivity gaps.

The National Infrastructure Commission has previously called for a refreshed pipeline of price auctions to reach 65 percent renewable electricity sources by 2030, a significant investment in developing a firm evidence base for a decision on the future of the United Kingdom's gas-heating network, and a boost to nationwide electric-vehicle charging infrastructure.[2]

Such policies mean nothing without a clear plan for delivery, but they are an essential starting point.

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[1] *Policy responses to COVID-19,* International Monetary Fund, accessed November 17, 2020, imf.org.
[2] *National infrastructure strategy,* HM Treasury, November 2020, gov.uk.

Makhtar Diop

Vice President for
Infrastructure, World Bank

As governments seek to foster economic recovery, they have a unique opportunity to shift the global economy's trajectory toward a more sustainable path. Sustainable infrastructure can not only contribute to economic growth and job creation but also provide social and environmental benefits.

Specifically, as they prepare their infrastructure investment packages, governments can focus on three areas: energy, transport, and digital infrastructure.

In energy, the most promising investments are those supporting cleaner energy solutions while encouraging the transition from fossil fuels. Renewable energy and battery-storage solutions are increasingly able to provide cost-effective energy, and the cost of pursuing these solutions has fallen dramatically in recent years, making them attractive options in today's fiscally constrained environment. There is also enormous untapped potential in energy efficiency at low or negative cost if behavioral barriers are addressed. Furthermore, rural solar electrification is the cleanest and most cost-effective way to reach low-income households in remote areas. In this time of crisis, solar electrification can help save lives by keeping lights on, accommodating heating and cooling systems, and powering health facilities in those areas.

In transport, investments focused on projects that shift traffic toward cleaner transport modes—such as buses, railways, and waterways—can reduce carbon intensity. The shift toward sustainable mobility can begin immediately with comprehensive tax and subsidy reforms on fuels and vehicles that distort consumer choices, as well as with coordinated planning to improve the availability of low-carbon modes. Investments aimed at improving public transport are also critical, particularly in this time of crisis, as they can help low-income communities access services and employment opportunities. Novel initiatives, such as regulating the export of used cars—which are, on average, more polluting and less safe—can also make urban areas greener and more livable in emerging markets and developing economies.

Finally, strong broadband infrastructure investments are a prerequisite for providing access to the digital technologies needed to decarbonize the economy. From smart grids and smart buildings to automated transport systems and smart supply chains, the potential applications are numerous. Governments are already turning to digital technologies to respond to the crisis; the decarbonization agenda would greatly benefit from that effort.

More than ever, now is the time to firm up energy, transport, and digital infrastructure investments, as they will allow us to overcome today's challenges and prepare for tomorrow.

Catherine McKenna

Minister of Infrastructure and Communities, Government of Canada

Governments worldwide are gearing up to jump-start economies ravaged by the COVID-19 pandemic using a range of fiscal tools, and infrastructure spending has a critical role to play. Low interest rates, massive infrastructure needs, and significant growth potential are among the reasons the International Monetary Fund is advising its members to boost infrastructure stimulus.[3] Canada has the fiscal firepower to follow through. Our government's Fall Economic Statement signalled the country's intention to invest $70 billion to $100 billion over the next three years toward stimulating economic recovery.

The essential consideration for infrastructure stimulus—in Canada and for all governments—is not simply how much we spend but where, how, and to what end. The key is multiple benefits. Every dollar we invest must provide economic dividends, often measured by indicators such as employment rates and economic growth, focused on key sectors and promoting productivity and competitiveness. However, we must also ensure every dollar achieves social and environmental benefits, including building more inclusive and just societies and fighting climate change.

Practically, achieving these "triple benefits"—for jobs, the climate, and inclusivity—means supporting a diverse workforce, access to skills training, and services in our most vulnerable communities. It means promoting the use of low-carbon aluminum and steel, preparing for natural disasters, and building for a net-zero future. It means focusing on long-term goals, including getting off of coal, transitioning to electric vehicles, closing the Indigenous-infrastructure gap, and ensuring that everyone has access to high-speed internet. Achieving these outcomes in tandem with job creation and economic benefits is how taxpayers get the most out of infrastructure stimulus.

To maximize investments, governments also need to consider drawing on the private sector.[4] The Canada Infrastructure Bank was established to leverage the capital and expertise of the private sector to achieve public outcomes and value for taxpayers. The National Infrastructure Bank recently announced that the United Kingdom is expected to be given a similar mandate.[5]

Economists and policy makers have been quick to point out the stark differences between the Great Recession and the COVID-19 crisis. My hope is that chief among those differences is that today's infrastructure stimulus not only helps our economies to come roaring back but that, in the process, we build more inclusive communities and clear the path to net-zero.

Voices *highlights a range of perspectives by infrastructure and capital project leaders from across geographies and value chains. McKinsey & Company does not endorse the organizations who contribute to* Voices *or their views.*

[3] *IMFBlog,* "Public investment for the recovery," blog entry by Victor Gaspar et al., October 5, 2020, blogs.imf.org.
[4] For more, see "CIB's Michael Sabia on the future of investment in Canada infrastructure," *Voices on Infrastructure: The project of the future*, September 15, 2020, McKinsey.com.
[5] *National infrastructure strategy*, November 2020.

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Selecting infrastructure projects for the next normal

Infrastructure projects can create jobs and spur economic growth—both critical as the world reckons with the fallout from COVID-19. But budgets are tight, so which projects should be prioritized?

Aaron Bielenberg
Partner, Washington, DC
McKinsey & Company

Sarah Brody
Associate Partner,
Washington, DC
McKinsey & Company

Paul Jacobson
Senior Expert,
Washington, DC
McKinsey & Company

Rebecka Pritchard
Expert, Atlanta
McKinsey & Company

Even as governments and business leaders manage the immediate health crisis and address citizens' and businesses' urgent financial needs amid the COVID-19 pandemic, they are looking for ways to stimulate economic recovery. Infrastructure is at the core of many leaders' plans. China, the European Union, Japan, and the United States have all announced stimulus programs in which infrastructure investment is a key component.[1] Investing in new infrastructure can create jobs and have a direct, positive impact on economic growth and meet critical healthcare infrastructure needs—which are particularly relevant and acute now. New and upgraded technology-enabled infrastructure can also reduce costs related to congestion and environmental damage, as well as enable the transition to more efficient, safer, and lower-carbon infrastructure solutions.

However, not all infrastructure projects can begin immediately and have an impact on jobs and the economy in the near or medium term. And to deliver services efficiently and equitably, prioritized projects should address the future needs of the population and integrate new design tools and technologies. Furthermore, money for infrastructure projects is tight, and governments face competing priorities for constrained budgets as revenues decline and scarce resources are allocated to immediate health and welfare needs.

It is critical in this moment that governments select the infrastructure projects that can both spur recovery in the near term and make the most of available funds. Specifically, governments might consider focusing on projects that are both shovel ready and shovel worthy and using public–private partnership models to attract private capital for infrastructure. What might success look like? McKinsey analysis suggests that a selection of potential priority projects in the United States alone could generate $80 billion in investments and create more than two million new jobs.

Selecting infrastructure projects to spur economic recovery and attract private capital

By focusing on spurring the economy and making use of private capital, governments may find a few project archetypes to be most attractive.

Spurring economic recovery

Many infrastructure-stimulus programs focus on projects that may take years before their impact is felt. However, for infrastructure to spur economic recovery, construction needs to begin immediately. That means selecting infrastructure projects that are both shovel ready and shovel worthy. Road projects with existing plans or administrative projects that don't require lengthy approvals would be considered shovel ready. The shovel-worthy requirement asks whether a proposal fulfils urgent economic and social needs and favors projects that generate a large number of construction jobs, for example, or provide long-term connectivity to vulnerable populations.

Prioritizing in this way can lead to a set of projects that generally fall within one of four categories:

— ***Projects that are already part of near-term capital plans, for example, those led by a department of transportation, a city buildings department, a parks department, or a water utility.*** These are projects for which the need has been established and the planning completed; therefore, construction can be accelerated. A program to upgrade and expand capacity on local bridges and roads that have longstanding congestion issues and well-defined solutions is one example.

— ***Projects that provide "smart" upgrades to existing assets.*** These are projects where integrating new technology and design vastly improves the way the infrastructure operates and reduces costs and environmental impact. Examples could include installing energy-efficient and low-cost LED lighting,

[1] Policy responses to COVID-19, International Monetary Fund, January 8, 2021, imf.org; *Invesco Blog*, "Nations pledge trillions in fiscal stimulus to boost their economies," blog entry by Kristina Hooper, June 1, 2020, blog.invesco.us.com.

or redesigning an urban curbside and parking system to enable deliveries, rideshares, and pedestrian and bicycle use.

— ***Projects that are modular, replicable, and distributed in nature.*** These projects are most effective when they can be delivered quickly and efficiently as part of a large, at-scale program to spur economic development. The model hinges on design having been completed and on limited need for site-specific design. An energy-retrofit program applying proven, replicable energy-efficiency technologies to hundreds of buildings could meet the requirements, while reducing energy consumption and cost for thousands of people.

— ***Projects that meet immediate health and safety needs.*** The COVID-19 pandemic has highlighted the significant gaps in our healthcare infrastructure, from too few ICU beds and vaccination sites to deficiencies in the cold-storage supply chain. While building and expanding hospitals, particularly in rural and underserved communities, can be a medium-term infrastructure objective, many of the immediate needs can fortunately be met through rapid conversions and modular construction. Converting stadiums and gymnasiums to sterile vaccination centers and increasing cold-storage supply-chain units and vehicles can happen quickly, and such projects offer many of the positive job- and economic-growth benefits of core infrastructure while also addressing today's most urgent needs.

Attracting private capital

Given limited budgets and stimulus funding, governments may consider prioritizing some infrastructure projects that can be delivered in a way to attract private capital. In 2020, the top ten investing firms, globally, raised—but did not deploy—$84 billion in infrastructure capital. Much of this is earmarked for long-term infrastructure projects, with investors still looking for both brownfield and greenfield infrastructure investment despite coronavirus-related impacts to traffic. Governments therefore may choose to encourage the deployment of private and stimulus capital in helping fill urgent infrastructure needs.

Governments can use concessions and create new operational and maintenance structures to transfer the operation and management of some infrastructure to the private sector—as well as the obligation to pay for improvements. Private-sector involvement can also allow governments to launch more infrastructure work sooner, and for less money up front, by bundling infrastructure upgrade projects (such as for bridges, local roads, and culverts) into large construction programs for private companies to complete. And availability-payment structures can spread payments over a period of 15 to 20 years, in contrast to traditional arrangements where all payments come due during construction. Transferring risk to the private sector can create benefits when done through clear and efficient procurements that articulate the infrastructure-service and social benefits and commit the partner to delivering in a way that is aligned with equity and sustainability considerations.

Five project archetypes

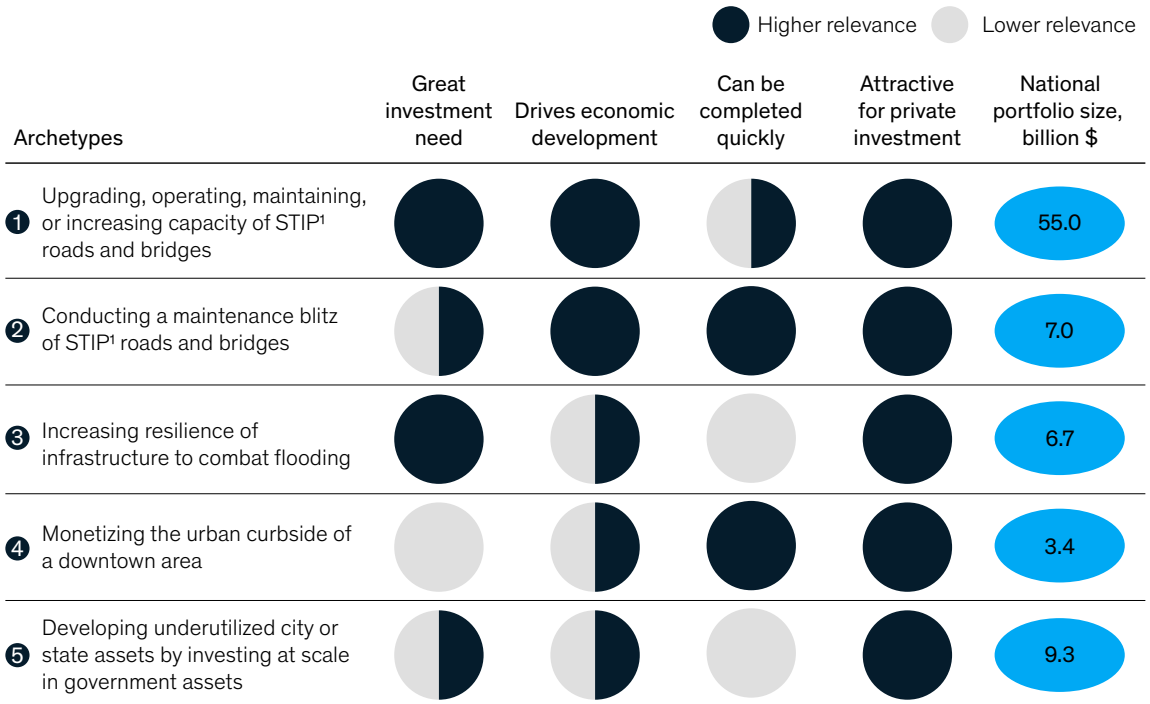
Five project archetypes meet all of these criteria—projects that are shovel ready, shovel worthy, and can attract private capital. This is, by no means, an exhaustive list—but rather, these are examples of the types of projects that may warrant government and investor consideration (Exhibit 1).

— ***Upgrading, operating, maintaining, or increasing capacity of State Transportation Improvement Program (STIP) roads and bridges.*** To address congestion and boost traffic on a specific road, for example, governments can establish a concession

[2] Data is from paid data source Preqin, preqin.com.

Exhibit 1

These five project archetypes meet public needs, can quickly drive economic development, and could attract private investment, to varying degrees.



[1]Statewide Transportation Improvement Program.
Note: These figures are based on specific projects that are available in prioritized states and extrapolated based on miles of roads, GDP or population growth, state of environmental infrastructure across cities, and other factors.
Source: Emsi, Q2 2020 Data set for United States

contract where a private firm adds a managed lane and smart technology to that road. STIP upgrades are planned, priority projects and are likely to be completed more quickly than new ones.

— ***Conducting a maintenance blitz of STIP roads and bridges.*** Maintenance projects often have systems in place that can allow for quick turnarounds. Many state governments also prioritize maintenance projects, which can quickly provide economic stimulus.

— ***Increasing resilience of infrastructure to combat flooding.*** The implementation of replicable green infrastructure can address flood management and wastewater issues. This could include, for example, a citywide program to install landscaping and culvert solutions and convert flood plains to public parks to manage runoff. Resiliency efforts are a necessary upgrade that can keep environmental disasters from compounding economic ones.

— ***Monetizing the urban curbside of a downtown area.*** Privatizing parking and creating commercial and rideshare zones can provide significant value to governments and citizens by reducing congestion and facilitating new uses of urban roads.

— ***Developing underutilized city or state assets by investing at scale in government assets.*** Governments might consider developing vacant land into affordable housing as part of a transit-oriented project. This archetype creates and maintains a source of governmental revenue from something that would otherwise be vacant.

If applied across the United States, these five nonexhaustive archetypes could generate $80 billion in investment and create up to two million jobs. In turn, the investment in these projects could create $70 billion to $215 billion in GDP impact in the United States (Exhibit 2).

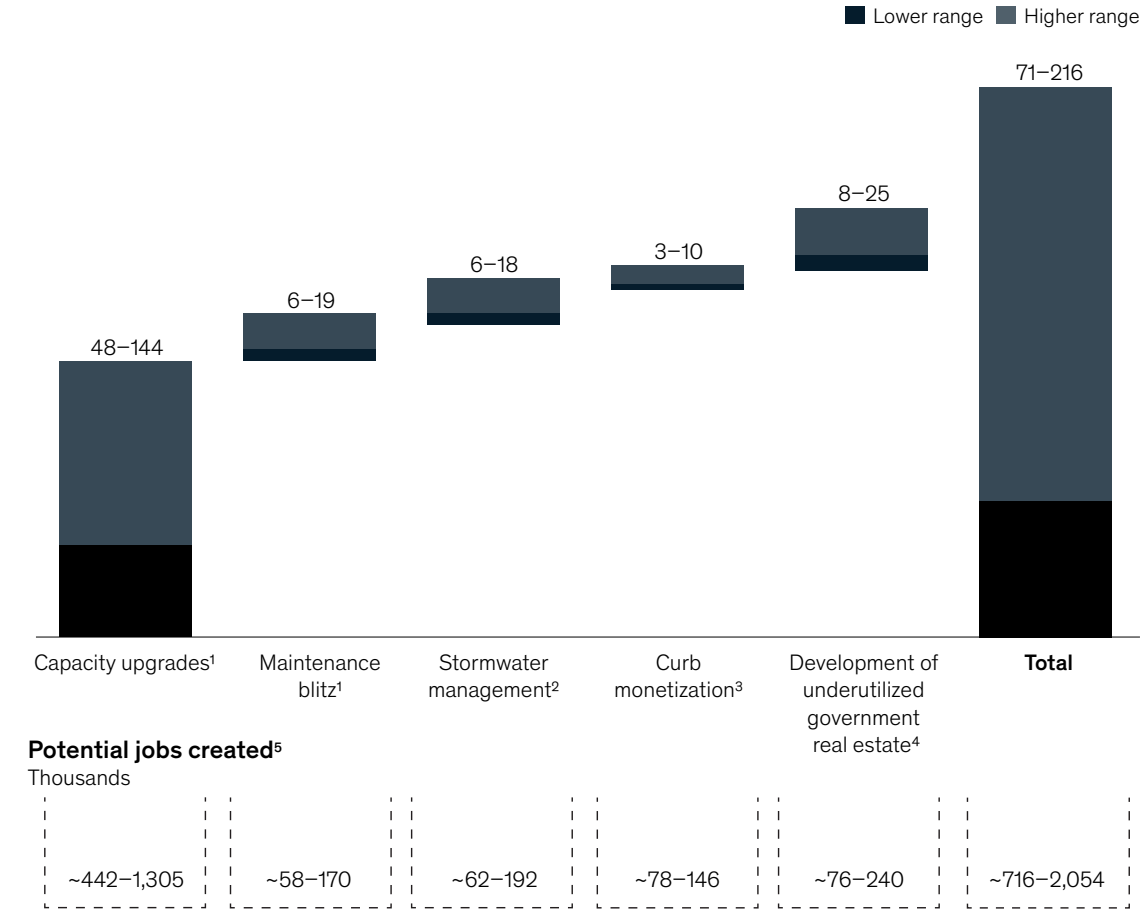
While each government will have a specific set of infrastructure project priorities, this framework can be applied anywhere in the world. The opportunity for investment and the jobs created can be sized specifically to that country, city, or regional jurisdiction.

Making it happen

In addition to building a portfolio of shovel-ready and shovel-worthy projects and considering new funding and partnership models, governments could consider accelerating procurement (to create jobs in the near term) and launching programs at scale (to take advantage of

Exhibit 2

The five archetypes could potentially bring significant near-term economic benefits and deliver up to approximately two million jobs nationwide.



[1] Based on highway, street, and bridge construction industry.
[2] Based on water and sewer line and related structures construction industry.
[3] Based on parking lots and garages industry.
[4] Based on commercial and institutional building industry.
[5] Range based on difference between including induced value and jobs which are the result of spending from wages of workers.
Source: Emsi Q2 2020 data set for United States

efficiencies in procurement and delivery). They can also integrate technology at every stage of the process to ensure both the infrastructure design and the process for implementation are as efficient and future-proofed as possible.

To contribute to economic recovery, infrastructure investors have actions to consider beyond working to develop innovative engagement and funding models. For example, they will need to identify which investable opportunities support economic development and address public-sector needs. They can take risks on early-stage development by investing in design and feasibility studies for projects that support economic recovery and develop unsolicited proposals even before a request, knowing that their limited investment may ultimately be a public good. And they can engage with public-sector entities to build support for the project and establish the value private investment could bring—and build coalitions with technology providers, labor unions, communities, and citizens in a constructive way.

Governments across the globe face the threat of a deep recession. Infrastructure investments won't be enough on their own, but they can go a long way to creating jobs and contributing to GDP—if approached thoughtfully.

Aaron Bielenberg is a partner in McKinsey's Washington, DC, office, where **Sarah Brody** is an associate partner and **Paul Jacobson** is a senior expert. **Rebecka Pritchard** is an expert in the Atlanta office.

Infrastructure options for the future of cities

Leaders must tackle increasingly complex economic, social, and environmental challenges to ensure cities stay competitive. Harnessing new technologies can help.

Rohit T. Aggarwala

Senior fellow, Urban Tech Hub at the Jacobs Technion-Cornell Institute

Senior adviser, Sidewalk Labs

Joshua Sirefman

Cofounder and senior adviser, Sidewalk Labs

The COVID-19 pandemic has created a massive upheaval of life as we know it. Beyond its threat to our health, it has affected our work, education, childcare, and even how we think about our cities. While it is too soon to know the lasting impact of the pandemic in many regards, the quick and largely successful shift to embracing technology and remote working has made many people question the value proposition of our biggest cities.

Indeed, as individuals and businesses contemplate whether the return on living and operating in a city is worth the cost, there is a new imperative for local leadership to encourage people to stay by providing a good quality of living. This means not only accommodating the business environment but also ensuring the city runs smoothly and benefits everyone. At the same time, cities are being called upon to tackle other sizable challenges, any one of which would be daunting when budgets are tight: achieving economic and social recovery, mitigating climate change, and addressing systemic societal inequities.

A crucial connection among these goals is the built environment, with infrastructure serving not only as a significant job creator but as the lifeblood of cities. However, it is difficult for cities to make large-scale changes quickly. New construction, despite the industry's investments in innovation, can take years and be prohibitively expensive. Yet retrofits are so complex that beginning a new project is almost always the more attractive option.

The good news is that in a wide variety of key urban infrastructures, new technologies allow for high-impact, affordable solutions that expand the options for cities looking to meet today's challenges and make the most of infrastructure funding. Several investment opportunities for urban leaders, and potential innovative partners, stand out: renewing old infrastructure using technology overlays, harnessing reservations and monitoring systems to get more out of existing infrastructure, and reinventing the way we build new infrastructure.

The promise of technology in urban infrastructure

By harnessing new technologies, urban leaders can overcome longstanding hurdles and maximize their infrastructure investments. And perhaps most importantly, these investments will help cities effectively and sustainably provide transit, housing, and public space for all.

Renewing outdated infrastructure

One of the challenges with old infrastructure is that it isn't built with the intelligent capabilities—such as sensors, management systems, and interconnectivity—designed into new projects. Historically, retrofitting older systems has been prohibitively expensive, especially if new wires needed to be run to supply power and data capacity to a host of new sensors, or if mounts had to be installed for antennas or other technologies.

However, several technologies have advanced dramatically over the past few years, making infrastructure renewal far more feasible today. Low-cost miniaturization can enable everything from automated utility meters to air-quality monitors to be deployed in tiny versions and at relatively minimal cost. Low-power Wi-Fi communication allows devices to send intermittent streams of data, such as occupancy counts or temperature readings, in a way that prolongs battery life. And the evolution of both solar panels and batteries means buildings can harness more power at lower cost.

For only a few thousand dollars, owners of buildings without complex building-management systems can purchase a box of battery-powered thermometers that stick to the wall like postage stamps, connect to Wi-Fi, and communicate with a smart thermostat. They use so little power that they last years before needing a replacement—and they provide the beginnings of a smart building. Taken together, these technologies mean that existing infrastructure can now become smart with a simple, relatively inexpensive overlay.

Similar opportunities exist for using sensors in urban systems such as parking garages, metro stations, and parks—anywhere where occupancy, resource consumption, or condition data are needed.

Getting more out of existing capacity

The rise of the shared economy has shown how digital information about underused capacity can reveal opportunities to turn waste into value. In the same way, urban leaders can consider adopting innovations that allow assets previously tied to one use to instead serve multiple purposes. They can rely on digital systems to offer the kind of monitoring and accountability that previously stemmed from physical control of assets.

One application of this concept is the virtual parking lot. Cities routinely have redundant parking capacity. Often, facilities have their own parking lots within proximity to other lots, and rarely are they all fully occupied at the same time. And demands may be entirely complementary. Parking networks that allow registered users to make use of the full range of parking in a given area—perhaps with micropayments to each owner—can increase real supply, free up land for productive development, and remove street parking. This street space can be repurposed for greatly needed uses, such as for outdoor dining or public space.

Similar approaches are possible in the power sector, where distributed "virtual power plants" can be created either through demand-response or actual microgeneration units. The city of Oakland, California, is already creating a virtual, direct-to-consumer microgrid—an example of this capability at work.

Reducing the cost to build new

The application of artificial intelligence and machine learning to traditional challenges—such as urban site planning and transportation modeling—can improve performance and economics. For example, machine-learning-based urban-planning tools can help developers find additional usable space on a given parcel while improving performance characteristics, such as access to light and open space.

Going forward, urban construction— an industry whose productivity worldwide has stagnated at a time when overall productivity has increased thanks to technology—is likely to be disrupted by standardization and automation. Whether building tunnels or skyscrapers, cities can push builders to adopt new approaches. The components of skyscrapers, for example, can be built in factories by robots, much as automobiles are manufactured, and The Boring Company has demonstrated how to reduce tunneling costs through similar capabilities.

The range of options for achieving high-impact urban infrastructure is far greater now. For cities that are willing to approach infrastructure endeavors differently—such as by updating rules and regulations to enable new capabilities to be deployed—there are creative and achievable next-generation solutions that can help meet today's challenges and make the most of funding.

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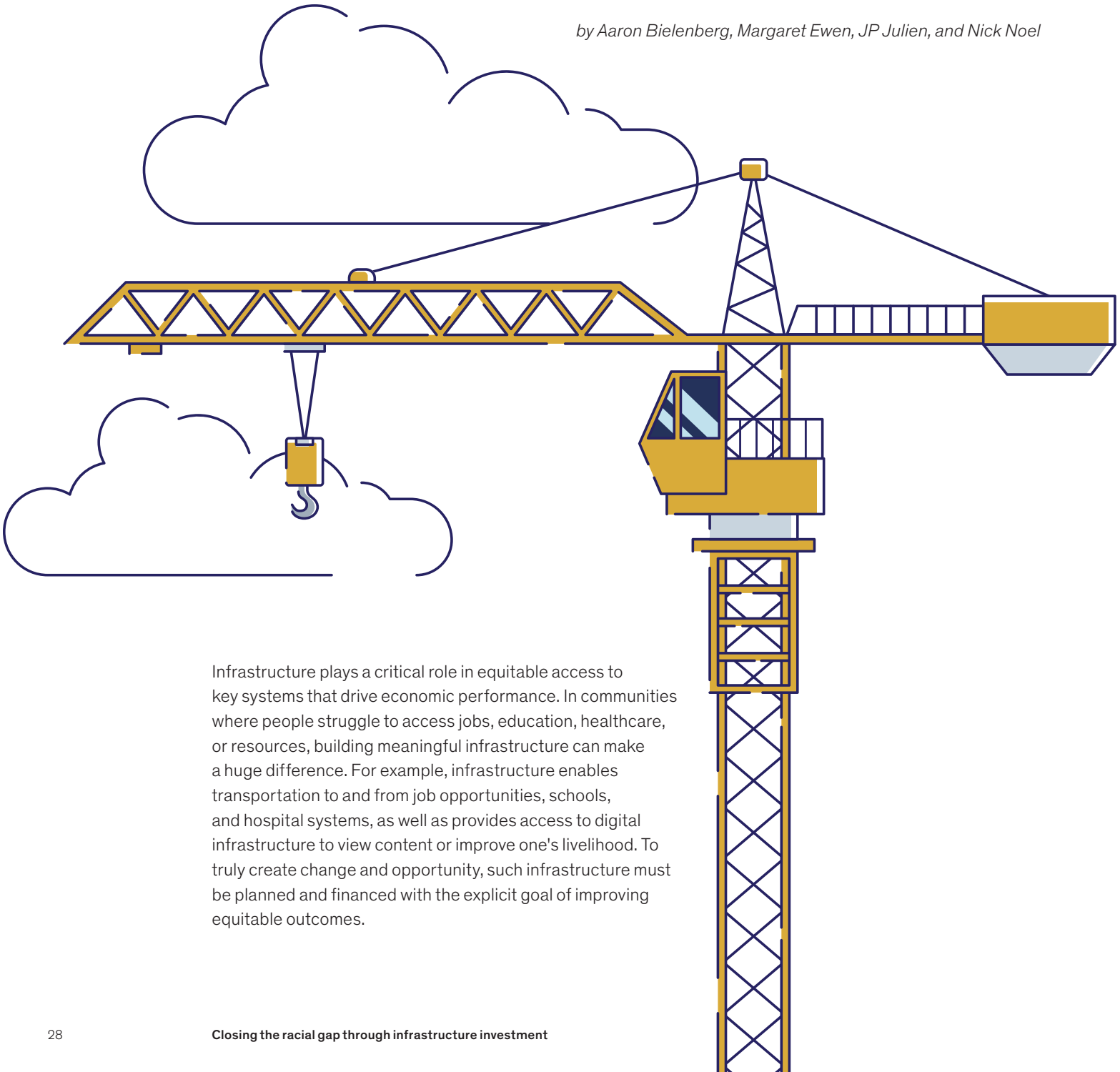
Rohit T. Aggarwala is a senior fellow at the Urban Tech Hub at the Jacobs Technion-Cornell Institute and a senior adviser at Sidewalk Labs. **Joshua Sirefman** is a cofounder and senior adviser at Sidewalk Labs.

Closing the racial gap through infrastructure investment

In the face of rising disparity and negative outcomes for excluded regions and populations, there are several ways in which infrastructure investors and developers can spur positive change.

by Aaron Bielenberg, Margaret Ewen, JP Julien, and Nick Noel

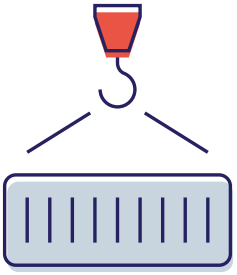


Infrastructure plays a critical role in equitable access to key systems that drive economic performance. In communities where people struggle to access jobs, education, healthcare, or resources, building meaningful infrastructure can make a huge difference. For example, infrastructure enables transportation to and from job opportunities, schools, and hospital systems, as well as provides access to digital infrastructure to view content or improve one's livelihood. To truly create change and opportunity, such infrastructure must be planned and financed with the explicit goal of improving equitable outcomes.

The role of public and private infrastructure investors and developers in driving equitable outcomes are varied, and can have significant impact.

Financing

Stakeholders can partner to focus on projects with lower financial returns but high social return through blended financing solutions.



Sourcing and resourcing

Investors and developers can choose to source from minority-owned suppliers or emphasize projects with high job-creation potential in vulnerable communities.

Infrastructure investors and developers themselves can also strive to employ a more diverse workforce, as well as drive change via the funds and projects they choose to engage in.

Prioritization

Stakeholders can choose to invest in projects that address wide and existing gaps in racial outcomes within specific cities or metropolitan statistical areas (MSAs).[1]

[1] In the United States, the US Census Bureau collects robust data on metropolitan statistical areas that can be used as the basis of the proposed analysis. In other countries, analogous data is often available from national statistics agencies.

As an aid to prioritizing potential projects and partnerships, investors and developers can develop diagnostic criteria to select potential projects based on impact.

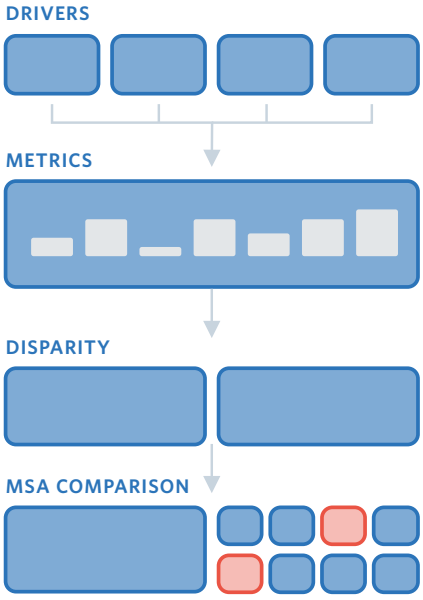
There are four primary steps:

1. Establish the drivers.

A diagnostic for assessing potential investments should be based upon key drivers related to infrastructure. These could include access to digital infrastructure, access to affordable housing, public transportation to city centers, and proximity to healthcare infrastructure.

2. Identify the metrics that will affect the outcome of each driver.

In health, for example, an important metric may be what percentage of an MSA's Black and Latinx population lives within a specified distance of a hospital.



3. Measure racial disparity in each metric.

By comparing the Black and white populations' metric outcomes, such as percentage living within a specified distance of a hospital, a diagnostic can begin to paint a picture of racial disparity in terms of access to infrastructure.

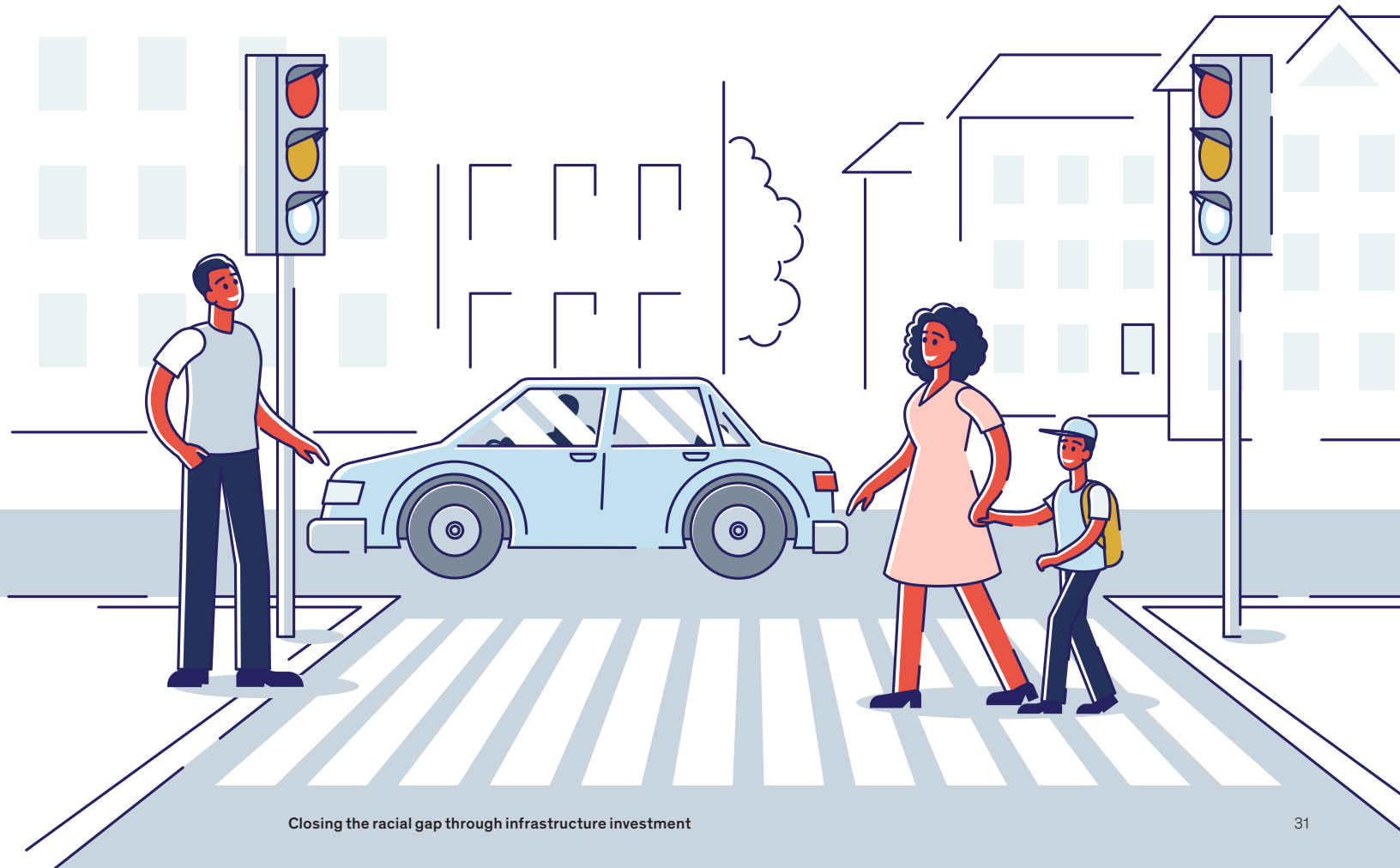
4. Contextualize the potential investment against others in the pipeline.

Within a pipeline of potential investments, opportunities may have differing levels of potential for driving equitable outcomes. A diagnostic performed across potential project geographies may reveal important investment factors, such as how to prioritize different projects based on gaps addressed or exacerbated.

Conclusion

To drive a more inclusive economy, investors and developers could consider including equity as a core principle of their infrastructure financing and development process. They can do this by identifying root-cause barriers and assets to address or emphasize through investment, deprioritizing investments that are increasing inequitable outcomes, and following through on investments with an inclusive operating model. A diagnostic could be a helpful step to achieving positive change in equity and inclusion outcomes.

Aaron Bielenberg is a partner in McKinsey's DC office, where **Nick Noel** is a consultant. **Margaret Ewen** is a consultant in the Philadelphia office, where **JP Julien** is an associate partner.



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Investing in infrastructure for a ‘green recovery’

Asset managers must understand the impact of climate change on their portfolios. Doing so can result in a more sustainable built environment that supports decarbonization technologies.

Lawrence Slade

CEO
Global Infrastructure Investor Association

The issue of climate change is still with us, writ large. With many countries and companies committing to achieve net-zero greenhouse gas emissions by 2050 or earlier, and many private or pension investors shunning carbon-related assets, the policy questions for the world are staggering. The COVID-19 pandemic has further complicated these questions.

Decarbonizing a modern economy has never been done and presents inherent risk to governments and investors alike. At the heart of success is how all parties—asset owners, investors, and policymakers—understand and manage this risk. They must stay in tune with how policies and regulations are developed to achieve low- or zero-carbon economies and ensure early-stage development capital is available to advance the right projects. The stakes are high: advancement of these infrastructure projects is widely recognized as a critical aspect of post-COVID-19 economic recovery.

But how does economic recovery fit within the green agenda? The so-called green recovery incorporates resilience into infrastructure to achieve net-zero projects. The challenge is in identifying areas of opportunity for adopting new technologies or retrofitting existing assets. In addition, companies must decide when to move on from stranded assets, such as fossil-fuel power generation, that are nearing the end of their economic life because of regulatory or market changes.

In the years to come, asset owners will need to understand how the markets will be affected by the energy transition, make decisions based on climate policy and regulation, and pursue public–private partnerships.

Stranded assets present significant challenge

Many investment opportunities will arise from increased digitalization, green gas, electric vehicles (EVs), clean power, and other areas of innovation. However, companies must carefully manage these opportunities alongside challenges from stranded assets.

For example, in the United Kingdom, coal-fired power stations will be taken off the grid no later than 2025. While coal remains a major source of electricity generation for some EU countries, commitments to hit net-zero emissions targets will require the European Union to rapidly adopt new clean sources of energy. Another area is oil and gas infrastructure. Globally speaking, there are numerous questions asset owners must ask—for instance, when will internal-combustion-engine (ICE) vehicles be banned? How quickly will consumers move to EVs? Or how fast can economies move to green gas? Similarly, revenues that once seemed set in stone, such as those for certain tollways, might now be less predictable because there may be less traffic over the next ten years.

If economies hope to meet climate-change objectives, leaders in both the public and private sectors will need to address the challenges of stranded assets, consider the latest climate guidance and policy, and determine when to pursue opportunities and when to exit. For instance, does it make more sense to reverse-engineer carbon capture and storage (CCS) technologies or introduce newer, cleaner options?

Critical questions for implementing a 'green recovery'

Determining how to move forward with a green recovery requires a large-scale shift in the role infrastructure plays in economies. The following questions, which often result in interdependent answers, can help determine the industry's path forward.

How can current asset owners and future investors manage risk and realize opportunities?

Owners and investors alike must understand the speed of the transition over the next ten to 15 years, as well as which markets will transition completely (requiring greenfield projects) and

which will be merely impacted (requiring brownfield projects). For example, the midstream gas and transport sectors will likely need to transition to accommodate green gas and hydrogen-based fuels, while the power sector could adopt CCS technologies.

A clear view of the challenges can help identify opportunities and, more important, avoid risk from stranded assets. With this view in mind, companies will also need to leverage or attract new investment around both greenfield and brownfield projects, which requires careful evaluation of existing assets, new investment opportunities, and the latest policy changes.

How should investors incorporate current climate guidance and policy into their decisions?
Assets must be future-proofed according to current climate guidance. For instance, assets located in coastal areas will likely need substantial investment to increase their climate resilience to a level that protects their value for many decades. By contrast, consider tollways equipped with gas stations. Such stations will be necessary for many years—albeit over time, with falling demand—until new regulations phase out ICE vehicles. However, looking at the impending transition to EVs, it's clear there is a need to create cross-country infrastructure to accommodate EVs and destination charging units at malls and airports. The same logic applies to supplying electric coaches, buses, and heavy vehicles with power.

Many new technologies and start-ups are emerging—all claiming to provide the fastest, cleanest solutions. Thus, it's critical that owners understand the challenges on both technical and economic levels, identify linked opportunities across sectors, and pursue partnerships that are mutually beneficial. As an example, a recent partnership between two European companies will result in the use of offshore-wind infrastructure to create hydrogen, which is then injected directly into the natural-gas grid to reduce emissions. In this sense, everyone benefits: the major infrastructure players that own the gas networks; the industry itself, which decarbonizes; and customers who receive a cleaner, greener product.

How can policy makers achieve decarbonization agendas?
Investing in infrastructure to decarbonize requires a multidecade horizon for any asset. In an uncertain world in which conditions are constantly changing and technology is always evolving, companies and policy makers need to be realistic about implementing change, and governments need to be clear and transparent about how their policies will evolve. In the United States, for example, change occurs on both federal and state levels. Local departments of transportation would also need to be involved. In the United Kingdom, the duties placed on regulators will likely need to be reset to meet the fast-evolving needs of net-zero economies.

No matter the region, an open discussion on how economies can best deploy public and private capital to create clean, emissions-free infrastructure is critical. This means understanding the markets in which healthy competition will work, those that require regulatory intervention, and where and how government and private capital can work in partnership, including clear direction from governments on preferred infrastructure funding models to enable private capital investment.

Finally, an understanding of what fulfils the description of "investable infrastructure" will play a vital role. There will be some elements of new technology that require government support to move forward to the point that the risk profile is reduced sufficiently for private capital.

Relatively new technologies or assets—such as more powerful batteries, CCS, floating offshore wind, EVs, and hydrogen gas—all require different funding models to help their early-stage development and bring private capital in at different risk and return levels. And governments, investors, regulators, and society all have a part to play.

Decisions made today by asset owners, investors, and policy makers should not be taken lightly because they will affect generations to come. It is critical not only to act now but to do so decisively. Similarly, societal expectations of what it means to "do the right thing" are changing, including where pensions are invested, how assets are managed, and how reporting requirements are disclosed. While the opportunities are increasing in number, the bar for success is arguably getting higher. In the end, getting the right advice is often a matter of asking the right questions.

Voices *highlights a range of perspectives by infrastructure and capital project leaders from across geographies and value chains. McKinsey & Company does not endorse the organizations who contribute to* Voices *or their views.*

Lawrence Slade is CEO of the London-based Global Infrastructure Investor Association, or GIIA.

A low-carbon recovery is vital—and achievable

The post-pandemic recovery could be decisive in the fight against climate change. Our analysis illustrates how policy makers can bring economic, environmental, and social priorities together.

Hauke Engel
Partner, Frankfurt
McKinsey & Company

Alastair Hamilton
Partner, London
McKinsey & Company

Solveigh Hieronimus
Senior Partner, Munich
McKinsey & Company

Tomas Nauclér
Senior Partner, Stockholm
McKinsey & Company

The tragedy of the COVID-19 crisis has taken much attention away from the threat of climate change as institutions have devoted themselves to safeguarding public health. Severe job losses and revenue declines in some sectors have also compelled policy makers to mount an unprecedented financial response.

Important as it is to repair the economic damage, a swift return to business as usual could be environmentally harmful. After the 2007–08 financial crisis, the economic slowdown sharply reduced global greenhouse-gas emissions in 2009. But by 2010, emissions had reached a record high, in part because governments implemented measures to stimulate economies, with limited regard for the environmental consequences. The danger now is that the same pattern will repeat itself—and today the stakes are even higher. The period after the COVID-19 crisis could determine whether the world meets or misses the goals of the 2015 Paris Agreement, which calls for limiting global warming to well under 2°C above preindustrial levels.

Achieving those goals is a distinct possibility. A low-carbon recovery could not only initiate the significant emissions reductions needed to halt climate change, but also create more jobs and economic growth than a high-carbon recovery would. Research suggests that many low-carbon programs stimulate growth and create jobs as effectively as—or better than—environmentally neutral or harmful programs. In a survey, more than 200 economists and economic officials said that green economic-recovery measures performed at least as well as other measures did. An econometric study of government spending on energy technologies showed that spending on renewables creates five more jobs per million dollars invested than spending on fossil fuels.

In assessing and prioritizing recovery measures, policy makers may wish to balance several factors:

Socioeconomic benefits. These can be assessed by various criteria, including the number of jobs created per sum of money spent, the GDP or gross-value-added (GVA) multiplier, or the benefits to particular population segments, sectors, or geographies. The last consideration may be especially important, for COVID-19's economic fallout has landed unevenly.

Climate benefits. A recovery measure's decarbonization effect can be gauged by tons of greenhouse gases prevented (or removed) per year or by the ability to enable other carbon-reducing changes. Reinforcing the energy grid, for example, promotes more distributed microgeneration, which can cut emissions.

Time frame for measure to take effect. Certain measures have a more immediate effect on job creation and GDP growth; for example, programs to construct bicycle lanes can ramp up and create jobs quickly. Other options take longer to play out. Big infrastructure projects require extensive planning before economic activity starts in earnest.

Time frame in which carbon emissions are reduced. Some recovery measures, such as efforts to improve industrial efficiency, can lower emissions in the near term. Measures to support the development of low-carbon technologies may take longer to make a difference—though their cumulative emissions-reduction effects can make innovation a valuable element of recovery portfolios.

Feasibility. The ease of implementing recovery measures also matters. Construction programs, for instance, might require training or reskilling large numbers of workers. Expansions of renewable-energy capacity might proceed slowly until regional supply chains are more developed. COVID-19 also introduces new feasibility issues, such as the need to maintain physical distancing.

All these factors matter not only when governments assess individual recovery options but also when they assemble them into a package. Options that quickly put people to work might be attractive, but not all boost employment for long. Sustained growth might call for projects that create jobs for years to come, even if they require extra time to ramp up. A mix may provide the best employment outcomes. Similarly, policy makers might combine some measures that cut greenhouse-gas emissions in

the near term with others that reduce them after several years.

Our analysis of nearly 50 measures across four sectors in one European country illustrates the possibility of assembling a balanced, effective low-carbon recovery program. We based estimates of the gross-value-added (GVA) multipliers of each potential measure on those observed for similar activities in major EU economies. Job-creation potential was estimated through regression analysis. To gauge each measure's decarbonization impact, feasibility, and fit with the skills of the workforce and the needs of individual sectors, we drew on expert interviews and academic research.

This approach yielded a list of 12 feasible recovery measures with strong socioeconomic benefits (including multiregional job creation) and decarbonization effects in the near, medium, and long terms. These run the gamut from improving energy efficiency in homes and industrial facilities, to reinforcing the power grid to support widespread electrification and building out wind- and solar-power generation capacity, to expanding bus rapid transit projects and scaling up electric-vehicle manufacturing.[1]

According to our analysis, this recovery package would deliver substantial economic and environmental returns. By our estimates, deploying €75 billion to €150 billion would produce €180 billion to €350 billion of gross value added, create up to three million new jobs—many in sectors and demographic categories where jobs are highly vulnerable—and support a 15 to 30 percent reduction in carbon emissions by 2030 (exhibit).

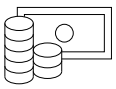
[1] For more details, see Hauke Engel, Alastair Hamilton, Solveigh Hieronimus, and Tomas Nauclér, "How a post-pandemic stimulus can both create jobs and help the climate," McKinsey & Company, May 27, 2020, McKinsey.com.

Exhibit

A balanced low-carbon recovery portfolio can produce significant economic and environmental benefits.

Estimated capital mobilized and impact of a low-carbon recovery package for a European country[1]

Capital mobilized



€75–€150 billion

of capital mobilized[2]

Induced employment

1–3 million

"job years" of employment created, excluding knock-on effects[3]

Gross value added

€180–€350 billion

in GVA created[4]

Decarbonization

15–30 percent

reduction in CO_2 by 2030[5]

[1] Population of 50 million to 70 million. Low-carbon recovery package includes 12 recovery measures.
[2] Includes direct government spend and "crowded-in" private-sector capital; exact cost to state is dependent on funding mechanism.
[3] Job years correspond to 1 job for 1 year; job multipliers measure only employment created during spend. In practice, economic recovery could create jobs that become self-sustaining, resulting in more job years than shown here.
[4] Based on gross-value-added (GVA) multiplier at a sector level for a typical European country of 50 million to 70 million people.
[5] Reduction is relative to current emissions and estimated based on potential; actual reduction will depend on multiple societal factors.

It now appears that recovery from the COVID-19 economic crisis will require programs to last for months or even years. Those coming months and years will also be a decisive time for efforts to keep global warming below 2°C. Low-carbon recovery measures can help policy makers fulfill both needs at once—but the clock is ticking. This is the pivotal moment for policy makers to unite their economic and environmental priorities to improve and sustain the well-being of individual citizens and of the planet as a whole.

This article is adapted from a longer version, published on McKinsey.com.

Hauke Engel is a partner in McKinsey's Frankfurt office, **Alastair Hamilton** is a partner in the London office, **Solveigh Hieronimus** is a senior partner in the Munich office, and **Tomas Nauclér** is a senior partner in the Stockholm office.

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Infrastructure tendering in the midst of COVID-19

As the pandemic causes supply to outpace demand in tendering, project owners must adjust their approaches to consider new risks—and make the shifts the industry needs to move forward.

Jim Banaszak
Partner, Chicago
McKinsey & Company

Corey Hopper
Associate Partner, New York
McKinsey & Company

Garo Hovnanian
Partner, Philadelphia
McKinsey & Company

Bidding on capital projects requires a reliance on certain assumptions: when the work will start, what suppliers will be available, how much materials will cost, how productive the labor will be, and so forth. COVID-19 has thrown to the wind many of the formulas for making these assumptions. Supply chains are disrupted, work rules are changing, and the industry is forced to keep up despite the uncertainty.

As both private and public infrastructure project owners have revisited their project pipelines,[1] tendering competition has grown fierce. Many engineering and construction (E&C) firms, starved for the work necessary to maintain cash flow and backlog, are throwing their hats into more rings than usual—and often quoting projects at increasingly aggressive prices, sometimes seemingly below cost. And while owners may initially be tempted by the competition-induced fall in prices, caution is warranted.

Engineering and construction firms see disruption in bidding

In a survey of E&C firms from across industries and geographies fielded in September 2020, 89 percent of respondents said they have changed how they approached bids (exhibit). The plurality of those that have changed their approach indicated more willingness to explore alternative contracting methods, while one-third acknowledged a change in their pricing approach. This is likely a competitive response, as 82 percent of respondents said they have seen the nature of the competition

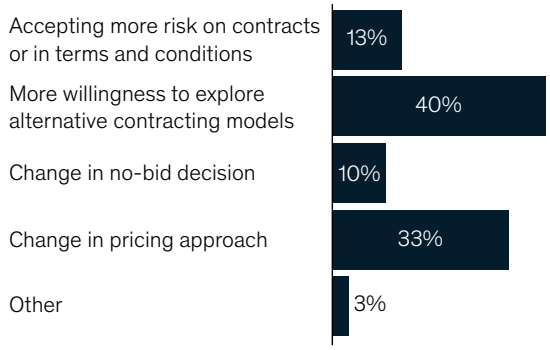
[1] Tom Brinded, Zak Cutler, Erikhans Kok, and Prakash Parbhoo, "Resetting capital spending in the wake of COVID-19," June 25, 2020, McKinsey.com.

Exhibit

COVID-19 has disrupted how engineering and construction firms bid.

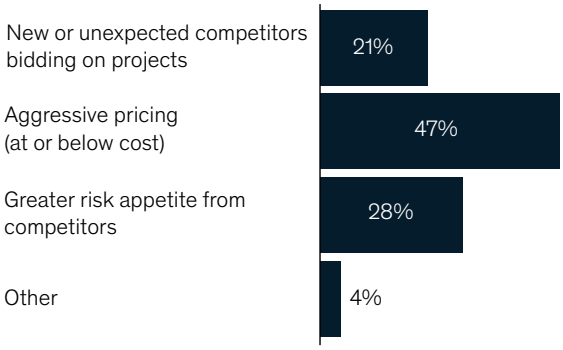
"Has the economic disruption of the global COVID-19 pandemic changed how you are approaching bids?" (n = 52)

89% of E&C firms have changed how they approach bids—specifically:



"Which if any of the following reactions have you observed within your company?" (n = 35)

82% of E&C firms have seen the nature of competition change—specifically:



Note: Figures may not sum to 100, due to rounding.
Source: McKinsey Global Institute, Tender Office Survey, September 2020

change—namely in the form of more competitors and aggressive pricing at or below cost. One respondent noted, "Competitors are bidding low and are desperate for cash and work continuity."

For owners hoping to keep work going during tough times—especially public infrastructure owners that have received funding infusions with relief packages—these may sound like good conditions to complete projects in a time when the economy is thirsting for jobs and any form of growth. The head of capital programming for a large metropolitan transportation agency noted that, since May, bids have been coming in as much as 30 percent lower than internal estimates. However, accepting such bids also invites a level of risk that may leave owners holding the bag in the medium to long term. While owners are initially excited to award a project for less than they budgeted, this exposes them to a higher risk, as the E&C firm will need to find other ways to make the project profitable—or else risk financial distress that can threaten the project already in progress.

What owners need to do

Supporting a healthy pool of engineering, construction, and specialty-service firms with the right balance of skills, risk-taking, and financial solvency can help bolster projects' long-term viability. Three actions hold merit:

Shift decision-making weight from price to risk. In short, owners can't afford to simply pick bids that are substantially below historical costs or internal estimates without first investigating where the dramatic savings are coming from. According to the survey, some bidders may be prioritizing winning the bid at whatever cost in order to keep their backlog full and their people employed—but eventually they will need to make a profit, either through claims or by cutting corners in ways that could add unforeseen risk to the project.

In response, owners can revisit their procurement formulas. While price will always be a factor—and in some cases the legally required deciding factor—owners can adjust the baseline for other metrics related to contractors' financial security and risk-management plans to ensure that even the lowest bid meets a reasonable threshold of risk mitigation in a postpandemic environment. If owners allow price to guide their decisions as heavily as they have in the past, they may end up working with contractors that are racing to the bottom.

Set conditions for the ecosystem, not just the project. As evidenced by collaborative contracting, alternative risk-sharing models, and the use of advanced digital tools, the E&C industry is increasingly showing a willingness to adapt to new working models—but it's largely up to owners to require these conditions.[2] In our survey, 22 respondents indicated more willingness to explore alternative contracting models: "Some talk about the need for collaborative contracting and a partnering approach by clients," one respondent said. To date, "this has not translated into reality, however; most contracts are still bid on a fixed-price, lump-sum basis." Indeed, in a historically conservative industry, the current state of project supply and demand can offer owners an opportunity to overhaul their tendering requirements for the benefit of not only themselves but also the industry as a whole.

Favor contractors with a strong track record in their sector, type of work, and geography. Many survey respondents noted that contractors are branching into new areas out of necessity. Pivoting to near adjacencies when the typical pipeline dries up has long been common in the entrepreneurial culture of the construction industry. But how will contractors adjust their pricing models, supplier relationships, and preferred subcontractors for a new industry or geography for which they have

[2] For more on collaborative contracting, see Jim Banaszak, Jeff Billows, Rudi Blankestijn, Matthieu Dussud, and Rebecka Pritchard, "Collaborative contracting: Moving from pilot to scale-up," January 17, 2020, McKinsey.com. For more on advanced digital tools, see Maria João Ribeirinho, Jan Mischke, Gernot Strube, Erik Sjödin, Jose Luis Blanco, Rob Palter, Jonas Biörck, David Rockhill, and Timmy Andersson, "The next normal in construction: How disruption is reshaping the world's largest ecosystem," June 4, 2020, McKinsey.com.

little data? And the data that they do have were gathered while operating amid a global pandemic for the better part of a year. Before gambling on a new entrant, conscientious owners will want to put bidders through the paces and truly demonstrate how they can carry over success from other sectors into a new sector with risk-management plans, qualified leadership, and so forth.

The road to full recovery after the COVID-19 crisis will likely be long and difficult. Whether there is substantial federal stimulus or not, US agencies have the chance to reimagine the country's infrastructure and create a more resilient and efficient future. This is a critical time that could define America's infrastructure for the next generation.

Jim Banaszak is a partner in McKinsey's Chicago office, **Corey Hopper** is an associate partner in the New York office, and **Garo Hovnanian** is a partner in the Philadelphia office.

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The effect of government stimulus on commercial real estate amid COVID-19

Governments have used a variety of measures to support commercial real estate and their tenants through COVID-19—with mixed results for both parties. What opportunity exists for new approaches?

Jonathan Lurie

Managing Partner, Realty Corporation, and Senior Adviser, McKinsey & Company

Rob Palter

Senior Partner, Toronto McKinsey & Company

The COVID-19 pandemic, the worst humanitarian and health crisis the world has seen in the last 100 years, has had devastating effects on families, livelihoods, and economies. Governments' efforts to enforce work-from-home rules and limit congregation as critical public health measures to control the spread of the virus have had significant impacts on commercial real estate, the businesses that occupy these spaces, and the people who work there. Indeed, physical distancing and stay-at-home mandates have left many office buildings deserted, and many companies have pushed office return dates out to summer 2021—more than a year after the lockdowns started.[1] In Q3 2020 the United States saw a decline in office occupancy of 28.9 million square feet—the largest single-quarter drop on record—and vacancy rose to 16 percent.[2] Meanwhile, retail real estate and shopping malls have been utterly devastated.

Given that real estate is the largest illiquid asset class in the world, estimated at more than $228 trillion in asset value in 2016,[3] as well as how many people are employed directly or indirectly in the industry, governments at the federal, state, provincial, and municipal levels are focusing significant amounts of COVID-19 financial support on the sector. The responses have varied considerably by government, ranging from indirect support, such as simple deferrals of rent and changing of eviction rules, to significant direct financial support of landlords (via payments to tenants).

Clearly, governments recognize that maintaining stability throughout the duration of the pandemic is required for the tenants, landlords, building value, property taxes, safety and security, and quality of life in every community. But, to date, how effective have these stimulus plans been—and what might governments, landlords, and tenants consider doing differently going forward, especially in a post-vaccination economic recovery? In this article, we review the shape of various programs around the world, offer a perspective on their effectiveness and the second-order distortions they're causing in the market, and offer some considerations to facilitate the sector's exit from the COVID-19 pandemic and set it up for success in the years to come.

What do these stimulus programs look like?

To date, government funding has largely come from federal sources, where there is more substantial borrowing capacity compared with hyper-local sources. Federal funds have generally provided direct support that is time-limited and targeted, as opposed to generally available. This support has included, for example, stimulus checks given directly to employers that allows businesses to divert scarce cash to nonemployment costs, as well as checks to the tenants themselves that allow them to keep paying their rent or mortgage.

For example, at the outset of the COVID-19 pandemic, Canada made forgivable loans available to landlords where the loans cover 50 percent of the rent, the tenant pays 25 percent of the rent, and the landlord absorbs 25 percent of the rental loss. The government also extended the period before eviction notices can be served. During the second wave of COVID-19, the Canadian government launched a second rent relief program that covers up to 65 percent of rent or commercial mortgage interest (linked to a sliding scale of revenues impact due to COVID).[4] The UK government has required extensions in notice periods by landlords before eviction, and issued a moratorium on commercial lease evictions.[5] The French government is offering landlords a tax credit equal to 50 percent of the amount of rent waived for commercial tenants that have no more than 250 employees.[6] In Germany, the

[1] Gillian Friedman and Kellen Browning, "July is the new January: More companies delay return to the office," October 13, 2010, nytimes.com.
[2] Scott Homa and Phil Ryan, "United States office outlook—Q3 2020," Jones Lang LaSalle, October 14, 2020, jll.com.
[3] "Global real estate: Trends in the world's largest asset class," Hongkong and Shanghai Banking Corporation, July 2017, hsbc.com.
[4] Jordan Press and Christopher Reynolds, "Anxiety, criticism greet arrival of Liberals' revamped commercial rent relief program," Canadian Broadcasting Corporation, November 23, 2020, cbc.ca.
[5] "COVID-19 government measures in real estate: Europe," Squire Patton Boggs, April 3, 2020, squirepattonboggs.com.
[6] Emilie Renaud and Nassim Vareilles, "French government introduces new tax credit for landlords to waive rent payments," Gowling WLG, November 16, 2020, gowlingwlg.com.

government enabled tenants to defer lease payments from 2020 to 2022.[7]

Beyond such direct financial supports, many governments have also announced green retrofits of buildings as an important part of their economic recovery plans. For example, the Canadian Government has pledged 2 billion Canadian dollars for building retrofits;[8] the French government has pledged €7 billion and the UK government has pledged £3 billion.[9]

Are these programs effective?

To determine if the stimulus programs aimed at the real estate sector had any positive impact, we need to examine two metrics: the percentage of uptake by landlords and tenants, and the impact of these programs in terms of vacancy, rent rolls, and ultimately asset values. It's also helpful to consider the distortions in the sector caused by stimulus efforts.

Uptake by landlords and tenants

The evidence on the uptake of these programs is mixed by country. For example, in Canada, the government set aside more than 900 million Canadian dollars for commercial rental support. Its most recent estimates are that just 163 million Canadian dollars was spent and that 21,000 of 1.2 million small businesses that could have benefitted from the program were funded.[10] We have heard from many real estate executives that the application process is too arduous, and many landlords do not want to put more debt on their balance sheets even though the loan was forgivable in part.

At the other end of the spectrum, there has been significant uptake for COVID-19 support in the United Kingdom through the "Bounce Back Loan Program," which provided £50,000 loans to small businesses that can be paid off over ten years. Demand for these loans, which can be used to pay rent, far exceeded anticipated levels. It was estimated that there would be £18 billion to £26 billion of uptake. But it is currently estimated that uptake ranges from £38 billion to £48 billion.[11]

Impact on market metrics and asset values

While it is still early to understand the full scope of government intervention in the market, it would seem that the majority of efforts to support landlords—from requiring rent deferrals to funding building retrofits—have served to avoid a panic or sell off in the sector. According to research from JLL, sublease markets are suffering as the supply of available space far outstrips the current demand. The overall volume of asset sales has dropped precipitously, even as individual asset pricing has remained stable (except for retail). Asset values are not being remarked quickly by financial institutions. Yet, small business defaults and closures continue to increase. For example, in Canada, where the government has arguably been the most aggressive in terms of rental relief programs, it is estimated that the COVID-19 pandemic could cause the permanent closure of up to 19 percent of small businesses.[12]

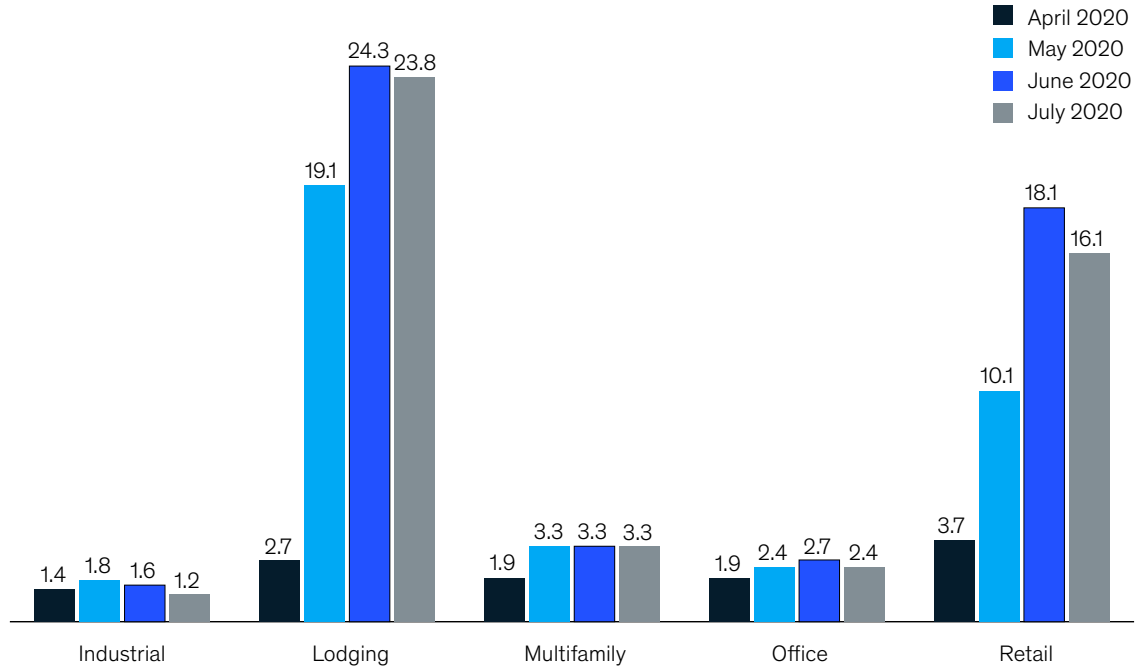
As noted above, the impact on occupancy and vacancy has been severe. Delinquency rates have varied by sector, with both lodging and retail spiking significantly starting in May 2020 (exhibit).

While there are several indicators showing that things are worsening in real estate, things likely would have been even worse without these stimulus programs. Rent support has shored up continuity of income and continuity of occupancy, which in turn has stabilized asset values. However, unlike the rebound we have seen in other parts of the economy through the end of 2020 (for example, retail shopping), the real estate market

[7] "COVID-19 government measures in real estate: Europe," April 2020.
[8] "Canada Infrastructure Bank's growth plan backgrounder," Canada Infrastructure Bank, October 2020, cib-bic.ca.
[9] Yamide Dagnet and Joel Jaeger, "Not enough climate action in stimulus plans," World Resources Institutes, September 15, 2020, wri.org.
[10] Samantha Edwards, "Commercial rent subsidy program uptake remains low," *NOW Magazine*, July 3, 2020, nowtoronto.com.
[11] "Bounce back loans: Taxpayers may lose £26bn on unpaid loans," *British Broadcasting Corporation*, October 7, 2020, bbc.com.
[12] "Canada could lose an additional 158,000 small businesses to COVID-19," Canadian Federation of Independent Business, July 29, 2020, newswire.ca.

Exhibit

The significant spike in delinquency in lodging has been stabilized.



Source: Trepp CMBS Research, August 4, 2020

has seen—at best—a modest rebound, and asset values are generally below pre-COVID-19 levels.

Distortions in real estate

In some cases, stimulus efforts have exacerbated the problems created by tight construction markets already struggling to meet demand. Most major projects around the world did not stop construction as a result of COVID-19; many took temporary pauses to learn how to operate a construction site in a socially distanced manner, but work has continued. Green retrofit packages can provide critical support in increasing adoption of these technologies, reducing greenhouse gas emissions from buildings, and helping stimulate the economy—but not without trade offs. They are increasing construction costs in several markets. Without the possibility of rent increases to offset increased construction costs, this is a new, pandemic-induced element of risk in the real estate market.

Because many of the stimulus policies have involved deferring eviction notices, many real estate markets have essentially "frozen" as people wait for these eviction rules to expire. Curiously, despite the use of anti-eviction laws in many jurisdictions, it does not appear that tenants are forgoing rent payments when they can afford to pay. Despite that landlords can still sue tenants for unpaid rent, interestingly, they have not jammed the courts with lawsuits. Rather, landlords have been trying to work matters out privately through alternate payment plans. As such, these interventions seem to have brought some stability to the market (a form of distortion).

Assets are not trading hands and so assigning value to assets is difficult, making mark-to-markets

challenging—and the mortgage and loan groups of banks are having difficulty assessing the true riskiness of their portfolios. As a result, relatively few distressed situations have emerged, and transaction volumes are relatively low. In the US, the dollar volume of commercial real estate sales in Q3 2020 was 57 percent lower than the same period in 2019.[13] Moreover, with the possible exception of distressed retail, there has been limited forced selling or distressed loan portfolios traded, as regulators have mostly left banks alone provided that they can pay or reasonably restructure their debt service.

Finally, before COVID-19, real estate investments produced yields above treasuries or bonds and boasted attractive risk-adjusted returns. Now, the risk equation has shifted. Once government support tapers off or disappears altogether, it is unclear how the market will shake out and it is difficult to know what the future holds for government policy and regulation. This uncertainty has stemmed the flow of real estate investment in the short term—and could cause longer-term sputtering.

What other approaches might governments, landlords, and tenants consider going forward?

While existing programs have provided some relief, it is possible that more can be done to assist commercial landlords and tenants. For example, federal governments might study ways to more effectively provide rent relief, which may involve offering tax credits directly to landlords rather than providing rent money to tenants and simplifying access to relief programs, as the French government has done. Governments may also consider some form of property tax relief, as those in South Australia, Western Australia, and New South Wales are doing. And with programs aimed at stimulating new infrastructure investment, such as green retrofits, governments may want to consider how funding these programs today will affect future budgets and spending.

Landlords and tenants will also have to do their part. While all landlords have been restructuring tenant leases, it may be increasingly important for them to consider switching to leases with variable rent components where the landlord receives more rent when the business performs well and less when it does not. Greater rent flexibility may help tenants stay in the building and enable the landlord to benefit from a vaccine-induced economic recovery in a way the landlord would not have in a more traditional fixed-rent approach. Tenants, meanwhile, can be proactive in negotiating with their landlords to work out payment plans or restructure their occupancy—before their debts to the landlord begin to mount. Tenants that have received a loan or grant may see increased flexibility in negotiating rental agreements. They can work with the landlord on a payment plan in exchange for resetting the lease to a more affordable level for a period of time.

Stimulus efforts to date have served to quell panic and keep many doors open, even if workers aren't walking through them at the moment. As governments, landlords, and tenants look to the future, new formulations and approaches to stimulus offerings can help beat projections and accelerate recovery.

Jonathan Lurie is managing partner of the Realty Corporation and a senior adviser to McKinsey. **Rob Palter** is a senior partner in McKinsey's Toronto office.

[13] Matthew DiLallo, "Commercial real estate investing statistics 2020," *Millionacres*, November 16, 2020, fool.com.

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