B20 INFRASTRUCTURE TASKFORCE POLICY PAPER

July 2016

Table of contents

Taskforce composition.....1
Leadership.....1
Membership.....1

Summary of recommendations.....2
Context.....2
Challenges.....2
Recommendations.....3

Recommendation 1. Increase and accelerate the pipeline of high-quality bankable projects.....6
Summary.....6
Context.....6
Value.....7
Actions.....7
Targets.....12

Recommendation 2. Develop conducive regulations, deploy asset-monetization strategies, and promote the creation of financial instruments necessary to unlock long-term investments in infrastructure.....13
Summary.....13
Context.....13
Value.....14
Actions.....14
Targets.....18

Recommendation 3. Enhance the catalytic role of multilateral development banks and institutions in enabling private investment in infrastructure.....19
Summary.....19
Context.....19

Value....20
Actions....20
Targets....22

Recommendation 4. Enable and support the deployment of best-practice asset management and innovative technologies to increase whole project life-cycle productivity and to build future-proof and sustainable infrastructure....23
Summary....23
Context....23
Value....24
Actions....25
Targets....27

Recommendation 5. Strengthen or establish national, regional, and global initiatives to enhance infrastructure interconnectivity across all sectors (such as GEI, PIDA, TEN, and SIEPAC)....28
Summary....28
Context....28
Value....29
Actions....29
Targets....32

Closing statement....33

Value calculation methodology....33

Taskforce schedule and distribution of members....35
Schedule of meetings....35
Distribution of members....35
Chair, co-chairs and taskforce members....35

Special thanks....42

Taskforce composition

Leadership

The 2016 B20 Infrastructure Taskforce was established under the leadership of taskforce Chair Hongbin Ren, Chairman of Sinomach, and eight co-chairs: John Beck from Aecon, Hans-Paul Bürkner from The Boston Consulting Group (BCG), Kirill Dmitriev from the Russian Direct Investment Fund (RDIF), Chengyu Fu from Sinopec, Zhenya Liu from State Grid Corporation of China (SGCC), Lu Ma from State Power Investment Corporation of China (SPIC), Marcus Wallenberg from Skandinaviska Enskilda Banken (SEB), and Jean-Sébastien Jacques from Rio Tinto.

Membership

To ensure broad business representation in our taskforce, the more than 120 taskforce members currently represent all major regions in the G20, with senior executives from across the energy, construction, transportation, and communications sectors, as well as from multilateral development banks and institutions, investment firms, and leading thought leaders and institutions. Our taskforce membership has strong continuity, as almost half of the members have been involved in prior years. The taskforce is assisted by The Boston Consulting Group (the Knowledge Partner), and by the World Economic Forum and the International Chamber of Commerce (the Network Partners).

Summary of recommendations

Context

Reinvigorating and increasing public and private investments in infrastructure assets is a priority for all countries seeking to boost economic growth, productivity, social welfare, competitiveness, and connectivity. The rationale for prioritizing infrastructure investments is well known and appreciated and thus leveraging these benefits has become a top priority for the G20 and emerging-market nations. This prioritization can be seen through previous G20 communiqués, the inclusion of various infrastructure-related objectives in the United Nations' Sustainable Development Goals (SDGs), the Addis Ababa Action Plan, and the commitment to build green, clean, and resilient infrastructure at COP21.

The G20 has focused on infrastructure as a critical growth lever since France's leadership in 2011. It has subsequently identified a series of actions to improve the quality of investment planning and project preparation, facilitate standardized contracting, enable long-term sources of capital, and support public institutions' long-term capacity-building efforts. The G20 moved from identifying actions to taking significant action with the creation of the Global Infrastructure Hub (GIH) by the Australian-led G20 in 2014. The purpose of the GIH is to increase the flow and quality of infrastructure investment opportunities in G20 countries.

Still, there is more to be done. The World Economic Forum estimates that global investment in infrastructure is approximately US$1 trillion less per year than what is needed to satisfy the demand by 2030. Overcoming this investment deficit requires that private investment and know-how is coupled with public-sector funding and multilateral institution support.

The central challenge facing G20 governments is developing enough projects that are "bankable."[1] Progress has been made to increase the strength of the project pipeline in some developed countries. However, the supply of bankable greenfield projects remains limited in emerging and developing countries. Many of these countries do not have a track record in building a credible enabling environment and routinely administering, preparing, and delivering projects reliably.

Challenges

Despite the extensive work of G20 nations and their partners, a variety of persistent challenges still limit infrastructure development and investment across all sectors (for example, transport, energy, water, communications, and social infrastructure):

- **Project pipeline:** Many governments face challenges identifying, selecting, and prioritizing the right projects as well as preparing, structuring, and procuring projects. These challenges can hinder projects from being delivered on time, on budget, and on a bankable and sustainable basis. Additionally, the absence of internationally recognized and supported project-preparation approaches, guidelines, and

[1] A project is considered "bankable" (financeable or investable) if lenders (including banks, capital market participants, or other financiers) are willing to provide project financing or if equity investors (including construction and operations firms and long-term investors) are willing to take exposure in the project.

checklists limits the ability of individual countries to rapidly and effectively address these upstream processes.

- **Financing:** Institutional investors have US$80 trillion[2] at their disposal, with only a small portion allocated to infrastructure. Opportunities to match investor capital with projects directly and indirectly through capital market securities are few. Many markets are still limited by early maturity constraints, such as inadequate investor regulations and protections (including long-term insurance products), shallow and narrow capital markets, and limited availability of risk-sharing and risk-mitigating instruments.
- **Role of Multilateral Development Banks (MDBs):** With significant changes in the MDB landscape, there are opportunities for MDBs to crowd in more private-sector investment through enhanced inter-institutional cooperation, more upstream project development support, and an adjusted product and balance sheet strategy.
- **Innovation and productivity:** The way of constructing and operating infrastructure has largely remained unchanged, translating to relatively low productivity improvement. The emergence of digital, green, and other innovative technologies presents an opportunity to change how infrastructure is designed, built, and managed. Broader technology adoption can unlock this large productivity potential to build and operate sustainable and future-proof infrastructure.
- **Interconnectivity:** Transnational projects are often neglected for two reasons. First, infrastructure is traditionally planned at the country level. Second, there are political, regulatory, and design complexities inherent in these investments. Governments can tap into huge benefits, however, by collaborating and connecting their infrastructure to enable trade, integrate regional economies, and better leverage scarce resources.

Recommendations

The 2016 B20 Infrastructure Taskforce identifies the following five recommendations to supplement pre-existing G20 actions. Recommendations 1 and 2 reinforce the "evergreen" B20 actions from previous years; recommendations 3 through 5 identify new opportunities to close the infrastructure investment gap. These high-impact recommendations, if implemented, could generate more than US$2 trillion in economic activity every year and create more than 30 million additional jobs across the G20 economies.[3] The recommendations of the Infrastructure Taskforce are complemented by the B20 Trade & Investment Taskforce, which provides recommendations for the establishment of a global investment policy environment that better facilitates and appropriately protects investment, as well as supplemented by the B20 Anti-Corruption Forum report.

The global business leaders of the Infrastructure Taskforce encourage each G20 government as well as emerging countries to set out an ambitious infrastructure reform agenda incorporating these recommendations.

---

[2] https://www.oecd.org/g20/topics/trade-and-investment/b20-panel-the-next-wave-of-global-investment-what-and-where.htm.

[3] B20 Australia, 2014.

1. Increase and accelerate the pipeline of high-quality bankable projects

1.1 G20 members should develop a coherent, long-term infrastructure vision and plan on the basis of an objective, rigorous assessment and prioritization of projects.

1.2 G20 members should streamline, standardize, and accelerate project preparation and procurement processes to de-risk projects and bring them to the market.

1.3 G20 members should evaluate the potential and feasibility of all possible revenue sources during project preparation, such as user charges, land value capture, and ancillary businesses.

1.4 G20 members should develop bankable public-private partnerships (PPPs) and other private-participation models that follow international best-practice standards, with well-balanced risk allocation and adequate long-term investor protections, particularly against political and regulatory risk.

1.5 G20 members should enhance public capabilities, create central knowledge hubs, and develop a standardized project-development framework as a guideline to increase and accelerate project pipelines, by drawing on expertise housed in MDBs, the GIH, the OECD, and G20 nations.

2. Develop conducive regulations, deploy asset-monetization strategies, and promote the creation of financial instruments necessary to unlock long-term investments in infrastructure

2.1 G20 members should further improve investment climates and remove unnecessary barriers to infrastructure investment in capital market and prudential regulations.

2.2 G20 members should encourage the development of systematic asset-monetization plans for bankable brownfield assets and subsequently re-invest proceeds into greenfield assets; this will increase investment opportunities for long-term investors and improve market liquidity of the asset class.

2.3 G20 members should work to enable the development of the financial instruments that facilitate debt and equity participation in greenfield infrastructure.

3. Enhance the catalytic role of multilateral development banks and institutions in enabling private investment in infrastructure

3.1 The G20 should direct MDBs to enhance the scope and depth of coordination and cooperation, particularly in areas such as co-financing and technical assistance, and provide more support to governments in developing bankable projects.

3.2 The G20 should encourage MDBs to consider increasing their focus on crowding in private-sector financing by developing and supporting innovative financial instruments (for example, by raising the volume and coverage of guarantees, creating new contingent-financing instruments, and co-investing with private investors).

4. Enable and support the deployment of best-practice asset management and innovative technologies to increase whole project life-cycle productivity and to build future-proof and sustainable infrastructure

4.1 G20 members should encourage the launch of national asset-transformation initiatives to capture latent value from existing assets by making better use of digital and other

innovative technologies and asset management best practices.

4.2 G20 members should encourage its construction oversight bodies and procuring entities to incentivize the use of productivity-enhancing technologies and other innovation in infrastructure construction and development.

4.3 G20 members should encourage the enablement, development, and deployment of innovative technology, particularly in the energy and transport sectors.

5. Strengthen or establish national, regional, and global initiatives to enhance infrastructure interconnectivity across all sectors (such as GEI, PIDA, TEN, and SIEPAC[4])

5.1 B20 supports the G20 proposal for a "Global Infrastructure Connectivity Alliance Initiative", and encourages existing and emerging MDBs and multilateral development institutions (MDIs) involved in the alliance to leverage relative strengths to deepen interconnectivity coordination and cooperation, as well as expand other transnational infrastructure programs and implementation mechanisms.

5.2 G20 members should encourage regular G20 government, business, and expert dialogue to shape the interconnectivity agenda and foster the exchange of best practices across regions and sectors.

[4] GEI refers to the Global Energy Interconnection, PIDA refers to the Program for Infrastructure Development in Africa, TEN refers to the Trans-Europe Network, and SIEPAC refers to the Central American Electrical Interconnection System.

Recommendation 1. Increase and accelerate the pipeline of high-quality bankable projects

Summary

Recommendation	Increase and accelerate the pipeline of high-quality bankable projects
Owner	Individual G20 governments
Timing	(1) Develop action plans within one year after the 2016 G20-B20 Summit (2) Start implementing action plans within two years after the 2016 G20-B20 Summit
Value	An additional US$7 trillion of infrastructure capacity by 2030 and US$1.9 trillion of GDP, and 31 million jobs per annum
Targets	(1) The increase in the number and value of bankable projects in national project pipelines (percentage) (2) The creation of a country-level infrastructure benchmarking tool by the GIH (3) The creation of a standardized project-preparation framework and project-rating methodology by the GIH and/or the MDBs

Context

The limited number of bankable projects in the pipelines is now a chronic first-order issue in most emerging countries and in some developed economies. The G20 has acknowledged the importance of, and the need for, improved project preparation since the Cannes Communiqué of 2011. The B20 has advocated for improved preparation and planning of bankable projects with similar persistence. Despite progress in some countries, this bottleneck remains.

The following pain points continue to plague projects from identification through preparation in many countries:

- **A lack of rigorous national infrastructure planning:** Projects are often developed without an overarching vision or national infrastructure plan that identifies sector and regional priorities on the basis of thorough diagnostics of sector and asset needs and deficiencies.
- **Simplistic or subjective project evaluations:** Projects are often not subjected to rigorous analysis before being selected. Such an analysis would evaluate their economic and financial benefits and their projected social and environmental effects. Even when accurate technical evaluations are conducted, subjective interests often drive project evaluations, prioritization, and selection.
- **Suboptimal project preparation:** Many project developments are plagued by unnecessary delays and inefficiencies. These result from low-quality feasibility studies, complicated land-acquisition processes, and stakeholder opposition, as well as complex and redundant approval procedures.
- **Insufficient revenue streams:** Projects often lack sustainable revenue streams that can pay back the initial investment. While public contributions are constrained, user charges are largely unpopular, and other funding sources (such as ancillary

businesses and land value capture) are underutilized.

- **Uninformed delivery-model decisions:** Decisions to pursue a project through traditional public procurement or through private participation are often guided by nontransparent, incomprehensive, or biased value-for-money assessments or distorted by specific taxation, funding, or legal provisions.
- **An absence of internationally recognized project-preparation approaches, guidelines, and checklists:** Poor project preparation limits the ability of individual countries to rapidly and effectively address the deficiencies outlined above.

Overcoming the preceding challenges remains essential to increase the volume of bankable projects in many G20 countries and emerging economies. Although several governments have made progress in some of the aspects above, the overall progress is insufficient. The root cause behind the insufficient progress is likely a lack of strong public-sector capabilities and institutions that are ready, willing, and able to deliver these priorities.

Value

Expanding and accelerating the project pipeline is expected to increase infrastructure capacity by US$7 trillion by 2030. In G20 countries, this will increase GDP by US$1.9 trillion and support 31 million jobs per annum. [5]

Actions

Ref	Action
1.1	G20 members should develop a coherent, long-term infrastructure vision and plan on the basis of an objective, rigorous assessment and prioritization of projects.
1.2	G20 members should streamline, standardize, and accelerate project preparation and procurement processes to de-risk projects and bring them to the market.
1.3	G20 members should evaluate the potential and feasibility of all possible revenue sources during project preparation, such as user charges, land value capture, and ancillary businesses.
1.4	G20 members should develop bankable public-private partnerships (PPPs) and other private-participation models that follow international best-practice standards, with well-balanced risk allocation and adequate long-term investor protections, particularly against political and regulatory risk.
1.5	G20 members should enhance public capabilities, create central knowledge hubs, and develop a standardized project-development framework as a guideline to increase and accelerate project pipelines, by drawing on expertise housed in MDBs, the GIH, the OECD, and G20 nations.

[5] B20 Australia, 2014.

(1.1) The B20 recommends that G20 members create credible, long-term infrastructure plans and project pipelines. To implement such a recommendation, governments can follow the three steps below.

First, each G20 government should establish an integrated and long-term national infrastructure vision and plan to address future needs beyond the current political cycle. This would be based on the key economic, social, and environmental development priorities. This should also reflect a country's climate-change mitigation and adaptation strategy (as agreed at COP21) and achieve its Sustainable Development Goals (SDG). Additionally, the national infrastructure vision and plan should outline the government's ambition to include private participation in the infrastructure sectors. Governments may find the APEC Business Advisory Council (ABAC) Checklist and the G20/OECD Checklist on Long-term Investment Financing Strategies and Institutional Investors[6] useful tools in such an exercise. [7]

Second, national governments and public agencies that are responsible for project origination should identify and scope projects. These projects should address the current infrastructure deficiencies and be the ones best suited to accommodate future requirements to achieve a government's overall vision. Governments and agencies should also perform robust infrastructure diagnostics to identify priority sectors, regions, and asset types that require greenfield investment, including large nation-building projects. At the same time, these institutions should carefully and seriously consider brownfield expansions or other shorter-term and lower-cost interventions, such as demand management and targeted debottlenecking investments, which can improve existing assets. In addition, governments should carefully assess whether bundling of different assets is required to reach the necessary transaction scale in order to attract sufficient private sector interest and deliver projects efficiently.

Third, when selecting projects, governments should adopt a transparent, objective, rigorous, and expert-based review process that is focused on selecting the most productive, sustainable, and welfare-enhancing projects. Many countries derived benefits from creating an objective decision-making authority to conduct project prioritization and selection. Moreover, project delivery modalities (such as public procurement and PPPs) should only be determined once the evidence-based review and project appraisal has been conducted.

Case Study 1: South Korea's independent and rigorous Public and Private Infrastructure Investment Management Center (PIMAC) has helped improve fiscal productivity

Hosted by the think tank Korea Development Institute (KDI), PIMAC was founded in 2000 as an independent entity to evaluate infrastructure projects in a transparent, objective, and rigorous manner.

PIMAC's guidelines for preliminary feasibility study (PFS) processes were designed by a team of more than 100 experts from academia and the public and private sectors, focusing on economic feasibility, policy analysis, investment priority, proper timing, and financing methods. In addition to the PFS, PIMAC also provides project design improvement advice, conducts feasibility reassessment for large-scale publicly financed projects, and executes value-for-money tests in

[6] http://www.oecd.org/daf/fin/private-pensions/G20-OECD%20Checklist%20on%20Long-term%20Investment%20Financing%20Strategies.pdf
[7] http://www.ncapec.org/publications/docs/Infrastructure%20Checklist%20ONLY.pdf.

PPP projects for final consideration by the Ministry of Strategy and Finance (MOSF).

Thus far, PIMAC has found almost half of the projects it has reviewed to be infeasible (compared with 3 percent previously), resulting in a savings of more than US$103 billion in 15 years.

Sources: PIMAC; BCG analysis.

(1.2) To bring their project pipelines to market in a reliable and de-risked manner, G20 members should strive to streamline, standardize, and accelerate the project preparation, procurement, and approval processes. An illustrative two-step process is outlined below.

First, governments should review project processes to identify and rectify recurring bottlenecks, including coordination failures among public institutions. The list of processes should include project approval, land acquisition, feasibility studies, project assessment, environmental and social due diligence, and procurement. These efforts would prevent the excessive and unnecessary delays that regularly occur on many projects and that undermine investor confidence.

Second, governments should use this evidence to redesign and standardize their processes to be consistent with globally leading practices. Governments should consider the following dimensions, among others:

- Standardizing project-preparation, procurement, and project-approval processes as well as setting time limits for procurement, regulatory, and environmental approvals.
- Leveraging digital and IT solutions to improve the efficiency of processes (for example, e-procurement systems).
- Innovating and leveraging best practices in procurement, such as clearly stipulating evaluation criteria that combine quality and price considerations, whole life costing, a staged procurement process that enhances competitiveness but is streamlined for bidders, and transparency mechanisms.
- Facilitating contractors' and suppliers' early participation and involvement in project preparation (for example, by creating an unsolicited proposal framework).
- Appointing, or creating, central lead agencies for execution and coordination among the various government entities involved in permits and approvals in order to speed up processes.
- Designing and implementing inclusive community engagement procedures.

Case Study 2: Improvements to Colombia's fourth-generation road concession plan (4G Plan) attracted a significant number of domestic and international investors

To prepare the 4G Plan, the Colombian government's goal was to eradicate the bottlenecks that plagued the first three generations of concession plans, notably institutional complexities in the approval and procurement process as well as corruption.

New PPP and infrastructure laws laid the legal foundation for contractual obligations and the creation of new tools for concessionaries (for example, land acquisition obligations). The previous reputation-damaged agency INCO was replaced by a financially and technically autonomous new state agency, the ANI,[8] which is responsible for planning, awarding, and overseeing concession contracts. Projects are now structured into various tranches, with adequate risk allocation and clearly defined technical scope. "Step-in-rights" are also applied in the contracts to protect investors against counterparty, construction, and credit risks.

The 4G Plan has enjoyed huge financing success, receiving unprecedented participation from international PPP sponsors, private equity, and pension funds. The first wave of the plan saw a total of ten projects awarded with more than US$4.6 billion invested.

Sources: ANI; IFLR 1000; World Finance; BCG analysis.

(1.3) G20 members should consistently evaluate the potential of alternative funding sources for their projects, as the lack of revenues is a key impediment to creating a bankable project pipeline—projects are "unbankable" when they lack sustainable revenue streams that can pay back the initial investment. Two examples of how governments can implement such changes are below.

First, policies and regulatory frameworks should be established that enable alternative revenue sources to be incorporated in public infrastructure projects. Much of today's infrastructure funding is sourced through general and specific taxes. However, funding from user charges, ancillary businesses, and land value capture remains underutilized. This is the case even though these sources often have significant potential to generate revenue, particularly when used for economic infrastructure assets in urban settings. National infrastructure agencies should also redefine expectations and templates for project feasibility studies, requiring project evaluators to consider the opportunity for and feasibility of such revenue sources. Moreover, innovative projects should be identified that integrate multiple asset classes, including real estate, to diversify revenue streams, make available ancillary revenues, and increase potential for land value capture. Another innovative funding source for sustainable and green infrastructure could come from carbon pricing of polluting alternatives.

Second, governments should consider performance-linked, availability-based compensation mechanisms for infrastructure assets (such as social infrastructure projects) that have no or few revenue streams. Institutionalized viability-gap funds should help provide such additional revenues to eligible projects in a transparent and quick approach.

(1.4) G20 members should develop bankable PPP models and other private-participation models that follow international best-practice standards. These models should have well-balanced risk allocation and adequate long-term investor protections, particularly against political and regulatory risk.

[8] INCO refers to the Instituto Nacional De Concesiones; ANI refers to the Agencia Nacional de Infraestructura.

Where possible, the G20 should encourage the GIH, the OECD, and the MDBs to take three actions: develop standardized clauses and principles for PPP contracts, foster the exchange of PPP best practices to support in-country efforts, and promote the international harmonization of PPP processes and contractual structures.[9] Yet, standardizing project documents should not be construed as standardizing risk allocations. Risk-allocation models need to be adaptable to the specific country and local asset context in order to achieve a well-balanced risk allocation, where each risk is assigned to the party best able to manage or bear it. Developing a toolbox, best practices, and a set of previously successful project risk-allocation examples can help guide project proponents in their structuring process.[10] In this regard, the B20 supports the GIH's ongoing work to develop such risk-allocation toolkits but would like to invite MDBs to also curate their extensive experience on risk allocation. For some difficult-to-control and long-term risks (such as demand or refinancing risks), governments should consider risk-mitigation or risk-sharing mechanisms (such as guaranteed minimum off-takes, least-present-value-of-revenues auction mechanisms, or availability-based concessions).

In addition, governments should strive for well-balanced and stable regulatory models for infrastructure sectors that use regulated privatization. An example of such a sector is electricity in many countries. Governments should make regulations as predictable as possible, yet adaptable to changing circumstances. Governments should also establish independent and expert-staffed regulatory bodies to oversee these sectors.

Adequate investor protection, particularly against political and regulatory risk, is equally important to render country frameworks investable.[11] This should include appropriate judicial capacity and general rule of law, good governance practices and legislation, [12] reliable dispute-resolution processes, and well-balanced termination clauses and government guarantees. Governments should also strive to improve the general investment environment by building the trust that is required for investors to make such long-term commitments. Governments can build trust by avoiding opportunistic regulatory changes and (creeping) expropriation and by strengthening the nonpartisan alignment on strategic decisions. Such actions would also reduce the probability that a new government would reverse prior decisions. By building trust and a successful track record, the real and perceived risk and return expectations of investors will be lowered and the total cost to the government will be reduced.

Detailed recommendations on how to improve investor protection, including specific proposals relating to setting up a multilateral investment framework, are provided by the B20 Trade & Investment Taskforce. Recommendations on how to prevent corruption are further detailed by the B20 Anti-Corruption Forum.

Beyond PPPs and regulated privatization, governments should also introduce and make more use of other contracting models—such as performance-based or output-based contracts and best-value tendering (as opposed to lowest-cost tendering)—that incentivize quality, cost efficiency, and innovation. Alternatively, models in which the government

[9] World Economic Forum, April 2013, ***Strategic Infrastructure: Steps to Prepare and Accelerate Public-Private Partnerships.***

[10] See also the World Bank/OECD project checklist for public-private partnerships delivered to G20 in 2015 and the GIH PPP risk matrix supported by the OECD and the Singapore Ministry of Finance.

[11] World Economic Forum, February 2015, ***Strategic Infrastructure: Mitigation of Political and Regulatory Risk in Infrastructure Projects***

[12] Refer to the recommendations of the anti-corruption taskforces of previous B20s

retains project ownership through the construction phase and then subsequently sells the asset to the private sector could be explored.

(1.5) Simultaneous and long-term efforts are needed by governments to build public-sector institutional or agency capabilities to create bankable pipelines and deliver projects quickly and diligently throughout a project's life cycle. Governments should assess the specific public-sector capabilities constraining the origination, preparation, procurement, construction, operations, and maintenance of infrastructure assets, sector by sector. Various enablers, such as best practices and tailor-made toolkits, are available from multilateral agencies to assist governments in this task. In addition, all governments should consider setting up a central agency and knowledge hub that supports line ministries in developing bankable projects.

The B20 also proposes that the G20 identify relevant MDBs or MDIs to take three specific actions (refer to recommendation 3.1 for further details on the role of MDBs):

- MDBs and the GIH should explore playing a larger role in the capability-building of public agencies—particularly local governments—in addition to sharing best practices.
- The GIH, potentially with support from MDBs, should initiate infrastructure-readiness benchmarking to assess and track individual countries' preparedness to develop pipelines of bankable projects over time.
- Ask GIH and/or relevant MDBs to take the lead in reviewing existing work and establishing a nonbinding G20 globally standardized project-preparation framework with clear steps, best practices, and checklists for developing bankable projects. This guiding framework should cover all life-cycle phases, including project definition, prioritization, structuring, and procurement. Individual governments should then adapt these standards and best practices on the basis of local conditions and development stage.

Targets

Governments should set national targets to track progress toward a pipeline of bankable projects. A potential metric to measure annually is the following:

- The increase in the number and value of bankable projects in national project pipelines (percentage)

This target should be complemented by more detailed targets for specific action plans related to recommendations 1.1 through 1.5. In addition, the global community should set the following targets:

- The creation of a country-level infrastructure benchmarking tool by the GIH
- The creation of a standardized project-preparation framework and project-rating methodology by the GIH and/or the MDBs

Recommendation 2. Develop conducive regulations, deploy asset-monetization strategies, and promote the creation of financial instruments necessary to unlock long-term investments in infrastructure

Summary

Recommendation	Develop conducive regulations, deploy asset-monetization strategies, and promote the creation of financial instruments necessary to unlock long-term investments in infrastructure
Owner	Individual and collective G20 governments
Timing	(1) Develop action plans within one year after the 2016 G20-B20 Summit (2) Start implementing action plans within two years of the 2016 G20-B20 Summit
Value	An additional US$500 billion of infrastructure capacity by 2030 and US$ 100 billion of GDP, and 2 million jobs per annum
Targets	(1) The share of total equity investment and debt financing in infrastructure from long-term investors, such as pension funds, insurance funds, and sovereign wealth funds (2) The creation of strategic plans for asset monetization (3) An evaluation of existing insurance pools and providers of risk mitigation and insurance products

Context

G20 countries and emerging-market nations cannot meet infrastructure needs using public funding alone. Private financing is critical, particularly the ability and willingness of private debt and equity providers to take direct exposure to infrastructure assets. [13]

The G20 has previously acknowledged that traditional commercial debt and equity providers need to be supplemented by long-term investors, such as pension funds, insurance funds, and sovereign wealth funds. These investors are estimated to have US$80 trillion available for investment, but they currently invest only a small share in infrastructure; that investment is focused on developed countries, with little money flowing into the developing countries where infrastructure needs are highest. There are several challenges for G20 nations and emerging countries:

- Improving the quality of investment climates and the regulation of domestic capital markets and long-term investors
- Providing a pipeline of bankable and accessible brownfield investments to attract long-term investors and to boost liquidity in the infrastructure market

[13] Recommendation 1 considers the asset-specific actions needed to increase the number of projects attractive to the private sector, while this recommendation focuses on the financial interventions and innovations governments should make to enable and promote the private financing of infrastructure.

- Increasing the availability of financial instruments, including innovative insurance products, to enable equity investments and debt participation in greenfield infrastructure

Value

By implementing these sets of recommendations, the G20 nations can generate an additional US$500 billion of infrastructure capacity by 2030 and increase GDP by US$100 billion, as well as add 2 million jobs per annum. [14]

Actions

Ref	Action
2.1	G20 members should further improve investment climates and remove unnecessary barriers to infrastructure investment in capital market and prudential regulations.
2.2	G20 members should encourage the development of systematic asset-monetization plans for bankable brownfield assets and subsequently re-invest proceeds into greenfield assets; this will increase investment opportunities for long-term investors and improve market liquidity of the asset class.
2.3	G20 members should work to enable the development of the financial instruments that facilitate debt and equity participation in greenfield infrastructure projects.

(2.1) G20 members should further improve investment climates and remove unnecessary barriers to infrastructure investment in capital market and prudential regulations. Five areas suggested for review are detailed below.

First, the global investment environment, especially around regulations to protect investment, and anti-corruption strategies are both high-priority topics for the Infrastructure Taskforce. These recommendations are provided by the B20 Trade & Investment Taskforce and B20 Anti-Corruption Forum. Beyond these recommendations, the B20 Infrastructure Taskforce would recommend in particular that central governments should reaffirm commitments to facilitating and supporting private participation in the delivery and operation of public infrastructure.

Second, governments should remain cognizant that private participation in infrastructure is more sensitive to sovereign credit quality than other forms of cross-border investment.[15] Working diligently to settle outstanding debt and maintaining, or striving to achieve, investable sovereign credit ratings are crucial levers available to governments focused on reforming the infrastructure investment climate.

[14] B20 Australia, 2014.

[15] Araya, Schwartz, and Andres, ***The effects of country risk and conflict on Infrastructure PPPs,*** World Bank Working Paper 6569, August 2013.

Third, ministries of finance, in collaboration with financial regulators, should review the effects of prudential financial regulations (such as Solvency II, Basel III, and derivative regulations) and the effects of accounting standards on regulated long-term investors (such as insurance firms and banks). The review should establish the extent to which prudential regulations have created an unnecessary disincentive for investing in infrastructure assets. Specifically, do these regulations and standards affect investors' ability to allocate resources to, and invest in, infrastructure assets and capital market securities?

The current global trend is to measure the risk associated with infrastructure investments as a market-volatility risk, while the more appropriate risk measure is long-term default risk. As a result, capital requirements linked to infrastructure investments are unnecessarily excessive, restricting long-term investors' ability to participate directly and indirectly in the infrastructure asset class. Defining infrastructure as a separate asset class within regulatory frameworks and accounting standards would provide the option for infrastructure-specific prudential regulation as well as competitive fiscal and accounting treatments; this would contribute to unlocking more investment into infrastructure.

Fourth, central governments, in close collaboration with financial regulators, should review existing capital market regulatory frameworks and work with advisors to create regulatory regimes that align with international best practices and that are coherent with each other. Specific interventions may be needed to improve a variety of technical standards, including disclosure regimes for securities pricing, standardizing contractual clauses for financial instruments, and mandating settlement and dispute resolution procedures. Capital market modernization is a broad reform agenda that can have wider positive effects than facilitating investments into listed and unlisted infrastructure.

Fifth, governments should work on increasing information disclosure on the infrastructure assets, including providing better information on investment opportunities. They should promote infrastructure data collection, including historical cash flow and performance data at the project level as well as qualitative data covering project characteristics such as sustainability issues. Better information on project opportunities would facilitate the creation of investment benchmarks and would also contribute to better matching of global capital with local projects; a good example in this regard is the European Investment Project Portal, which is part of the broader Juncker Plan.

(2.2) G20 members should encourage their national, regional, and municipal governments to develop systematic asset-monetization plans for existing bankable brownfield infrastructure assets and subsequently re-invest proceeds into greenfield assets. Such plans should increase private-sector opportunities and interest in the asset class since brownfield assets are especially well-suited for long-term institutional investors. Consequently, investor interest (and prices paid) in such tenders is particularly high. Through such a monetization and recycling strategy, governments can unlock hidden public resources, increase deal flow, and re-invest proceeds into new infrastructure construction and other welfare-focused investments.

As a starting point, each sphere of government will need to populate asset registers covering all of the infrastructure assets by sector within its jurisdiction. Once identified, each asset's performance and revenue history, as well as its improvement potential through private involvement, should be evaluated to identify the assets that should be tendered as brownfield PPPs or full divestitures. Governments should also make more effort to communicate the benefits of private sector involvement to the general public to foster and maintain broad support across electoral terms.

Case Study 3: The Australian government recycles funds from the privatization of brownfield assets into greenfield infrastructure investments

The Australia Asset Recycling Initiative was launched in mid-2014 to improve fiscal and social incentives for asset recycling. It is expected to catalyze up to US$24 billion of new infrastructure investment in five years.

To mobilize local governments' participation, the Commonwealth provides states and territories with 15 percent of reinvested sales proceeds as a bonus payment.[16] To help facilitate private-sector engagement in the initiative, governments publish the details of proposed asset sales online. The initiative has also gained public support because Australian pension funds are participating in the purchase of brownfield investments and the proceeds will be reinvested in new public infrastructure.

The first agreement under the initiative was signed in February 2015 and specifies that the Australian Capital Territory Government plans to sell nearly US$300 million worth of assets to invest in the Canberra Capital Metro light-rail project, which is expected to deliver approximately US$750 million of economic benefits in stage one alone.

Sources: Australian Government Department of Infrastructure and Regional Development; Australian Government Department of the Treasury; The Australian Financial Review; Australian Capital Territory Government Capital Metro; BCG analysis.

(2.3) G20 governments should enable the development of financial instruments that facilitate debt and equity participation in greenfield projects. Three specific considerations are listed below.

First, long-term investors' participation in infrastructure is constrained by the limited availability of financial instruments capable of de-risking investments in greenfield infrastructure. G20 nations should reaffirm their commitments and work to enable the development of innovative financial instruments, which are needed to increase the volume of financing available to project finance structures. Governments should take several steps in this regard:

- Governments should encourage and enable their own national development banks or national guarantee institutions to provide credit-enhancement and risk-mitigation products, including guarantees.
- Governments should provide the political and funding support to MDBs to increase their offerings of such instruments. In these endeavors, governments should closely coordinate and align with the various MDB plans and initiatives (see recommendation 3.2).

The value proposition of these risk-mitigation instruments is strong, as creditors (and potentially equity investors) are provided with insurance that they will be partially compensated in the event of adverse policy changes, the non-honoring of sovereign obligations, and significant exchange rate fluctuations, among other project risks. The expansion of these instruments will be critical to increase the number of bankable greenfield infrastructure projects, particularly in emerging markets.

[16] For example, a state sells an asset for US$1 billion and reinvests US$800 million (80 percent) of the proceeds in new productive infrastructure. The bonus payment would be 15 percent of US$800 million, which is US$120 million; the incentive scheme is capped at US$3.2 billion.

Case Study 4: Credit-enhanced project bonds and a government-led risk-mitigation tool help attract investor interest for greenfield projects

The Europe 2020 Project Bond Initiative boosts investor confidence with credit-enhanced debt financing

As a joint initiative launched by the European Commission and the European Investment Bank, the Europe 2020 Project Bond Initiative (PBI) has been in pilot stage since November 2012 to stimulate investment in key strategic infrastructure in the EU and to establish debt capital markets as a source of financing in addition to bank financing.

The PBI aims to provide partial credit enhancement for project bonds. Essentially, a subordinated tranche is provided that can take one of two forms: a loan given from the outset or a contingent credit line should senior debt service be in danger. This increases the senior tranche credit quality to a level (preferably to at least A-) where most institutional investors are comfortable holding the bond for the long term.

Since inception, the PBI has supported nine large infrastructure projects across Europe,[17] including offshore wind farms, motorways, and telecom infrastructure, with the total amount of issued loans or credit lines being more than US$455 million.

A sovereign guarantee enabled a critical power project in Pakistan

Pakistan has power constraints, with per capita electricity consumption at one-sixth of the world's average. As part of the Belt and Road initiative, a conventional power-generation project[18] was identified in 2014 as one of the fast-tracked projects. The project has the potential to generate power supply for 9 million local citizens, covering 4.5 percent of the total population, while also creating 2,000 local job opportunities during the construction period.

However, the project faced the risk of default by the designated off-taker, the National Transmission and Dispatch Company (NTDC) of Pakistan. To increase bankability, the government of Pakistan provided back-stopping for the project by setting up a guarantee that would be triggered in the event of off-taker nonpayment. Furthermore, political risk insurance, underwritten by an export and credit insurer, was purchased by the project sponsor to cover the potential risk of sovereign default.

Such a financial structure provided sufficient insurance against nonpayment risk to close the transaction for this important generation asset, offering lessons for governments and financial institutions in other emerging markets regarding how to enable potential infrastructure investments.

Sources: EIB; B20 Infrastructure Taskforce member; BCG analysis.

[17] Those projects include the Castor Gas Storage in Spain, OFTO Greater Gabbard in the UK, A11 Motorway in Belgium, Axione Telecom Infrastructure in France, Autobahn A-7 PPP in Germany, Gwynt y Môr offshore wind farm in the UK, Port of Calais in France, N25 New Ross motorway in Ireland, and West of Duddon Sands offshore wind farm in the UK.

[18] Pakistan used to be heavily dependent on imported energy sources (oil and gas), but it ranks sixth in the world for its reserve of 180 billion tons of coal. Owing to the longer lead time for hydropower projects and the improvement in pollution treatment of coal-fired power plants, a coal-fired power project is considered to be the most optimal choice to tap the indigenous power resources in Pakistan.

Second, the G20 should consider evaluating existing insurance pools and providers of risk mitigation and insurance products to assess the adequacy of the existing insurance and guarantee instruments available to equity investors against forms of political and regulatory risk, including breach of contract, non-honoring of sovereign obligations, and changes in laws, decrees, regulations and/or licensing agreements. Such risks are key constraints in attracting more long-term institutional investment to infrastructure, particularly in emerging and developing countries. These instruments can provide equity investors with an effective way to mitigate political and regulatory risk exposure, allowing them to more accurately price risk, and in turn lower the cost of capital for project owners.

Currently, the availability of these instruments may be limited, with the Multilateral Investment Guarantee Agency (MIGA) providing a broad range of coverage to cross-border investments in developing countries, national providers providing specific guarantees to exporters, and private insurers covering a limited range of political risks (for example, changes in sector-level regulations that adversely affect specific assets are typically not covered). The evaluation should identify whether the current supply of risk mitigation and risk insurance products are adequate to meet current and future market demand and whether the existing offering can be enhanced through business model improvements and product innovation.

Third, national governments should take proactive steps to develop credit ratings for state-owned enterprises (SOEs) and public utilities to enable these institutions to participate in the local capital markets. Such steps would increase the public sector's access to debt markets and the availability of rated, infrastructure-linked debt in the market. Developing credit ratings is a time-consuming process that relies on the development and application of appropriate financial controls and budgetary processes, as well as other actions. Governments can work directly with the MDB credit academies to create "shadow ratings" and develop the internal capabilities needed to formally apply for a credit rating.

Targets

Governments should set appropriate national targets to reflect the local development stage of the infrastructure finance market. Suggested annual metrics and one-off targets include the following:

- The share of total equity investment and debt financing in infrastructure from long-term investors, such as pension funds, insurance funds, and sovereign wealth funds
- The creation of strategic plans for asset monetization
- An evaluation of existing insurance pools and providers of risk mitigation and insurance products, with consideration of existing case studies where insurance has been provided to support equity investors

Recommendation 3. Enhance the catalytic role of multilateral development banks and institutions in enabling private investment in infrastructure

Summary

Recommendation	Enhance the catalytic role of multilateral development banks and institutions in enabling private investment in infrastructure
Owner	G20 governments collectively and MDBs
Timing	(1) Develop action plans within one year after the 2016 G20-B20 Summit (2) Start implementing action plans within two years of the 2016 G20-B20 Summit
Value	No specific value assessment is provided to avoid double counting, as MDBs further catalyze the actions listed in recommendations 1 and 2 and support in unlocking that value
Targets	(1) The additional volume of private-sector financing crowded in through MDBs (2) The additional bankable projects prepared through MDB interventions (3) The co-financing share of total lending commitments to infrastructure (percentage per MDB) (4) The share of total commitments issued in the form of contingent instruments

Context

The year 2015 was a dynamic year in the MDI market, given the launch of the Asian Infrastructure Investment Bank (AIIB), the New Development Bank (or BRICS Bank), and the Global Infrastructure Hub (GIH). These institutions play two important roles. First, they increase the already-strong financial and knowledge capacity of the MDIs. Second, they further expand the opportunity for national governments to partner with MDIs as an effective means of building and accelerating the delivery of infrastructure.

The B20 strongly supports the February 2016 and April 2016 communiqués from the G20 finance ministers and central bank governors stating that MDBs have a historic opportunity to increase their scope and depth of co-financing and cooperation. Yet, MDBs face some challenges to fully co-financing—compared with parallel financing—infrastructure projects, owing to historically independent internal practices.

The B20 also agrees with the G20 finance ministers and central bank governors in their February 2016 and April 2016 communiqués: MDBs have an opportunity to increase the amount of private investment catalyzed through MDB operations. Currently, MDBs' leveraging of private investment for infrastructure relies on the use of a specific contingent-financing instrument—the guarantee. This instrument comes in varying guises and covers political risk, policy adjustments, and payment defaults, but the guarantee generally concentrates on supporting greenfield energy-generation projects. Expanding the use of guarantees to additional sectors and regions is a top priority for MDB policy makers, as is developing new, innovative contingent-financing tools to crowd in private investment.

Value

MDBs play a central role in the infrastructure financing market (particularly in developing countries), as MDBs commit about US$40 billion to infrastructure each year, typically catalyzing three to four times[19] that amount in additional private investment. Should recommendation 3 be implemented, the value in recommendations 1 and 2 can be fully unlocked.

Actions

Ref	Action
3.1	The G20 should direct MDBs to enhance the scope and depth of coordination and cooperation, particularly in areas such as co-financing and technical assistance, and provide more support to governments in developing bankable projects.
3.2	The G20 should encourage MDBs to consider increasing their focus on crowding in private-sector financing by developing and supporting innovative financial instruments (for example, by raising the volume and coverage of guarantees, creating new contingent-financing instruments, and co-investing with private investors).

(3.1) The B20 recommends that the G20 encourage MDBs to increase the amount of funding committed to co-financing projects with other MDBs. MDBs should also further improve and broaden the strategic and operational alignment of technical assistance programs. In addition, MDBs should further strengthen and broaden their technical assistance to governments to develop a pipeline of bankable projects. To do so, there are two areas in which the B20 believes MDBs can strengthen efforts.

First, MDBs should unlock co-financing opportunities by aligning their internal procedures, which would lower the transaction costs involved in co-financing. To enable co-financing, MDBs should further align project preparation, project appraisal processes, and supervision requirements. Additionally, MDBs should establish pan-MDB collaboration as a norm by developing systematic and integrated technical-assistance programs when MDBs work with client countries. Implementing these actions will involve the traditional harmonization committees at a country level. However, it will also require systematic engagements at the technical practice and executive levels by forming a policy-integration committee with each MDB's head of operational policy and country services.

Second, MDBs should strengthen and broaden their technical-assistance programs to support governments in developing a pipeline of bankable projects. This support should span the origination, preparation, structuring, and procurement phases, in particular helping host countries structure bankable risk allocations that are acceptable for investors in the long-term. Beyond specific country support, the MDBs should further build on their successful programs in developing and disseminating standards, best practices, and toolkits among government decision makers (see recommendation 1.5.). MDBs should also further expand their technical assistance from traditional areas, such as project

[19] The World Bank (http://www.worldbank.org/mdgs/documents/FfD-MDB-Contributions-July-13-2015.pdf, http://www.worldbank.org/en/programs/guarantees-program#6).

preparation and institutional reform, to areas in which local governments require support, such as project delivery, project monitoring, and asset management.

(3.2) The B20 recommends G20 members encourage MDBs to further increase their role in crowding in private financing. This implies raising the volume and coverage of existing guarantee instruments, creating new contingent-financing instruments, and co-investing alongside private investors. These solutions should be developed in a targeted way, based on a rigorous analysis of the current obstacles to more private investment in each sector and country. While many initiatives have already been contemplated and implemented at various MDBs, the B20 wants to reiterate the importance of such schemes and its support for them, and has raised four areas for further consideration.

First, MDBs should identify additional opportunities to extend the core guarantee business beyond the backstopping of private investments in energy-generation projects in emerging and lesser-developed countries. MDBs should also increasingly expand their guarantee businesses to new sectors and regions. Significant demand exists to extend these instruments to transportation projects (namely, PPPs for expressways), for which investors seek insulation from both political risk as well as government nonperformance risk.

Case Study 5: Various World Bank guarantee programs help mitigate key project risks and catalyze private capital

World Bank guarantees have been an effective instrument to mobilize commercial financing for development purposes. The guarantees aim to mitigate critical government-performance risks that businesses face. These instruments also have played a critical role in the aftermath of the 2008 global financial crisis when other risk-mitigation instruments (for example, mono-line insurance) were no longer offered by the market.

These products cover a wide variety of risks, including contractual, regulatory, currency, and political risks. These guarantee programs are offered individually or collaboratively by the various institutions under the World Bank Group: IBRD, IDA, IFC, and MIGA.

Two broad categories of guarantee products are provided:

- **Project-based guarantees:** Full or partial credit or risk guarantees can help public and private entities mitigate the risk of a potential payment or performance default by a government.
- **Policy-based guarantees:** These guarantees allow governments to borrow money from the private sector for fiscal spending on a bill or act or for setting up an institution.

As of 2015, 34 guarantee transactions[20] utilizing US$4 billion in IBRD/IDA commitments supported the mobilization of about US$13 billion of commercial financing. In addition, 19 guarantee transactions are under negotiation to utilize US$3.7 billion in IBRD/IDA commitments and are expected to mobilize an additional US$16 billion in commercial financing.

Sources: World Bank; BCG analysis.

[20] A list of selected projects is available at the World Bank website: http://www.worldbank.org/en/programs/guarantees-program#6.

In pursuing this expansion, MDBs should be wary of inadvertently crowding out private investment. In that regard, MDBs should also review policies governing the use of guarantees to ensure that projects that are already considered investment grade are not guaranteed.

Second, the clear benefits and strong track record of MDB guarantee programs should support an MDB's decision to create new, innovative contingent-financing instruments. Since these types of instruments do not involve direct loans, they are counted differently against the total borrowing envelope available to the client countries of MDBs. MDBs can explore the possibility of creating line-of-credit facilities for PPP projects that automatically draw down in the event that project revenues fall below debt-servicing levels (for example, due to regulatory risk events) and provide liquidity at the top of the cash-flow waterfall. By rebalancing commitment portfolios to contingent instruments, MDBs can support a greater number of projects in their client countries and incentivize themselves and clients to increase the number of bankable deals in country pipelines.

Third, the private-sector arms of MDBs (such as the IFC) should consider the possibility of co-investing more alongside private investors. MDBs' presence in deals with commercial pricing would give comfort to equity investors, as the MDBs can improve the chances of gaining a seat at the table if governments adjust regulatory and policy settings that impact pre-existing infrastructure investment arrangements.

Fourth, and more ambitiously, MDBs—or, more specifically, their treasury departments—should develop plans in the future to introduce asset-backed securities linked to loan repayment cash flows and evaluate how high-performing loans should be resold through the market. MDBs have the financial muscle, credit standing, and track record to develop secondary markets for infrastructure debt. Such markets would provide ample opportunity for long-term investors to gain exposure to infrastructure and, most notably, infrastructure in emerging countries.

Targets

MDBs should set appropriate individual targets to reflect their priorities. Suggested metrics include the following and should be tracked annually to gauge progress:

- The additional volume of private-sector financing crowded in through MDBs
- The additional bankable projects prepared through MDB interventions
- The co-financing share of total lending commitments to infrastructure (percentage per MDB)
- The share of total commitments issued in the form of contingent instruments

Recommendation 4. Enable and support the deployment of best-practice asset management and innovative technologies to increase whole project life-cycle productivity and to build future-proof and sustainable infrastructure

Summary

Recommendation	Enable and support the deployment of best-practice asset management and innovative technologies to increase whole project life-cycle productivity and to build future-proof and sustainable infrastructure
Owner	Individual G20 governments
Timing	(1) Develop action plans within two years of the 2016 G20-B20 Summit (2) Start implementing action plans over the next decade
Value	Widespread adoption of digital technologies in construction could reduce life cycle costs up to 20 percent; the productivity potential in O&M is in a similar range
Targets	(1) The productivity gain in infrastructure E&C and O&M (2) Sector and initiative specific targets (for example, the percentage of construction projects using BIM) (3) The increase of investment in innovative and green infrastructure

Context

The infrastructure sector is historically relatively slow to develop and adopt new technologies. The way assets are constructed and operated has not fundamentally changed over many decades. As a result, productivity improvements have been meager. For example, labor productivity in the U.S. infrastructure construction sector has fallen over the past 40 years and continues to lag far behind that of other industries.[21]

However, the infrastructure industry is now experiencing a period of rapid, increased innovation. Many of the digital and other innovative technologies pervading today's industrial landscape are applicable in the infrastructure value chain, such as in engineering and construction (E&C) as well as in operations and maintenance (O&M) and across all infrastructure sectors. Harnessing this innovation transformation could boost productivity in infrastructure across the whole life cycle and address many challenges. These challenges include delivering projects on time and on budget, lowering asset life-cycle costs, mitigating and improving resilience to climate change, and minimizing vulnerability to cyber threats.

In combination, some technological advances can substantially improve the return profile of projects to offer new opportunities for private-sector involvement.

[21] World Economic Forum, ***Shaping the Future of Construction,*** May 2016.

Private-sector companies, including many SMEs, have pioneered and spurred innovations along the infrastructure life cycle:

- **Operations and maintenance:** Integrated smart-city concepts, advanced traffic management, smart parking, predictive maintenance, smart metering, asset management software, etc.
- **Construction:** Building Information Modeling (BIM),[22] modularization and prefabrication, advanced building materials, autonomous and semiautonomous construction equipment, new construction technologies, drones for construction surveillance, 3-D printing, etc.
- **Equipment and usage:** Renewable energy generation, smart grids, energy efficiency technology, LNG and other gas technologies, district energy systems, self-driving vehicles and associated infrastructure, e-car-charging infrastructure, etc.

The key barriers to broader adoption of these technological innovations include high up-front investment for new technologies (despite significant life-cycle savings); the lack of strong, large-scale financial and socio-economic value proofs; the lack of common standards; and the gap between the broader socioeconomic benefits and customers' willingness to pay.

Value

The analysis undertaken by The Boston Consulting Group found that widespread adoption of digital technologies in construction could reduce a project's life-cycle costs by almost 20 percent and substantially improve construction times, quality, sustainability, working conditions, and safety.[23] Within ten years, according to these estimates, full-scale digitization in nonresidential construction will lead to annual global cost savings of US$1.0 trillion to US$1.7 trillion. Further digitization along the infrastructure life cycle and across infrastructure sectors could generate significant additional value.

[22] Building Information Modeling (BIM) is a collaborative digital-information 3-D model that can be used for effective management of information throughout a project's life cycle.
[23] The Boston Consulting Group, ***Digital in Engineering and Construction: The Transformative Power of Building Information Modeling,*** March 2016.

Actions

Ref	Action
4.1	G20 members should encourage the launch of national asset-transformation initiatives to capture latent value from existing assets by making better use of digital and other innovative technologies and asset management best practices.
4.2	G20 members should encourage its construction oversight bodies and procuring entities to incentivize the use of productivity-enhancing technologies and other innovation in infrastructure construction and development.
4.3	G20 members should encourage the enablement, development, and deployment of innovative technology, particularly in the energy and transport sectors.

(4.1) The G20 governments should launch national asset-transformation initiatives to capture the latent value of existing assets. The global infrastructure asset base is large, estimated to be worth approximately US$50 trillion, most of which is controlled by the public sector.[24] Therefore, even modest improvements in the operations and maintenance (O&M) of these assets could yield a substantial positive impact.

The asset-transformation initiatives should involve a review of existing assets, sector by sector. The purpose of this review should be to identify opportunities in which digital and other innovative technologies, as well as best-practice asset-management approaches, should be used to improve O&M efficiency. For example, the review may identify areas in which demand management techniques, such as e-tolling and dynamic pricing, should be rolled out in transportation networks.

Undertaking this asset-transformation initiative will improve asset management holistically. The initiative will maximize asset utilization and throughput, reduce the need for new construction, extend the life-span of existing assets, reduce O&M expenditures, and enhance users' experience.

(4.2) The B20 recommends G20 governments to create conducive conditions that enable innovative construction technologies, such as prefabrication and BIM, to become industry norms in order to boost productivity. Governments can create conducive conditions through the following three steps.

First, construction oversight agencies should thoroughly assess whether existing building codes and technical specifications related to specific assets or construction processes preclude certain innovative technologies and approaches. If necessary, these codes and specifications should be amended to enable fair competition among concepts.

Second, public procuring entities should leverage their market power and scale as major owners of infrastructure assets to accelerate the adoption of innovation in the marketplace. For example, BIM and other new technologies should be included in the technical bidding requirements to incentivize developers and contractors to advance their technological frontiers.

[24] World Economic Forum, ***Strategic Infrastructure: Steps to Operate and Maintain Infrastructure Efficiently and Effectively***, April 2014.

Case Study 6: The UK government drives a digital transformation of the construction industry by mandating the use of Building Information Modeling (BIM)

In May 2011, the UK government published the Construction Strategy, mandating collaborative 3-D BIM (level 2) be used on its projects by 2016. The aim was to reduce capital cost and carbon burden from the construction and operation of the built environment by 20 percent.

A BIM Task Group, made up of experts from industry, the public sector, and academia and supported by US$5.7 million of government funding, provided training and education programs to enhance sector capability as well as a free set of UK standards and tools to ensure interoperability.

The benefits of BIM were demonstrated in pilot public projects. For example, 18 percent savings were achieved in the design and procurement stages of the US$28.3 million Cookham Wood prison, while virtual 3-D tours were used in the Manchester Town Hall Building project to educate key stakeholders on the protection of the heritage.

From 2010 to 2014, the BIM adoption rate in the UK had increased from 13 percent to 48 percent. From 2016 to 2025, the UK will move to level 3 BIM to fully realize the vision of a "digitally built Britain."

Sources: UK Government Construction Strategy; UK Construction 2025; UK BIM Task Group; National Building Specification; BCG analysis.

Third, to support the previous initiatives, governments should strengthen their support for the construction sector and implement initiatives that encourage the overdue industry transformation. Examples of such initiatives include the following:

- Promoting R&D through tax incentives
- Encouraging joint industry-academia technology collaborations
- Supporting the up-skilling of workers
- Updating curricula at universities, technical colleges, and apprenticeships

(4.3) The opportunity to deploy new technology to create future-proof infrastructure,[25] particularly in the energy and transport sectors, exists. These technologies include ultra-high voltage (UHV) transmission lines; smart grids; low-carbon (green and clean) energy; energy efficiency; LNG and other gas technologies; high-speed rail; and shared, autonomous, and electric mobility. For these innovations, governments need to play a much wider role (for example, setting regulations and creating subsidies) in scaling them up, as the initial barriers to adoption are larger. To do so, three illustrative examples are outlined below.

First, national infrastructure authorities should, in close cooperation with businesses and think tanks, define technology roadmaps in the national infrastructure plans to introduce such technologies. Such roadmaps should start with government-funded pilot projects and detail a path to full-scale implementation with clear targets and commitments.

Second, the aforementioned infrastructure authorities, in conjunction with agencies overseeing infrastructure development policy, should launch initial financing-support mechanisms where required. Examples of such mechanisms are the feed-in tariffs used for

[25] Future-proof infrastructure are assets that are made for tomorrow's user, cost, sustainability and resilience requirements.

solar and wind power and the carbon-pricing methods used for polluting technologies. These mechanisms should bridge the viability gaps of early market introductions when technologies have yet to achieve the required economies of scale and have to become proven so that "first-of-a-kind" technology risks are mitigated for subsequent investments. These support mechanisms should be gradually phased out when new technologies become competitive.

Third, national governments also need to create the necessary legislative and regulatory conditions and establish standards for such new technologies. For example, autonomous vehicles require a review of existing regulations for liability laws, homologation and certification rules, and traffic regulations.

Case Study 7: China enables innovation in clean energy technology with pilot programs and supportive policies

In its latest five-year energy development plan, the Chinese government outlined its objective to rebalance its energy portfolio from conventional thermal power to cleaner energy sources, including solar, wind, nuclear, and others. As a result, a technology roadmap was created, with small-scale pilot projects followed by a broader roll-out, to ensure optimal utilization of capacity and a smooth learning curve.

To overcome initial financing gaps for these new technologies, the Chinese government provided fiscal incentives to encourage R&D and the deployment of new technologies in this area in the form of tax credits (including import tariff exemptions for large equipment) and subsidies (for example, subsidized loans). The government is considering the use of an innovation compensation mechanism as well. A power trading program was also initiated to ensure purchase of renewable power.

To identify and mitigate commercial risks early on, key stakeholders, such as manufacturers and financers, were encouraged to engage in the early development phase. Technology standardization through the commercial pathway of a "technology patent standard license" was also promoted to improve industry-wide adoption.

With such efforts, China is on track to meet its targets to reduce its carbon emissions per unit of GDP by 40 percent to 45 percent by the end of 2020.

Source: Infrastructure Taskforce member (SPIC), BCG analysis.

Targets

Governments should set appropriate national targets to reflect their current and planned levels of innovation and technology maturity. Suggested metrics include the following and should be tracked annually:

- The productivity gain in infrastructure E&C and O&M
- Sector and initiative specific targets (for example, the percentage of construction projects using BIM)
- The increase of investment in innovative and green infrastructure

Recommendation 5. Strengthen or establish national, regional, and global initiatives to enhance infrastructure interconnectivity across all sectors (such as GEI, PIDA, TEN, and SIEPAC[26])

Summary

Recommendation	Strengthen or establish national, regional, and global initiatives to enhance infrastructure interconnectivity across all sectors (such as GEI, PIDA, TEN, and SIEPAC)
Owner	G20 countries collectively
Timing	Develop action plans to coincide with the planning for the Global Infrastructure Connectivity Alliance Initiative (the Alliance)
Value	No comprehensive value estimates are available, but the high investment needs and anecdotal evidence demonstrate the large value potential
Targets	(1) The increase of investment in transnational infrastructure (2) The improved connectivity across borders (3) The Alliance to create a strategic plan identifying regional and global connectivity initiatives (4) The Alliance to engage with B20 infrastructure leaders to set up appropriate G20 government, business, and expert dialogue mechanisms

Context

Transnational infrastructure provides a broad range of benefits. Transnational transport networks play an important role as the physical backbone of regional integration by linking production clusters in different countries, removing physical barriers to trade, and facilitating the free movement and trade of goods, services, and people. Energy interconnection would enable countries to balance the supply and demand of electricity more effectively and efficiently, as well as enable long-distance transport of low-cost renewable energy (for example, from desert or windy areas to high-demand centers, such as the global megacities and production centers).

However, transnational infrastructure is often neglected because infrastructure projects are traditionally planned at a country level. In addition, transnational projects typically face many delivery challenges in addition to the usual infrastructure-project risks. First, these projects are unusually large and complex, as different existing networks on both ends need to be connected and the number and variety of stakeholders is amplified. Project promoters need to plan, procure, and deliver these projects despite different technical standards and operating requirements, as well as varying regulatory and legal

[26] GEI refers to the Global Energy Interconnection, PIDA refers to the Program for Infrastructure Development in Africa; TEN refers to the Trans-Europe Network; and SIEPAC refers to the Central American Electrical Interconnection System.

environments. Second, on the political level, it is also often difficult to reach conceptual consensus and align various national agendas, agree on a joint financing strategy, and determine a fair risk allocation in the contracts. Last but not least, creating transnational infrastructure can require overcoming historical political differences, language barriers, and cultural disconnections.

Many regional groupings (for example, the EU) and multilateral organizations have launched initiatives to give greater priority to the development of transnational infrastructure. More recently, several nations have also launched cross-border investment strategies, such as China's "Belt and Road," the United States' "Power Africa," and Japan's "JOIN" initiatives. In addition, the G20 recently proposed its Global Infrastructure Connectivity Alliance Initiative (the Alliance). In line with these initiatives, B20 will actively promote the Global Energy Interconnection (GEI) initiative.

Value

Interconnected infrastructure provides a host of benefits, as described above, and the large investments in transnational infrastructure are well documented (for example, Africa's PIDA requires US$68 billion through 2020[27]), yet there are no global estimates of how much transnational investment is needed, nor is it available on a cross-sector basis. Representative quantitative impact estimates, however, are not available. Anecdotal evidence shows the significant impact: for example, doubling the UK's electricity interconnector capacity could bring savings of US$1.5 billion a year.[28]

Actions

Ref	Action
5.1	B20 supports the G20 proposal for a "Global Infrastructure Connectivity Alliance Initiative" and encourages existing and emerging MDBs and multilateral development institutions (MDIs) involved in the alliance to leverage relative strengths to deepen interconnectivity coordination and cooperation, as well as expand other transnational infrastructure programs and implementation mechanisms.
5.2	G20 members should encourage regular G20 government, business, and expert dialogue to shape the interconnectivity agenda and foster the exchange of best practices across regions and sectors.

[27] http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/PIDA%20note%20English%20for%20web%200208.pdf.

[28] Exchange rate of GBP/USD = 1.5; http://www2.nationalgrid.com/Mediacentral/UK-Press-releases/2014/%C2%A31-billion-could-be-saved-from-electricity-costs-if-UK-doubles-its-interconnector-capacity-by-2020,-says-new-analysis-from-National-Grid/.

(5.1) The B20 welcomes the proposed launch of the Global Infrastructure Connectivity Alliance Initiative (the Alliance) by the G20. The B20 agrees that transnational infrastructure connectivity is important and encourages the G20 to direct the Alliance to develop credible implementation and funding mechanisms for transnational programs across all sectors. In particular, the Alliance should expand and build on existing programs, such as China's Belt & Road, Africa's Program for Infrastructure Development (PIDA), the EU's Trans-European Transport Network (TEN-T), and the Central American Electrical Interconnection System (SIEPAC). In addition, the Alliance should also explore the potential impact and feasibility of the setup of new sectoral or regional initiatives, such as the Global Energy Interconnection (GEI).

Specifically, the Alliance should encourage the following steps to drive transnational project implementation:[29]

- Gain alignment and commitment on the highest political level and drive the political integration process to identify shared interests and diffuse concerns
- Promote intergovernmental exchange, communication, cooperation, and coordination across various layers and sectors
- Assess and communicate the benefits of transnational infrastructure and drive advocacy on this basis
- Set up coherent interconnection strategies and plans for all infrastructure sectors in key regions
- Define clear roadmaps for enhancing regional connections and initiate flagship pilot projects
- Initiate transnational delivery agencies that enable and support the implementation and help overcome the significant challenges for transnational projects
- Harmonize or align regulations, technical standards, and operating requirements
- Ensure dedicated government funding for such transnational projects and consider private-sector involvement where possible
- Intensify cooperation around "soft" enablers to unlock demand for transnational infrastructure (for example, trade policy, visa rules, logistics regulation, and access to the electricity market and grid) to unlock demand for transnational infrastructure

[29] World Economic Forum, ***Managing Transnational Infrastructure Programmes in Africa—Challenges and Best Practices***, May 2014.

Case Study 8: Countries and regions find key enablers to promote electricity interconnectivity

China promotes renewable energy through interconnected ultra-high voltage (UHV) power grids

To solve the dual challenges of imbalanced energy distribution and heavy fossil-fuel reliance,[30] the Chinese government is seeking to promote cross-regional trading of renewable power through domestically interconnected ultra-high voltage (UHV) power grids by incorporating it into national and sectoral plans.

To accelerate on-the-ground implementation, central ministries are holding mobilizing meetings with participating provinces and municipalities to speed up progress at preliminary stages. Ministries are also fast-tracking UHV projects in environment and water assessments, as well as land requisition, while grants are being provided out of the central fiscal budget.

Currently, 19 UHV transmission lines are in operation or under construction. In 2015, a total of 722 terawatt hours (TWh) of electricity were transmitted across regions, accounting for 13 percent of total power consumption.

Europe enhances policy coordination by prioritizing "Projects of Common Interest" to enable the Trans-European Energy Network (TEN-E)

The TEN-E program was launched in 2006 with four main objectives: reducing greenhouse gas emissions, diversifying external energy sources, further integrating the internal energy market, and developing a common energy infrastructure. The European Commission (EC) established a set of regulations and guidelines to reach alignment on policy and procedures among participating member countries and to create a common European electricity market; in addition to these soft factors, proper projects for development were also identified.

For electricity, nine major axes,[31] four corridors,[32] and some 100 Projects of Common Interest were prioritized. These selected projects benefit from a streamlined permit-granting procedure that is faster, easier, and more transparent. These projects also are eligible for EU funding grants, project bonds, or guarantees.

Through the TEN-E program, the EC foresees an annual investment of US$2.9 billion to US$4.1 billion from 2010 through 2020.

Central Asia and South Asia countries strengthen alignment and collaboration in cross-regional transmission system through the Inter-Governmental Council (IGC)

A new electricity-transmission system, CASA-1000, is being constructed to make more efficient use of clean hydropower in the Central Asian countries of the Kyrgyz Republic and Tajikistan by enabling these countries to transfer and sell their electricity surplus in the summer to the power-deficient Afghanistan and Pakistan in South Asia.

[30] More than 80 percent of renewable energy resources (for example, wind and solar) are concentrated in western and northern areas, and more than 70 percent of electric power demands come from eastern and middle regions. Fossil fuels make up some 90 percent of total primary-energy consumption in China.

[31] The nine axes are France-Belgium-Netherlands-Germany; Italy's borders with France, Austria, Slovenia, and Switzerland; France-Spain-Portugal; Greece-Balkan countries-UCTE System; UK-continental and northern Europe; Ireland-UK; Denmark-Germany-Baltic Ring; Germany-Poland-Czech Republic-Slovakia-Austria-Hungary-Slovenia; and Mediterranean Member States-Mediterranean electricity ring.

[32] The four corridors are the Northern Seas offshore grid, the North-South electricity interconnections in Western Europe, the North-South electricity interconnections in Central Eastern and South Eastern Europe, and the Baltic Energy Market Interconnection Plan in electricity.

A high-level Inter-Governmental Council (IGC) made up of ministers from the four countries was established to provide central leadership for the project and to build and maintain a highly collaborative, consensus-building relationship among various stakeholders across countries and the project cycle.

Key decisions have been made by the IGC, ranging from financing, private-sector participation, and common policies and rules, to promote consistent technical, safety, and environmental standards.

Sources: Infrastructure Taskforce member; European Commission; European Union and the Committee of the Regions; Directorate-General for Energy and Transport; Inforse-Europe; CASA-1000 website; USAID; BCG analysis.

(5.2) In addition to welcoming the Alliance, the B20 encourages regular G20 government, business, and expert dialogue to shape the interconnectivity agenda and foster the exchange of best practices across regions and sectors.

The main objective would be to advance the global dialogue on interconnected infrastructure and serve as a platform for exchange among the various regional and sectoral interconnectivity initiatives. Examples of such initiatives include the ones established by ASEAN, the EU, or Africa's PIDA. These initiatives have all made great progress, but also face a common set of challenges in terms of policy coordination, funding, regulatory standardization, technical harmonization, and cross-border delivery capacity. By bringing world leaders together—political, business, and others—common challenges could be addressed, best practices exchanged, and joint issues reported back to the G20 and MDBs. Regular dialogue would also provide a unique opportunity for investors, policy makers, and MDBs to meet and exchange ideas, showcase new technologies and approaches (for example, high-voltage electricity-transmission technology), and refine action plans around interconnectivity. This dialogue could build on the successful G20 Strengthening Global Infrastructure Connectivity Forum organized by the World Bank and the OECD on 27th of April in Singapore.

The B20 requests that the G20 formally include the B20 as a participant with G20 members in the Alliance.

Targets

National governments and regional groupings should define appropriate targets to reflect their current and planned level of interconnectedness. Suggested metrics include the following and should be tracked annually:

- The increase of investment in transnational infrastructure
- The improved connectivity across borders

In addition, the Alliance should set the following targets:

- Create a strategic plan identifying regional and global connectivity initiatives
- Engage with B20 infrastructure leaders to set appropriate G20 government, business, and expert dialogue mechanisms

Closing statement

The 2016 B20 Infrastructure Taskforce has identified the above five recommendations as the key priorities for government actions to close the infrastructure investment gap of US$1 trillion per year. The recommendations stress the paramount importance of making further progress on two topics that have been raised in previous B20s: increasing and accelerating the pipeline of bankable projects and unlocking private finance for infrastructure. In addition, this year's B20 proposes several new opportunities: enhancing the catalytic role of MDBs, driving innovation in the infrastructure sector, and strengthening interconnectivity.

These five high-impact recommendations, if implemented, could generate more than US$2 trillion in economic activity every year and create more than 30 million additional jobs across the G20 economies. These are important outcomes in the current economic environment, which is characterized by slow growth, high unemployment, and constrained government budgets.

The B20, therefore, encourages the G20 to adopt these recommendations, and set out an ambitious infrastructure reform agenda to promote economic prosperity and social well-being around the globe.

Value calculation methodology

The potential value of undertaking individual recommendations was taken from the Australia 2014 B20 Infrastructure & Investment Taskforce Policy Paper, with additional input from The Boston Consulting Group in 2016. The Australian methodology followed three steps, as detailed below.

The first step was to estimate the size of the expected gap between future infrastructure needs and "business as usual," assuming a continuation of the current approach. Estimates of future needs vary, but a consensus view suggests that this could range from US$57 trillion to US$67 trillion by 2030.[33] Subtracting from these figures the estimates of potential future public investment consistent with meeting IMF debt-to-GDP targets[34] and current private investment levels[35] leaves a remaining "gap" of US$12 trillion to US$22 trillion.

[33] Consensus of BCG, McKinsey, and WEF forecasts to 2030 (which are in turn based on more detailed estimates at the sectoral level by the OECD, IEA, ITF, GWI, and others).

[34] Estimates based on October 2013 IF Fiscal Monitor estimates of adjustments required to the cyclically adjusted primary balance (CAPB) to meet debt-to-GDP targets while funding expected additional health and pension costs and the Heritage Foundation 2014 Index of Economic Freedom estimates of government expenditure as a percentage of GDP.

[35] BCG estimate.

The second step was to estimate the potential contribution of each initiative to closing this gap (that is, increasing effective infrastructure capacity) by 2030. These estimates were construed by first quantifying the maximum potential impact of the levers to close the infrastructure gap[36] and then assessing the degree to which specific initiatives could improve the levers.[37]

The third and final step was to estimate the broader economic impact associated with each recommendation. The potential impact of each recommendation was calculated on the basis of estimates of the long-run elasticities of GDP and employment to the infrastructure stock.[38]

[36] These include estimates of the benefits of improved project selection and prioritization (BCG and McKinsey); estimates of "privatizable" share of current government nonfinancial assets (Infrastructure Australia, The Economist, OECD, and BCG); estimates of increased revenue potential of user charges, land value capture, and ancillary revenue (African Infrastructure Country Diagnostic, IEA, WEF, and BCG); cost efficiencies from best practice capacity utilization, maintenance planning, and demand management of brownfield assets and streamlined delivery of greenfield projects (WED, BCG, and McKinsey); improving all countries' regulatory environment to current national best practices (analysis of the World Bank's Worldwide Governance Indicators data); and increasing depth of national financial markets toward world best practice (analysis of the World Bank Global Financial Development Database data).

[37] Full potential was assumed for benefits that national governments have direct control over (for example, government procurement and approval processes). For recommendations that require collaboration from multiple parties, it was assumed that 10 percent of the maximum potential of the lever is achieved. Triangulations are based on historical experience and individual case studies suggest that these estimates are likely to be conservative.

[38] The long-run elasticity of GDP to the core economic infrastructure stock was based on meta-analyses conducted by Born and Ligthart (2013), ***What have we learned from three decades of research on the productivity of public capital?*** (for developed countries), and Estache et al. (2013) ***Infrastructure and Employment Creation in the Middle East and North Africa*** (for developing countries). Estimates of the elasticity of jobs to GDP were based on analysis of the ILO employment data from 2000 through 2012.

Taskforce schedule and distribution of members

Schedule of meetings

#	Date	Location	Theme
1	26 Jan 2016	Beijing	Kick off and set preliminary directions
2	22 Feb 2016	Teleconference	Prioritize themes and recommendations
3	17 Apr 2016	Washington DC	Discuss 1st draft of taskforce policy paper
4	11 May 2016	Teleconference	Review 2nd draft of taskforce policy paper
5	31 May 2016	Paris	Review final draft taskforce policy paper
6	16 Jun 2016	Teleconference	Circulate final taskforce policy and advocacy paper
7	3-4 Sep 2016	Hangzhou	Receive G20 feedback & interact with the G20

Distribution of members

Country	#	Country	#	Country	#
Argentina	0	Italy	2	Turkey	3
Australia	5	Japan	2	United Kingdom	6
Brazil	2	Mexico	0	United States	19
Canada	5	Republic of Korea	3	Other European Union	10
China	37	Russia	7		
France	7	Saudi Arabia	0		
Germany	3	Singapore	3		
India	1	South Africa	1		
Indonesia	1	Switzerland	4		

Chair, co-chairs and taskforce members

Title	Given Name	Family Name	Position	Organisation
Mr.	Cesar	Alierta	Executive Chairman and Chief Executive Officer	Telefónica, S.A.
Dr.	Changbo	Bai	Vice President of BP China	BP
Mr.	Wiliam	Banks	Global Infrastructure Leader	EY
Mr.	John	Beck	Chairman	Aecon Group

Title	Given Name	Family Name	Position	Organisation
Mr.	German	Bejarano	Chairman´s Advisor	Abengoa
Ms.	Christiane	Bergevin	Board Director	Yamana Gold
Mr.	Denis	Berthiaume	President and COO	Desjardins Financial Security
Dr.	Hans-Paul	Bürkner	Chairman	The Boston Consulting Group
Mr.	Peixi	Cao	General Manager	China Huaneng Group
Mr.	Jean-Louis	Chaussade	CEO	SUEZ
Mr.	Wei	Che	Vice President	Danfoss
Mr.	Jinhang	Chen	Division General Manager	China Datang Corporation
Mr.	Kimball	Chen	Chairman	Energy Transportation Group, Inc.
Mr.	Song Hwee	Chia	Head of Investment Group	Temasek International Pte Ltd
Mr.	Jeffrey	Chua	Senior Partner & Managing Director	The Boston Consulting Group
Mr.	André	Clark Juliano	Institutional Relations Vice President	Camargo Corrêa
Mr.	Gershon	Cohen	CEO, Infrastructure	Aberdeen Asset Management Plc
Mr.	Thierry	Deau	CEO	Meridiam
Mr.	Oleg	Deripaska	President	UC Rusal
Mr.	Kirill	Dmitriev	CEO	Russian Direct Investment Fund
Mrs.	Jin	Dong	Executive Director	Australia China One Belt One Road Initiative
Mr.	Christophe	Dossarps	CEO	Sustainable Infrastructure Foundation
Mr.	Qiuchen	Fang	Chairman	China International Contractors Association
Mr.	Kim	Fejfer	CEO	APM Terminals
Mr.	Evgeny	Fokin	International Cooperation Director	En+ Group
Mr.	Chengyu	Fu	Ex Chairman	Sinopec Group

Title	Given Name	Family Name	Position	Organisation
Mr.	Luigi	Gambardella	Vice President	Telecom Italia
Mr.	Jisheng	Gao	Chairman	Lander Holding Group Co., Ltd.
Mr.	José	Gasset	Director of International Corporate Affairs	Iberdrola
Ms.	Susan	Gray	Global Head of Infrastructure	Standard and Poors
Mr.	Chunyuan	Gu	Senior Vice President of ABB Group; Chairman and President of ABB (China) Ltd.	ABB (China) Ltd.
Dr.	Jerome	Haegeli	Head of Investment Strategy	Swiss Re
Mr.	Jeffrey	Hardee	Executive Director, AP Government & Corporate Affairs	Caterpillar Inc
Mr.	Jeffrey	Hardy	Director	International Chamber of Commerce
Ms.	Xiuping	Huang	Vice President & Director, Corporate Affairs, China Region	Hewlett Packard Enterprise
Ms.	Wei	Huang	Director	Institute of World Economics and Politics, CASS
Dr.	Chang Soo	Huh	Chairman	Federation of Korean Industries
Ms.	Aysegul	Ildeniz	Vice President	Intel Corporation
Mr	Jean-Sébastien	Jacques	Chief Executive	Rio Tinto
Mr.	Weimin	Ju	Vice General Manager	China Investment Corporation
Ms.	Angela Joo-Hyun	Kang	Founder and Executive President	Global Competitiveness Empowerment Forum (GCEF)
Mrs.	Cassandra	Kelly	Global Chair, Expert Advisor	Pottinger
Mrs.	Sule	Kilic	Deputy Head of Turkey	European Bank for Reconstruction and Development
Mr.	Seung Youn	Kim	Chairman	Hanwha Group

Title	Given Name	Family Name	Position	Organisation
Mr.	Philipp	Kruschel	Executive Director	The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Mr.	Andre	Laboul	Deputy Director	OECD
Mr.	Spencer	Lake	Group General Manager	HSBC Bank Plc
Mr.	Mike	Lee	Deputy Director	SBF
Mr.	Qingkui	Li	Chairman	China Huadian Corporation
Mr.	Fengming	Liu	VP and General Counsel	GE Greater China
Mr.	Zhenya	Liu	Ex-Chairman	State Grid Corporation of China
Mr.	Jian	Liu	Vice President	ZTE Corporation
Dr.	Antonio	Llardén	Executive Chairman	Enagás
Mr.	Wenjun	Lu	Chairman	China National Heavy Machinery Corporation (CHMC)
Ms.	Yan	Luo	Chairman	China CAMC Engineering Co., Ltd.
Mr.	Jiongtao	Lv	Director in International Department	China Three Gorges Corporation
Mr.	Victor	Lysechko	Head of International Department	Russian Direct Investment Fund
Mr.	Li	Ma	Vice President	China Railway Group Limited
Ms.	Lu	Ma	Senior Vice President	State Power Investment Corporation
Mr.	Mark	Machin	Head of International	Canada Pension Plan Investment Board
Mr.	Craig	Mackieson	Managing Director	FG Corporate Finance
Mr.	Ziavudin	Magomedov	Chairman of the Board of Directors	Summa Group
Ms.	Leyla	MamadZada	Chief Business Development Officer	Summa Group
Mrs.	Emma Sri	Martini	President Director	PT Sarana Multi Infrastruktur (Persero)
Mr.	Gérard	Mestrallet	Chairman & CEO ENGIE	ENGIE

Title	Given Name	Family Name	Position	Organisation
Mr.	Wenbin	Miao	Executive vice president	Shuangliang Group Co. Ltd.
Mr.	Robert	Milliner	Non-executive Director	Global Infrastructure Hub Ltd
Dr.	Jan	Mischke	Senior Expert	McKinsey Global Institute
Mr.	Kiyotaka	Morita	Senior Manager	Keidanren (Japan Business Federation)
Mr.	Hajir	Naghdy	Head of Macquarie Capital Asia and the Middle East	Macquarie Group
Mr.	Hideo	Naito	Managing Executive Officer, Global Head of Infrastructure and Environment Finance Group	Japan Bank for International Cooperation
Mr.	Peder Holk	Nielsen	President and CEO	Novozymes
Ms.	Nonkululeko	Nyembezi-Heita	Chairman	Johannesburg Stock Exchange
Mr.	Feng	Pan	President	China VAST Industrial Urban Development Company Limited
Mr.	Shailesh	Pathak	Executive Director	Bhartiya Group
Mrs.	Dorothée	Pineau	Deputy General Director	MEDEF
Dr.	Surin	Pitsuwan	Chairman, Asia Logistics Council Advisory Board	GCEL
Dr.	Antonio	Poncioni Merian	Vice President of External Relations and Government Affairs	Odebrecht
Ms.	Jing	Qian	Vice President	JinkoSolar Holding Co., Ltd.
Ms.	Baoping	Qiao	Chairman	China Guodian Corporation
Ms.	Anne	Quenedey	Lawyer Partner	King & Wood Mallesons (KWM)
Mr.	Hongbin	Ren	Chairman	China National Machinery Industry Corporation (Sinomach)
Mr.	Peter	Robinson	President and CEO	U.S. Council for International Business (USCIB)
Mr.	Pedro Miguel	Rodrigues de Almeida	Head of Basic Industries	World Economic Forum

Title	Given Name	Family Name	Position	Organisation
Mr.	David	Rosenberg	Co-Founder and CEO	AeroFarms
Mr.	Ussal	Sahbaz	Secretary-General & Head of Istanbul Office	World SME Forum
Mr.	Ferit F.	Sahenk	Chairman	Dogus Group
Mr.	Patrik	Schinzel	Senior Adviser	Folksam
Mr.	Sebastian	Schiweck	Head of Department	WVM - German Non-Ferrous Metals Association
Mr.	Marcus	Scott	COO	TheCityUK
Mr.	Jose Pedro	Sebastian De Erice	Secretary-General	Técnicas Reunidas
Mr.	Kui	Shan	General Manager	China Communications Construction Company
Mr.	Stephen Wai-Lip	Shang	President in Greater China	Honeywell (China) Co., Ltd.
Mrs.	Mariana	Silva	Sustainable Finance Specialist	IISD - International Institute for Sustainable Development
Mr.	Michael	Silverman	Special Counsel	Hughes Hubbard & Reed
Mr.	Zhiping	Song	Chairman	China National Building Materials Group Corporation
Mr.	Francesco	Starace	CEO and General Manager	Enel SpA
Mr.	James	Stewart	Chairman, Global Infrastructure	KPMG
Mr.	Yinhuan	Sun	Chairman	Yida Group Co., Ltd
Mr.	Lee	Tashjian	Special Assistant to Chairman & CEO	Fluor Corporation
Dr.	Ian	Thomas	President, Boeing China	The Boeing Company
Ms.	Shiyue	Tian	Executive VP	Anhui Foreign Economic Construction (Group) Co. Ltd.
Mr.	Jean-Pascal	Tricoire	CEO	Schneider Electric
Mr.	Marcus	Wallenberg	Chairman	SEB
Mr.	Gefang	Wang	Chief Operating Officer	China Development Bank

Title	Given Name	Family Name	Position	Organisation
Mr.	Tongzhou	Wang	Member of the Board, General Manager, Chairman of the Technology Committee	China Energy Conservation and Environmental Protection Group
Mr.	Heang Fine	Wong	Group Chief Executive Officer (CEO)	Surbana Jurong Private Limited
Mr.	Guodi	Wu	Chairman	China International Energy Group
Mr.	Jiangxing	Wu	Director	National Digital Switching System Engineering Technology R&D Center
Mr.	Shanglong	Xu	President	Nanjing 21st Century Investment Group Co., Ltd.
Mr.	Lirong	Xu	Chairman	China COSCO Shipping Group
Mr.	Biao	Zhai	Partner & Managing Director	The Boston Consulting Group
Mr.	Chun	Zhang	President	China Machinery Engineering Corporation
Mr.	Miao	Zhang	Vice Chairman	Sinotrans Air Transportation Development Co., Ltd.
Mr.	Hongjing	Zhao	Vice President	China Fortune Land Development Co., Ltd.
Mr.	Jinhua	Zhao	Chief Economist	China Railway Construction Corporation Limited
Mr.	Vasily	Zhelobetsk	Deputy Chief Representative	GAZPROMBANK (Joint-stock Company) Beijing Representative Office
Mr.	Caiji	Zhen	Chairman	Datang Telecom Technology & Industry Group
Mr.	Zhiliang	Zhou	Chairman	China Railway Signal & Communication Co., Ltd.
Mr.	Zhengang	Zhu	General manager, International Department	China National Power Group Corporation
Ms.	Sabine	Zindera	Vice President, Legal and Compliance	Siemens AG

Special thanks

We would like to thank The Boston Consulting Group, the knowledge partner of the 2016 B20 Infrastructure Taskforce, for its in-depth support in the taskforce discussions and compilation of this report. We also thank the World Economic Forum and the International Chamber of Commerce, the networking partners of the 2016 B20 Infrastructure Taskforce, for their assistance in developing the recommendations and collaborating on advocacy.