

# The Global Infrastructure Challenge and the Role of G20 and BRICS<sup>1</sup>

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## Abstract

*Development and environmental sustainability, infrastructure and economic growth are closely interconnected. The world will need to more than double investment in infrastructure from current levels to meet its growth and development objectives over the next 15 years. This means raising infrastructure investment to more than \$6 trillion a year. Energy, transport and cities dominate infrastructure needs. As much as three quarters of the incremental investment requirements will be in emerging and developing economies. Developing this new infrastructure capacity in sustainable ways can be a game changer in the fight against climate change.*

*The agenda involves important transformations in the way infrastructure is developed and financed. It spans boosting investment in public and private sectors, and increasingly through public-private partnerships; reforming incentives to channel new investment toward efficient and sustainable infrastructure; strengthening institutions to ensure the feasibility and quality of investments; and promoting innovation in infrastructure technology to better address climate risks and sustainability, and in public and private financing modalities. Strong public policy leadership must be combined with new ways to catalyze private investment and financing, especially from institutional investors. More than half of the incremental financing will need to be mobilized from the private sector.*

*While much of this agenda is the responsibility of national governments, national-level actions must be supported with stronger international cooperation through collective actions, peer learning, and technical and financial support. The G20 and the BRICS grouping of Brazil, Russia, India, China and South Africa have an important role to play in this effort, both through successful individual and coordinated actions within these groups and more broadly through strengthening the policy, financial and institutional framework for global cooperation.*

**Key words:** infrastructure; sustainability; investment; finance; G20; BRICS

For citation: Qureshi Z. (2017) The Global Infrastructure Challenge and the Role of G20 and BRICS. *International Organisations Research Journal*, vol. 12, no 2, pp. 164–193 (in Russian and English). DOI: 10.17323/1996-7845-2017-02-164

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<sup>1</sup> The editorial board received the article in January 2016.

A summary version of this paper was presented at the International Conference on “G20 and the BRICS – New Global Governance Institutions” held at the Russian Presidential Academy of National Economy and Public Administration on 25 October 2016.

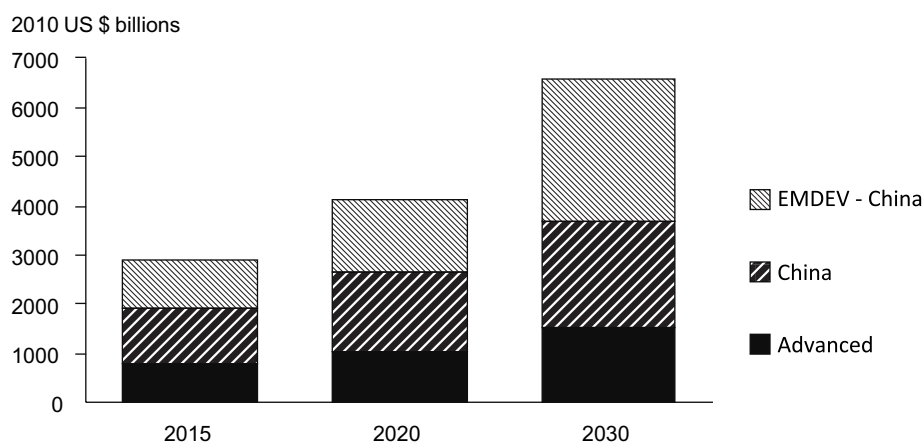
## The Global Infrastructure Challenge – and Opportunity

Infrastructure is at the nexus of economic growth, inclusive development and environmental sustainability. Infrastructure is a key driver of economic growth. In the current context of weak prospects for global growth and concerns about secular stagnation, boosting infrastructure investment can provide a welcome shot in the arm for global aggregate demand today while also strengthening the underlying supply-side foundations for future growth. Adequacy, affordability and resilience of infrastructure matter greatly for inclusive growth and poverty reduction. Moreover, infrastructure is key to tackling climate change, as it alone accounts for around 60% of global greenhouse gas (GHG) emissions. Done badly, it is a major part of the climate problem; but done right, it is a major part of the solution [OECD, IEA, NEA et al., 2015; Stern, 2015, GCEC, 2016].

The world has an unprecedented opportunity at present to move forward vigorously on this interconnected agenda. The adoption of the Sustainable Development Goals (SDGs) and the Paris Agreement on climate action have generated valuable political momentum to set the world on a path toward better and more sustainable development outcomes. Infrastructure is at the core of this agenda.

Globally, investment needed in infrastructure in the 15-year period from 2015–2030 is estimated at about \$93 trillion [GCEC, 2014]. On an annual basis, investment in infrastructure will need to more than double from close to \$3 trillion currently to over \$6 trillion (Fig. 1). As much as three quarters of the increase in investment will need to take place in the developing world, particularly in middle-income economies, reflecting their growth needs, rapid urbanization and sizable infrastructure backlogs. The largest part of needed investment relates to energy (45%), followed by transport (30%). The assessed investment requirements over 2015–2030 are twice the value of the entire global infrastructure stock today (estimated at about \$50 trillion). This presents a big challenge. But it also presents an opportunity to remake our physical environment in a better way [Bhattacharya, Oppenheim and Stern, 2015; Qureshi, 2016a].

How these infrastructure investments are made will be crucial. Infrastructure assets are long-lasting. There is a great danger of locking in high-carbon, polluting and unsustainable pathways if the new infrastructure is built in much the same way as before, for example by continuing to rely heavily on fossil fuels to meet the future energy demand. Currently, more than 80% of the world's primary energy supply and more than two thirds of its electricity are derived from fossil fuels [IEA, 2015a]. But if new investments in energy and other infrastructure factor in climate risks, they can not only bridge the infrastructure gap to support economic growth and development but also protect the climate. This means investing in infrastructure that is low-carbon and climate-resilient, including renewable energy, cleaner transport, more efficient and resilient water systems and smarter cities.



*Fig. 1: Global Infrastructure Investment Requirements*

*Source:* Global Commission on the Economy and Climate.

*Note:* EMDEV – China = Emerging and developing economies excluding China.

## Meeting the Infrastructure Challenge – The Policy Agenda

Delivering sustainable infrastructure at scale will require strong public policy leadership and active private-sector engagement, including important transformations in the way infrastructure investments are developed and financed. Specific actions must be tailored to reflect individual country circumstances. However, the main elements of the agenda can broadly be captured under four “I”s: investment, incentives, institutions, and innovation [Qureshi, 2016b/c]. National-level actions will need to be supported with stronger cooperation at the international level.<sup>2</sup>

### **(i) Investment**

Boosting investment in infrastructure to more than twice current levels will require substantial increases in public sector’s own investment and public policies to encourage and catalyze a major scale-up of private investment.

#### *Boosting Public Investment*

The public sector continues to dominate the provision of infrastructure in emerging and developing economies, though the private-sector role has been increasing. In these economies, the public sector typically accounts for two thirds to three quarters of

<sup>2</sup> The focus of this paper is on the policy agenda to meet the global sustainable infrastructure challenge. The paper synthesizes recent research to address the key elements of this agenda. Given its policy focus and space constraints, the paper does not get into details of the underlying theoretical and technical analyses but refers the reader to sources that develop and present those analyses more fully. One recent work where the analysis underlying the policy agenda discussed here is elaborated in much greater detail is a report co-written by the author and published by the Brookings Institution in late 2016 [Bhattacharya, Meltzer, Oppenheim et al., 2016].

infrastructure investment. By contrast, the private sector typically accounts for about two thirds of infrastructure investment in advanced economies. The public-sector role extends beyond its direct investment, given the catalytic role of its engagement.

Public investment rates have been declining in most economies for much of the past three decades [IMF, 2015]. In emerging and developing economies, public investment peaked at over 8% of gross domestic product (GDP) in the late 1970s/early 1980s and then declined to around 4–5% of GDP in the mid-2000s. It has since recovered to 6–7% of GDP. In advanced economies, public investment has fallen steadily from a high of just under 5% of GDP in the late 1960s to a historic low of just over 3% of GDP in 2012 (Fig. 2). With infrastructure forming a major part of public investment, the decline in public investment rates has exacerbated infrastructure gaps.

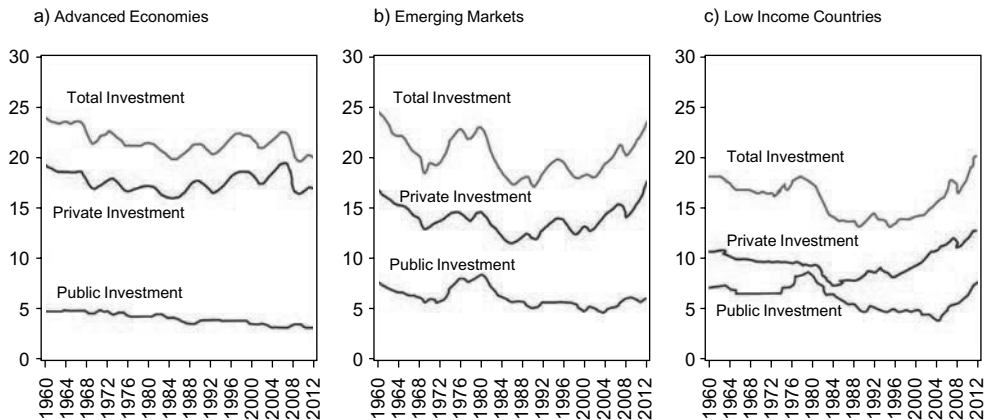


Fig. 2: Trends in Investment (% of GDP)

Source: IMF (2015).

The decline in public investment must be reversed. This is particularly the case where public investment levels were relatively low to begin with. In countries with high investment levels, notably China, aggregate investment may need to decline as part of the broader process of economic transformation. The main issue in these cases is the allocation, quality and sustainability of investment.

Public investment is generally a shared responsibility across levels of government. With rapid urbanization, the role of cities and municipal governments in infrastructure provision is increasing. Cities consume more than two thirds of the world's energy and release at least the same proportion of energy-related GHG emissions. In the next 15 years, the world's urban population will grow by 70 million people a year. Urban areas will account for more than 70% of total investment in infrastructure over the same period [CCFLA, 2015]. Empowering cities and local governments will be crucial to meeting the challenge of scaling up infrastructure while ensuring sustainability.

### Promoting Private Investment

Given the scale of the investment needed and the constraints on fiscal space in many countries, the contribution of the private sector will have to increase substantially. Of the estimated additional investment in infrastructure – more than \$3 trillion per annum required over 2015–2030 – more than half will need to come from the private sector [Bielenberg, Kerlin, Oppenheim et al., 2016].

Improving the policy frameworks and institutional capacities to effectively promote and manage public-private partnerships (PPPs) will be particularly important for middle-income countries in meeting their infrastructure investment requirements. Of the total investment of more than \$6 trillion per annum in infrastructure needed globally over 2015–2030, around two thirds, or \$4 trillion, will need to take place in these countries. This is well over double their current level of investment. PPP projects will be a key modality for meeting the incremental investment requirements.

Private participation in infrastructure in developing countries has been rising over the past decade and has averaged around \$150 billion annually in recent years (Fig. 3). This will need to be scaled up by an order of magnitude. In 2014, as much as three quarters of total private participation was accounted for by five middle-income countries, namely, Brazil, Turkey, Peru, Colombia and India (in that order). More middle-income countries will need to improve their enabling environments to attract private participation. Private participation is much more limited in low-income countries, as reflected in the small share of Sub-Saharan Africa in the total flows. However, these countries over time can also aim to mobilize more private investment by strengthening their policy and institutional frameworks [World Bank, 2015a].

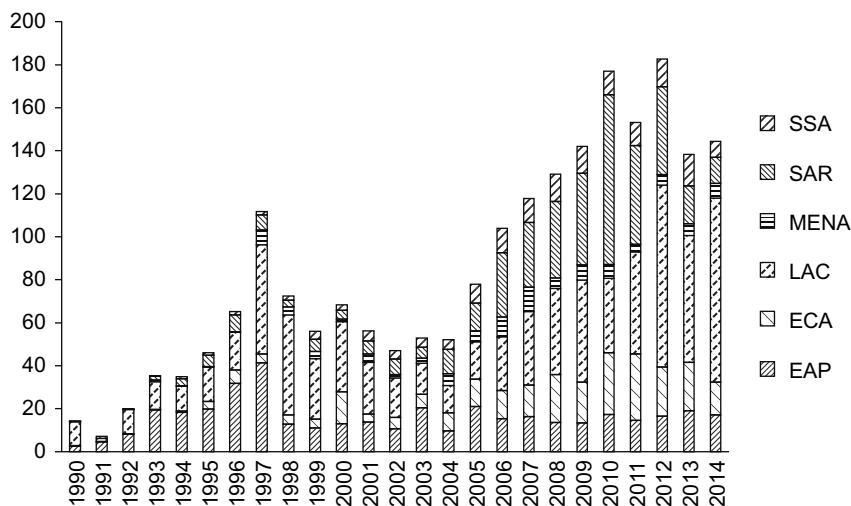


Fig. 3: Investment Commitments in Projects with Private Participation in Emerging and Developing Economies (2014 \$ billions)

Source: World Bank PPIAF Database (2014) using World Bank regional classifications.

**(ii) Incentives**

Increased investment will need to be underpinned by improvements in policy and regulatory frameworks that determine the incentives and enabling conditions facing investors and consumers. This includes addressing market price distortions and improving the policy and regulatory framework governing investment.

*Reforming Prices and Market Signals*

Correcting major price distortions is particularly important for improving the policy environment for efficient and environmentally sustainable infrastructure. The biggest distortions are fossil-fuel subsidies and the lack of carbon pricing, which bias infrastructure investment toward high-carbon sources of energy, discourage the development of cleaner energy technologies, undermine efficiency in energy use and cause harmful environmental impacts.

Energy subsidies, including the failure to price for negative externalities in terms of pollution and climate-change impacts, cost as much as \$5.3 trillion in 2015, or 6.5% of world GDP (Fig. 4). Fossil fuels accounted for 97% of the total. The largest component of these subsidies is associated with coal, followed by petroleum. The subsidies are pervasive across countries. Emerging Asia accounts for about half of the total subsidies, while advanced economies account for about a quarter [Coady, Parry, Sears et al., 2015].

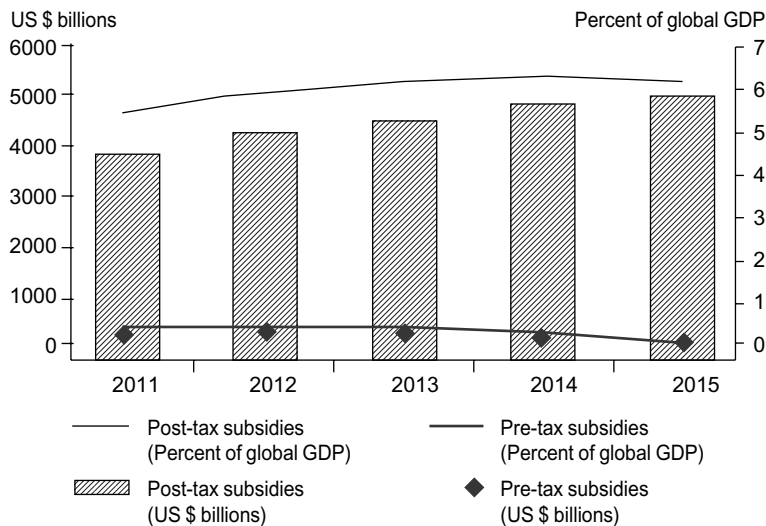


Fig. 4: Global Energy Subsidies

Source: [Coady, Parry, Sears et al., 2015].

Note: Pre-tax subsidies arise when the price paid by consumers (firms and households) is below the cost of supplying energy. Post-tax subsidies arise when the price paid by consumers is below the supply cost of energy plus a corrective tax that reflects the environmental damage associated with energy consumption and an additional consumption tax that should be applied to all consumer goods for raising revenues.

Elimination of fossil-fuel subsidies would reduce global CO<sub>2</sub> emissions by an estimated 20% or more. It could also generate substantial fiscal gains, which could be channeled to better uses, such as improving government finances, investing in sustainable infrastructure, bolstering R&D in green technologies and supporting social-safety nets that are better targeted than fuel subsidies, which tend to be highly regressive. Most of the benefits of energy subsidies, typically more than 90%, accrue to non-poor, higher-income groups [Arze del Granado, Coady and Gillingham, 2012; IEA, 2014].

While the removal of fossil-fuel subsidies would have global benefits by reducing carbon emissions, the bulk of the gains would accrue locally through environmental and fiscal benefits [Parry, Veung and Heine, 2014]. It is, therefore, in the interest of countries to move ahead unilaterally with fossil-fuel pricing reform. Nonetheless, global coordination can certainly help strengthen national reform efforts – and help achieve collective outcomes more efficiently.

Many countries are taking steps to remove or reduce fossil-fuel subsidies, especially taking advantage of the prevailing lower petroleum prices. These actions are encouraging. However, fossil-fuel pricing reform needs to go much further, not only to remove explicit fiscal subsidies but also to address implicit subsidies relating to the damages caused by pollution and carbon emission [Arezki and Obstfeld, 2015].

The single most important action public policy can take to shift the incentive structure toward investment in sustainable infrastructure is to put a price on carbon emissions. Carbon pricing is the most efficient way to reduce carbon emissions, aligning the price paid by carbon users with the true social opportunity cost of carbon and using the market mechanism to influence the behaviour of producers and consumers across the economy. It also raises revenue. Regulation can also play a role, such as through instituting environmental standards in energy and transport, but pricing is more efficient than a patchwork of regulations covering a discrete number of activities [OECD and World Bank Group, 2015a, Farid, Keen, Papaioannou et al., 2016].

Emission taxes and emission-trading systems are the main instruments for implementing carbon pricing. Since 2012, the number of carbon-pricing arrangements implemented or scheduled for implementation has almost doubled, rising from 20 to 38, with arrangements in the EU, China and the U.S. being the most notable in terms of their coverage of emissions. There is now some form of carbon pricing at the national level in almost 40 countries (including 28 in the EU's emission trading system) and there are more than 20 pricing arrangements at the subnational level. But these pricing arrangements collectively cover less than 15% of global GHG emissions (Fig. 5).

Carbon prices in existing arrangements vary considerably, ranging from less than \$1 to \$130 per ton of CO<sub>2</sub> equivalent (tCO<sub>2</sub>e). The majority of emissions – around 85% – are priced at less than \$10 per tCO<sub>2</sub>e, well below the price that economic models estimate is needed to meet the goal of keeping global average temperature to less than 2°C above pre-industrial levels [World Bank Group and ECOFYS, 2015].



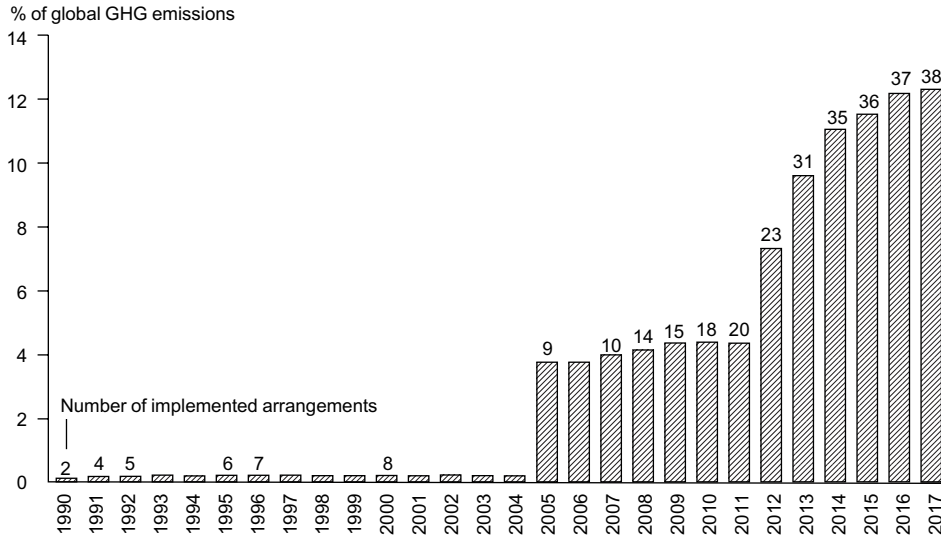


Fig. 5: Number of Regional, National and Subnational Carbon Pricing Arrangements and % of Global GHG Emissions Covered

Source: [World Bank Group and ECOFYS, 2015].

Pricing reform is not limited to the energy sector. Distortions are widespread in the pricing of other natural resources and infrastructure services. Governments need to review pricing across sectors to align them better with economic fundamentals, including externalities, and use more efficient targeting mechanisms to achieve equity objectives. In water supply, for example, subsidies provided through public utilities are estimated at more than \$450 billion or 0.6% of global GDP annually, encouraging inefficient resource use, discouraging new investment in sustainable water infrastructure and causing fiscal losses [Kochhar, Pattillo and Sun, 2015].

### (iii) Institutions

The feasibility, quality and impact of higher levels of investment will depend crucially on the strength of public institutions and regulatory frameworks for private investment. Potential efficiency gains in infrastructure investment from improved investment management could be as high as \$1 trillion a year globally, equivalent to roughly one third of total current annual investment in infrastructure [McKinsey, 2013]. The need for institutional strengthening is particularly strong in emerging and developing economies. Estimates of potential gains from public investment that are lost due to weaknesses in investment management capacities range from an average of 13% in advanced economies to more than 40% in low-income countries [IMF, 2015].

For public investment, institutional capacities to manage investment across the project cycle will need to be substantially strengthened to boost investment at scale. For private investment, policy and regulatory frameworks will need improvement to reduce



the cost and risk of doing business. Investment in infrastructure is especially sensitive to country-level policy risk, more than foreign direct investment overall. A World Bank study found that an improvement in country risk ratings by one standard deviation is associated with a 27% higher chance of having a private participation in infrastructure commitment and a 41% higher level of investment in dollar terms [Araya, Schwartz and Andres, 2013].

The institutional strengthening agenda is broad. It is also country specific in important respects. However, two priority areas stand out: developing stronger project pipelines and improving the regulatory and institutional frameworks for PPPs.

### *Developing Stronger Project Pipelines*

In many emerging and developing economies, weak project pipelines are a particularly important – and often a binding – constraint to boosting public infrastructure investment and attracting more private participation. Taking climate risks and sustainability into account in a systematic way magnifies the challenges for investment planning and project development and management. This requires incorporating environmental sustainability as an integral, cross-cutting element of government investment programmes and policies; capturing environmental externalities systematically in project appraisal and ensuring their proper valuation; and applying environmental safeguards to investments in a coherent and consistent manner [Marcelo, House, Mandri-Perrot et al., 2015, Smith and Braathen, 2015].

Efforts to build capacities for project preparation and investment management will need to reach beyond central government agencies to cover subnational and local-level entities that will have a major role in ramping up investment in sustainable infrastructure. City-related infrastructure accounts for the bulk of total infrastructure investment, but investment planning and management capacities are often the weakest at municipal levels. Only about 20% of the world's largest cities have the basic analytics necessary for low-carbon planning [World Bank, 2013a].

Governments and their development partners, especially the multilateral development banks (MDBs), will need to scale up investment in building institutional capacities to develop and manage stronger pipelines of infrastructure projects that are both bankable and sustainable. Project preparation facilities supported by MDBs and bilateral donor agencies can help by mobilizing technical expertise and financing. Project preparation costs in developing countries can reach as high as 10% of total project investment [World Bank, 2013b].

### *Improving the Framework for PPPs*

A sound legal and institutional framework governing private participation in infrastructure through PPPs is key to attracting more investment and ensuring its effectiveness. Transparency and credibility of processes for selection of projects and delivery models, negotiation and risk sharing are crucial. Investors' confidence in consistency of policy and implementation is helped by standardizing contracts and concessions,

purchase agreements and bidding documents as much as possible [EBRD, 2015; OECD and World Bank Group, 2015 b/c].

Appropriately structuring PPPs in terms of distribution of risks and returns and supporting regulation is vital to maximizing value for money – deriving benefit not only from the additional financing that private participation brings but also from its expertise to produce efficiency gains and capacity to innovate [Buckberg, Kearney and Stolleman, 2015]. Poor contract designs can thwart these potential benefits, producing inefficient project outcomes and saddling governments with large fiscal costs and liabilities. Maximizing benefits and minimizing risks requires specialized skills in developing and contracting PPPs. Related capacities in governments will need enhancement.

With increased emphasis on sustainable infrastructure, consistent treatment of climate risk in PPPs will be important. The increasing private investor interest in sustainable infrastructure should help promote sustainable approaches. Of the \$40 billion investment in electricity-generating PPP projects in developing countries in 2014, \$22 billion was in renewable energy, with onshore wind and solar PV as the most common technologies for renewable energy projects [World Bank, 2015a].

There is a rich body of assessments and indicators of countries' investment climate that can help to identify the most serious deficiencies and priorities for reform. For example, the World Bank's Doing Business reports assess key regulatory and institutional aspects of the overall business environment in a country [World Bank, 2015b]. The INFRASCOPE assessments developed by a group of MDBs (with the Economist Intelligence Unit) address policies and capacities for infrastructure PPPs [MDBs, 2015a]. The CLIMATESCOPE assessments focus specifically on the investment climate for clean energy projects [BNEF, 2015]. A PPP Knowledge Lab has been set up jointly by the MDBs to provide a comprehensive online resource [MDBs, 2016a]. The International Monetary Fund (IMF) and the World Bank have developed a framework that can be used for systematic assessment of PPP fiscal risks [IMF and World Bank, 2016].

#### ***(iv) Innovation***

The scale and the transformational nature of the sustainable infrastructure agenda will require considerable innovation around how infrastructure is developed and financed. On one hand, technological innovation will be needed to provide increasingly efficient components of low-carbon, climate-resilient infrastructure. On the other hand, fiscal and financial innovation will be needed to mobilize the necessary financing. Boosting investment in infrastructure to more than twice the current levels will present a major financing challenge, requiring stronger mobilization of both public and private finance, especially through new and innovative mechanisms. With concerted efforts across the full spectrum of sources of finance, it is possible to raise the \$3 trillion in annual incremental financing to reach the \$6 trillion in annual infrastructure investment

that is needed over 2015–30 (Fig. 6). More than half of the incremental financing will need to come from the private sector [Bielenberg, Kerlin, Oppenheim et al., 2016].

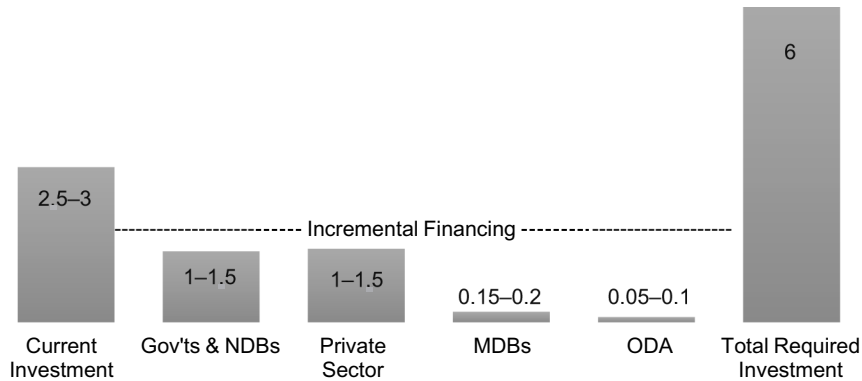


Fig. 6: Financing Requirements to Close the Infrastructure Gap (2010 \$trillions per annum)

Source: [Bhattacharya, Oppenheim and Stern, 2015; Bielenberg, Kerlin, Oppenheim et al., 2016].

### *Increasing Investment in R&D*

Investment in research and development (R&D) needs to be boosted significantly to support innovation and new technologies for sustainable infrastructure, such as clean and renewable energy. In countries of the Organisation for Economic Co-operation and Development (OECD), public R&D investment has slowed appreciably since the global financial crisis. Encouragingly, public R&D activities in emerging economies have been growing and their share in the global total has risen from 10% to 30% over the past 10 years [OECD, 2014]. Globally, governments spend orders of magnitude more on harmful fossil-fuel subsidies than on supporting new renewable energy technologies. There is a strong rationale for increased government investment in low-carbon research, supported by clear targets such as cutting the cost of clean electricity to below that of electricity from fossil fuels within 10 years [Layard, 2015].

Global investment in renewable energy R&D was estimated at \$11.7 billion in 2014, of which \$5.1 billion was public investment. The International Energy Agency (IEA) has determined that global public investment in energy R&D should at least triple to match the aspirations for low-carbon technologies [IEA, 2015b]. In addition to boosting their own investment in R&D, governments can encourage more private investment through partnerships, public procurement arrangements and well-designed fiscal incentives. Some promising R&D initiatives involving public-private partnership were announced at the United Nations Climate Change Conference Paris meeting (COP21), such as Mission Innovation, Breakthrough Energy Coalition and Global Solar Alliance. Governments now need to lay out clear implementation plans to realize increases in investments.

### *Expanding and Creatively Using Public Financing*

Across advanced and emerging economies, fiscal positions in many cases are under strain, with public debt/GDP ratios having risen sharply in the aftermath of the global financial crisis. Finding the fiscal space to meet large infrastructure investment needs will require determined efforts to tap available scope for additional resource mobilization through tax and expenditure policies. It will also require more creative use of government balance sheets.

#### *(a) Expanding Fiscal Space through Tax and Expenditure Reforms*

Advanced economies in general already raise substantial revenue relative to GDP but many have scope to raise more while also improving the revenue structure. Removing excessive and regressive tax exemptions, taxing negative environmental externalities and making fuller use of property taxes are some options. Recent improvements in international tax rules, in relation to Base Erosion and Profit Shifting and Exchange of Information, can also help by reducing losses through tax avoidance and evasion – this would benefit both advanced and emerging economies. There is scope for rationalizing spending, such as on subsidies, pensions and social security. Aging populations make the rationalization of pension and health spending especially important in advanced economies. More than half of the advanced economies in the G20 can improve their primary fiscal balance by more than 3% of GDP through tax and expenditure measures that minimize potential adverse effects on growth and equity [IMF and OECD, 2015].

Revenues relative to GDP are much lower in emerging and developing economies and there is typically more scope for greater revenue mobilization through tax reform and tighter tax administration. About half of these economies have tax/GDP ratios below 15%. As part of their efforts to support the Financing for Development agenda adopted at the conference in Addis Ababa in July 2015, the IMF and the World Bank launched an initiative to help developing countries increase their tax/GDP ratios by at least 2–4% [IMF and World Bank, 2015]. Spending on public sector wages, subsidies and social benefits typically accounts for as much as three quarters of total government spending in these countries. In many cases, there is sizable scope for savings in these expenditures.

#### *(b) Instituting Carbon Taxation*

Carbon taxes can generate substantial revenue, while also improving policy alignment with climate sustainability. The high cost of fossil-fuel subsidies and the associated potential for savings, and for mobilizing and rechanneling resources to better uses, was noted earlier. The key reform is to put a price on carbon emissions. A low initial carbon tax of \$30 per tCO<sub>2</sub>e can generate fiscal revenue amounting to more than 1% of GDP on average in large emitting countries (Fig. 7). Charging more fully for environmental damages can raise substantially more revenue. A simple and practical way to levy the carbon tax would be to build it into existing fuel excise taxes and apply similar

charges to coal, natural gas and other petroleum products. Increases in the carbon tax rate could be phased in to allow economies time to adjust [Calder, 2015; OECD, 2015c; Parry, 2015].

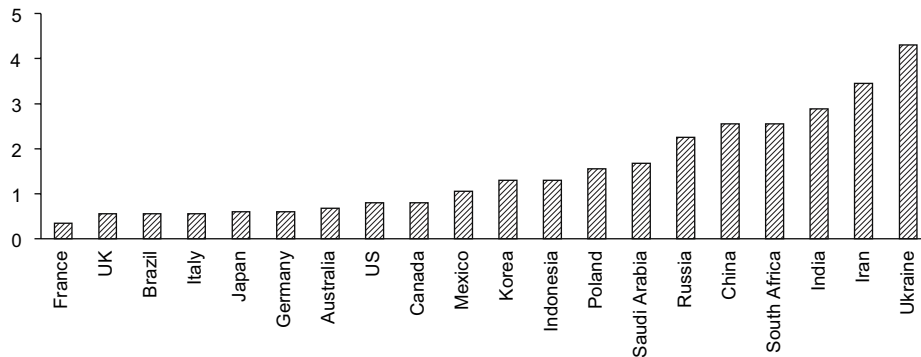


Fig. 7: Revenue Potential from a \$30/tCO<sub>2</sub>e Carbon Tax (% of GDP)

Source: [Parry, 2015].

Carbon taxes can also be designed to be revenue neutral. Depending upon their circumstances and objectives, countries can opt to raise more revenue from carbon taxes and less from other taxes that might negatively impact economic performance, such as taxes on capital and labor. For example, revenue gains from pricing reform to eliminate fossil-fuel subsidies would allow advanced economies to halve corporate income tax. In emerging economies, the gain would be worth double their corporate tax revenues. So, pricing carbon can be about smarter, more efficient tax systems and not necessarily higher taxes [Lagarde, 2015].

### (c) Strengthening Municipal Finance and Empowering Cities

Of the \$6 trillion plus of needed investment in infrastructure annually over 2015–2030, upwards of \$4.5 trillion will be related to urban areas. Urban finance is thus a core part of the financing challenge. Municipal governments must improve their fiscal health, both to expand their own resource envelope and enhance their ability to raise private financing from capital markets. Of the 500 largest cities in emerging economies, only 4% are deemed creditworthy in international financial markets and 20% in local markets [World Bank, 2013a].

Among local government revenue sources, property taxes in particular offer the potential for raising larger revenues. Even among developed economies, property taxes are generally underutilized. Among OECD countries, revenue raised from property taxes ranges from above 4% of GDP to well below 0.5% (Fig. 8). Besides contributing to local governments' general revenues, property taxes can more directly contribute to infrastructure financing, such as through levies to capture improved land values as a result of a transport project.

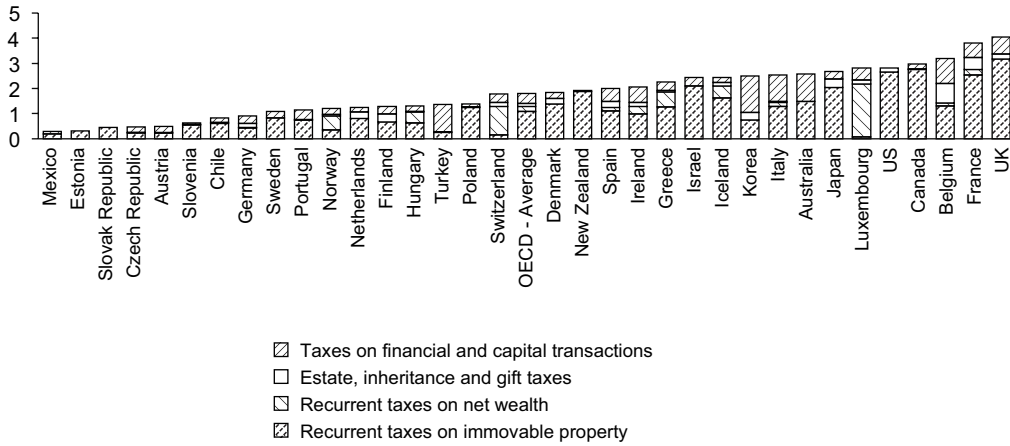


Fig. 8: Property Tax Collections in OECD Countries, 2013 (% of GDP)

Source: [OECD Revenue Statistics Database, 2015].

Municipal governments can also raise more revenue by better charging for infrastructure services, while structuring the charges in a way that protects poor customers. User charges for electricity, transport, water and sanitation are often kept well below cost recovery levels, draining public resources, undermining the efficient use of infrastructure assets and discouraging new investment. User charges are especially important to the proper maintenance of infrastructure investments. Every dollar spent on preventive pavement maintenance can reduce future repair costs by 4–10 dollars [Baladi, Svasdisant, Van et al., 2002].

Intergovernmental tax-sharing arrangements in developing economies typically have a high degree of centralization, with subnational governments heavily dependent on transfers from national governments. Tax-sharing arrangements should be reviewed to align them better with the increasingly important expenditure responsibilities at the subnational level. Also, intergovernmental transfers can be designed in ways that enhance incentives at the local level to bolster own-resource mobilization for investment and produce results, such as through matching and performance-based grants [Ahmad, 2015].

*(d) Making Better Use of Government Balance Sheets*

Countries with lower public debt/GDP ratios have more scope to borrow and leverage government balance sheets than those with higher indebtedness. But the scope for borrowing also depends on what it is used for. Even where current indebtedness is high, additional borrowing for infrastructure investment could be contemplated. Well-managed infrastructure investment can have multiplier effects on output of 2–3 times the size of investment, with the impact likely stronger in developing economies with large infrastructure gaps [IMF, 2014; Calderón, Moral-Benito and Servén, 2015; Standard and Poor’s, 2015]. A recent study estimated a rate of return as high as 20% on



quality investments in infrastructure [McKinsey, 2016]. Good infrastructure investment may therefore be self-financing. Also, currently the scope for more public investment may be greater with interest rates at low levels [Christiano, Eichenbaum and Rebelo, 2011; Eggertsson, 2011; Summers, 2016]. Investing in infrastructure would offer benefits that “under current circumstances would outweigh the costs of its financing” [Fischer, 2015].

Countries must exercise great care in managing their borrowing, as well as contingent liabilities, to ensure debt sustainability. Debt sustainability assessments need to take into account longer-term economic impacts of the debt-financed expenditures and implications for government balance sheets. With the large investments needed in sustainable infrastructure in the years ahead, with potentially high long-term returns in terms of growth and environmental outcomes, reflecting this perspective in policymaking will be increasingly important [Derviş, 2015]. Stronger guidance on these issues from international financial institutions, particularly the IMF, would be helpful.

#### *(e) Transforming Development Finance and MDB Role*

To meet the challenge of financing the scale up of infrastructure investment and the SDGs more broadly, official financial flows to developing countries will need to increase. Official concessional assistance is especially important for lower-income countries that have limited access to private financial markets. But a paradigm shift is needed regarding how development finance is used. Rather than simply filling financing gaps, development finance will need to be used in innovative ways that leverage much larger pools of financing. Even in the best-case scenario, official flows will measure in the hundreds of billions of dollars. But the financing requirements measure in the trillions. Going from the billions to the trillions will require a much stronger mobilization of domestic resources and private flows [Development Committee, 2015]. The key role of development finance will be to support countries in unlocking and catalyzing more financing from these sources.

The role of MDBs will be especially important in this paradigm of catalytic development finance. With the combination of technical and policy support, low-cost long-term financing and risk mitigation services that these institutions offer, they can be instrumental in leveraging substantial increases in flows of private finance to infrastructure and lowering its cost. This leveraging role will be in high demand especially in middle-income developing countries, where the financing needs are large and private capital will have to play a major role in meeting those needs. MDBs need to boost their own lending from current levels (Fig. 9) and use it to leverage larger pools of financing. This will require strengthening of their capital bases, innovations in investment instruments to catalyze more private financing, as well as changes in modalities (including capital adequacy rules and risk assessment methodologies) that allow more leverage from the capital base [Humphrey, 2015].



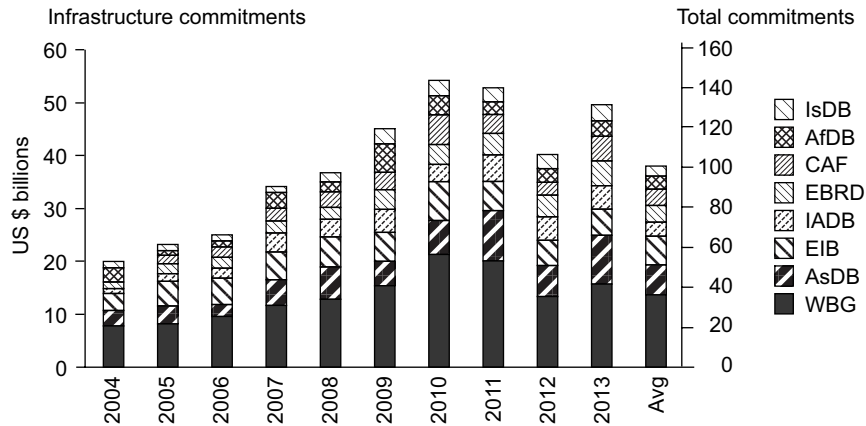


Fig. 9: Infrastructure Investment Commitments by MDBs, 2004–2013

Source: [Humphrey, 2015].

Note: Bars show infrastructure commitments (left axis) and the solid line shows total commitments (right axis).

### *Leveraging Private Financing Through Innovative Mechanisms*

Globally, assets under management by banks and institutional investors amount to more than \$120 trillion, of which a little over 5% is invested in infrastructure. While more than four fifths of these assets are held by institutions in advanced economies, the share of emerging economies is rising [Bielenberg, Kerlin, Oppenheim et al., 2016]. Channeling more of this large and expanding pool of capital to infrastructure and to emerging economies where the investment needs will be the greatest can go a long way toward meeting the overall financing requirements.

Currently, \$300–400 billion from this pool of capital is invested annually in infrastructure. This could rise to an average of \$1–1.5 trillion annually over the next 15 years, sufficient to meet one third or more of the total incremental financing needed over that period (Fig. 10). Making this happen will require actions to remove key constraints to the mobilization of this financing, including innovation in instruments and mechanisms to reduce investor risk and lower the cost of financing. Actions to promote specific financing mechanisms need to be underpinned by broader efforts to improve the enabling policy and institutional environment to promote sound development of capital markets, especially in emerging economies with weaker structures for provision of long-term finance that infrastructure investment needs [World Bank, 2015c].

#### *(a) Developing Infrastructure as an Asset Class*

To better tap the large pools of capital held by institutional investors, infrastructure needs to be better developed and promoted as an asset class. The steady long-term returns and risk diversification opportunities offered by infrastructure assets are features

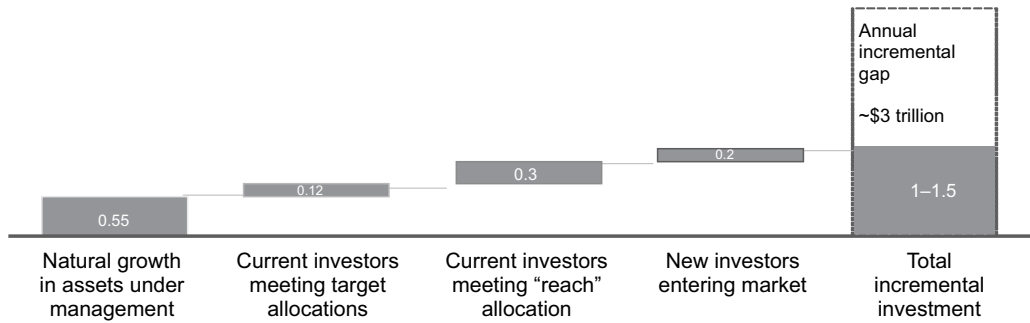


Fig. 10: Potential Incremental Annual Investment by Private Institutional Investors (2010 \$ trillions)

Source: [Bielenberg, Kerlin, Oppenheim et al., 2016].

that should be attractive to these investors. Yet, their commitment has been low and also narrow in terms of investment modalities, mostly taking the form of equity (typically unlisted equity) on a project basis. The untapped potential for bond financing by these investors is large, especially when projects reach an operational phase [Ehlers, 2014]. Developing a strong pipeline of sound and bankable projects, standardizing project templates where possible and improving the flow of information on projects to investors are essential to enhancing the profile of infrastructure as an asset class. So are regulatory and institutional frameworks for private investment that provide policy clarity and reduce risk.

With stronger capital market structures, and as investment in infrastructure bonds grows, trading in these bonds can enhance their liquidity and lower risk. Issuance of asset-backed securities for infrastructure assets could further develop the market for infrastructure as an asset class. Securitization could help better diversify and pool risks, create instruments to match the different risk appetites of investors and increase liquidity. Improved underlying policy and institutional frameworks, greater clarity on the risk-return profile of infrastructure projects and financial innovation could position infrastructure assets better in assessments by rating agencies.

### (b) Promoting Innovation in Investment Instruments

Innovations in financial instruments could expand the range of investment options, improve risk-return profiles and help reach a wider investor base. For sustainable infrastructure projects, green bonds and YieldCos already have shown a promising uptake. Debuted in 2007, the green bond market has grown rapidly in recent years, with outstanding issues estimated at more than \$65 billion in mid-2015 [CBI, 2015]. Strengthening the institutional structure underpinning the sustainable infrastructure-linked-instruments such as green bonds, YieldCos and green exchange-traded funds

(ETFs) can help promote their further growth, including platforms for their listing on exchanges and market value indices.

Innovation will also be needed to finance a more diverse set of investors in sustainable infrastructure compared to traditional infrastructure, including many smaller and often less creditworthy investors, such as in solar energy. New models will be needed that contain transaction costs and offer adequate risk-adjusted returns for investing in small distributed assets, including possibly bundling multiple projects to achieve scale [Perera, Uzsoki and Silva, 2015].

### *(c) Scaling up Risk Mitigation Instruments*

Well-designed risk mitigation and credit enhancement instruments can be effective in catalyzing private capital by reducing risk and cost. Infrastructure projects can face high risk premia and these can be even higher for sustainable infrastructure projects and investments employing new technologies. MDBs in particular are well-positioned to leverage private finance by extending risk mitigation guarantees, such as partial risk and credit guarantees. However, the use of these instruments to date has been well below potential.

International Bank for Reconstruction and Development (IBRD) guarantees outstanding in mid-2015 amounted to only \$1.4 billion, compared to outstanding IBRD loans of \$155 billion [IBRD, 2015]. Of the total climate finance provided by MDBs in 2014, only 5% was in the form of guarantees [MDBs, 2015c]. This is notwithstanding evidence showing that guarantees can leverage multiples in private capital for every dollar committed. On 28 World Bank guarantee operations, the estimated leverage ratio was as high as 8.6 [World Bank, 2010]. There is potentially a high payoff to current MDB efforts to devise better and more replicable models that can be used to scale up the use of risk mitigation instruments.

### *(d) Expanding Use of Loan Syndications and Pooling Vehicles*

MDBs and, where applicable, national development banks can also catalyze more private capital for infrastructure through increasing syndication of loans with commercial banks and other financial institutions. Syndications attract private capital by reducing risk and transaction costs and increasing investment optionality. They can be a powerful means for development banks to increase leverage; based on experience, MDBs can mobilize from other sources as much as 4–5 times the size of their own investment. Development banks can also securitize a selection of their loans and offer them to other investors, thereby helping to develop a secondary market for infrastructure-related securities and recycling their own scarce capital.

More use can be made of MDB-supported pooling vehicles or coinvestment platforms to crowd in private capital and promote PPPs [Arezki, Bolton, Peters et al., 2016]. These vehicles help catalyze private capital by reducing individual investor costs

for project preparation and execution, strengthening project pipelines, facilitating joint financing, providing credit enhancements and allowing risks to be shared. The Global Infrastructure Facility and Climate Investment Funds administered by the World Bank and the Equity Participation Fund managed by the European Bank for Reconstruction and Development (EBRD) are examples.

*(e) Blending Concessional and Private Capital to Finance Sustainability Premiums*

Low-carbon, sustainable investments often entail higher upfront costs while their benefits materialize much later in the project cycle. Lower-cost official financing could be used to attract private capital by financing the upfront cost premiums associated with making traditional infrastructure projects sustainable. Given the positive externalities from these investments, there is a good case for using concessional finance. Such development capital could come from multilateral, bilateral or national sources and would be a good use of some of the climate funds flowing from the Paris Agreement.

Funding models incorporating project costs and benefits over their entire life cycle are in use in advanced economies, especially in energy efficiency projects in which downstream energy efficiency gains are used to repay the upfront investment in capital improvements. Development capital can be used to pilot this model in developing countries, especially middle-income countries. Allocating \$10–15 billion of development capital a year to finance sustainability premiums for energy efficiency could catalyze \$118–176 billion a year of investment in energy efficient infrastructure [Bielenberg, Kerlin, Oppenheim et al., 2016]. The impact would be greater if the model is extended beyond energy efficiency to other sectors, such as water and waste.

## Role of the G20 and the BRICS

Much of the policy agenda set out above is the responsibility of national authorities. But there is an important role for international cooperation through collective actions, coordination of policies, peer learning and technical and financial support. The SDGs and the Paris Agreement on climate change have produced favorable momentum for scaling up action on infrastructure that boosts growth and development and also protects the climate. The G20, as a “premier forum for international economic cooperation” occupying a central place in today’s institutional framework for global governance, can play a lead role in delivering this agenda. The G20 leaders’ process can be particularly helpful in developing and coordinating political support among major countries on the interconnected agenda of infrastructure development and climate sustainability that is challenging in its scale and transformational nature.

The G20 accounts for more than three quarters of global investment in infrastructure. It also accounts for a similar proportion of global GHG emissions. Infrastructure is the largest single source of these emissions. How successful the world is in scaling up

infrastructure investment to the levels needed and doing so in environmentally sustainable ways will therefore depend crucially on the G20's success in implementing the related policy agenda within the group. The G20's actions will also play an important role in facilitating success in other countries by setting good examples and by strengthening the policy, financial and institutional framework for global cooperation.

Currently there are several G20 work streams and initiatives that cover key aspects of the infrastructure agenda and that are at different stages of progress. A concrete, coordinated G20 boost in infrastructure investment, which could be particularly useful in the current context of weak global growth, has so far been lacking. But the ongoing work is certainly helping to improve the enabling environment for infrastructure investment in the medium term, both for G20 members and for the world at large. This includes work on project preparation facilities, frameworks for public-private partnerships, long-term financing and local capital market development, and financial innovation and diversification of financial instruments for infrastructure, especially to tap institutional investors [G20, 2013; G20-DWG, 2014; OECD, 2015a/d/e]. Recent initiatives to strengthen coordinating mechanisms include the Global Infrastructure Hub and the Global Infrastructure Connectivity Alliance [G20, 2016; G20, 2014]. There is also important ongoing work on climate sustainability issues covering energy, fossil-fuel subsidies and climate finance.

Besides these efforts focused on specific, discrete elements of the agenda, the G20 has been working on developing overall country growth and investment strategies, which include infrastructure investment as an important component. These strategies provide useful vehicles for integrating the various elements of the agenda to achieve desired objectives. Boosting economic growth has been the major focus of these strategies and the infrastructure agenda is addressed in these strategies primarily as a driver of growth [OECD, 2015b]. Infrastructure's important links to climate sustainability are not as well addressed. The G20 can provide leadership in developing clear and coherent strategies for sustainable infrastructure as part of overall strategies for strong and sustainable growth, including achievement of countries' Intended Nationally Determined Contributions to climate goals envisaged in the Paris Agreement.

The G20 can also provide stronger leadership on the reform of fossil-fuel subsidies and the pricing of carbon emissions, which are crucial to shifting future investment toward sustainable forms of infrastructure and which can also have sizable fiscal benefits. Fossil-fuel subsidy reform has made progress in the G20 but has not yet produced concrete commitments to eliminate these subsidies – unlike the G7 that, at its summit in 2016, pledged to end these subsidies by 2025. The G20 can also lead by example in furthering progress on carbon pricing by taking stronger actions at the national level, and can help broader reform by providing a focused platform to address and provide guidance on technical and economic cooperation/coordination aspects of reform – complementing UN processes.

The G20 has played a useful role in providing a forum for coordinating a stronger MDB response to the infrastructure challenge [MDBs, 2015b]. For developing and

emerging economies, MDBs in particular will be key partners in building capacities and providing and catalyzing financing. The G20 processes have been instrumental in promoting action to bolster the capacities of these institutions, strengthen the focus on key elements of the infrastructure agenda, and spur innovations to optimize their balance sheets and enhance the catalytic impact of their financing. Encouraged by the G20, and as part of the agenda for the G20 2016 summit in Hangzhou, the MDBs produced a joint declaration on their plans to step up support to infrastructure investment [MDBs, 2016b].

The BRICS grouping adds an important pillar of emerging economy leadership and mutual cooperation to global economic governance. Its role in the infrastructure agenda is particularly important, since a large part of growth in infrastructure demand will be located in member countries of the group. China alone spends more on infrastructure than North America and Western Europe combined [McKinsey, 2016]. The BRICS countries together account for close to half of infrastructure investment globally. The BRICs grouping gives added impetus to the infrastructure agenda, both through its own work that features infrastructure prominently and through its strong voice on infrastructure issues in the G20 and other multilateral fora.

The New Development Bank and the Asian Infrastructure Investment Bank, two new international financial institutions established at the initiative of the BRICS countries, have a primary focus on supporting infrastructure investment. These institutions can strengthen the multilateral framework to address the global infrastructure challenge, adding valuable capacity to meet large investment requirements. Cooperation between the new institutions and existing MDBs will be important for collective effectiveness, including ensuring consistency of approaches to achieve infrastructure outcomes that not only are quantitatively at scale but are also qualitatively sound and environmentally sustainable.

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# Глобальный вызов развития инфраструктуры и роль «Группы двадцати» и БРИКС<sup>1</sup>

## 3. Куреши

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*Инфраструктура, экономический рост и развитие и экологическая устойчивость тесно связаны между собой. В течение следующих 15 лет для достижения глобальных целей роста и развития необходимо более чем в 2 раза увеличить инвестиции в инфраструктуру в сравнении с текущим уровнем. Это эквивалентно повышению инвестиций в инфраструктуру до более чем 6 трлн долл. США в год. Развитие энергетики, транспорта и городов является основной инфраструктурной потребностью. Три четверти дополнительных инвестиционных потребностей в инфраструктуре приходится на страны с формирующимся рынком и развивающиеся страны. Создание новой инфраструктуры на основе устойчивых подходов может оказать решающее влияние в процессе борьбы с изменением климата.*

*Программа необходимых действий включает в себя важные преобразования в способах развития и финансирования инфраструктуры. Она включает повышение инвестиций государственного и частного секторов и усиление роли механизмов государственно-частного партнерства; реформирование механизмов для направления новых инвестиций на создание эффективной и устойчивой инфраструктуры; укрепление институтов для обеспечения обоснованности и качества инвестиций; стимулирование инноваций в технологии в области инфраструктуры для более эффективного учета климатических рисков и вопросов устойчивости в условиях государственного и частного финансирования. Ведущая роль государства должна сочетаться с новыми способами привлечения частного финансирования, особенно со стороны институциональных инвесторов. Более половины дополнительных инвестиций необходимо будет привлечь из частного сектора.*

*Хотя реализация большей части этих мер является обязанностью национальных правительств, действия на национальном уровне должны быть поддержаны усилением международного сотрудничества на основе коллективных действий, обмена опытом, а также технической и финансовой поддержки. «Группа двадцати» и БРИКС играют важную роль в этих усилиях, как за счет успешных индивидуальных и согласованных коллективных действий в рамках самих институтов, так и в более широком плане на основе создания соответствующих политических, финансовых и институциональных условий для глобального сотрудничества.*

Ключевые слова: инфраструктура; устойчивость; инвестиции; финансы; «Группа двадцати»; БРИКС

Для цитирования: Куреши З. Глобальный вызов развития инфраструктуры и роль «Группы двадцати» и БРИКС // Вестник международных организаций. 2017. Т. 12. № 2. С. 164–193. DOI: 10.17323/1996-7845-2017-02-164

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<sup>1</sup> Статья поступила в редакцию в январе 2016 г.

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