



Asia-Pacific
Economic Cooperation

Advancing Free Trade
for Asia-Pacific Prosperity



APEC Economic Policy Report 2018

Structural Reform and Infrastructure



**Asia-Pacific
Economic Cooperation**

**APEC ECONOMIC POLICY
REPORT 2018
Structural Reform and Infrastructure**

APEC Economic Committee

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PREFACE

The 2017 APEC Leaders' Statement highlighted the importance of structural reform for balanced, sustainable, innovative and inclusive growth, and instructed economic and finance officials to work jointly on the 2018 APEC Economic Policy Report (AEPR) on *Structural Reform and Infrastructure*. This year's AEPR is, for the first time, a collaborative effort of the Economic Committee (EC) and Senior Finance Officials under the Finance Ministers' Process (FMP).

The 2018 AEPR makes the case that ensuring quality infrastructure requires an integrated, interlinked approach across a range of policy areas. This integrated approach entails sound public sector and fiscal management as well as structural policies to facilitate private sector involvement and competition and mitigate the social and environmental impacts of infrastructure development.

Infrastructure development is imperative for sustainable economic growth and regional connectivity, but also to efforts to promote public welfare and ensure that the benefits of growth are widely shared. The Global Infrastructure Hub estimates that the APEC region's infrastructure needs will increase to USD 2 trillion per year in 2020–2025, with high needs for transport, telecommunications and energy.* Meeting this challenge will require creative solutions that draw on both public and private sector financing, and cross-APEC efforts involving the EC's structural reform agenda and the FMP's 2018 priority area of accelerating infrastructure development and financing.

Member economies contributed to the 2018 AEPR through the Individual Economy Report questionnaires and by serving on the core team responsible for preparing the report. Several economies provided pertinent case studies or suggestions to improve the report. We thank the APEC Business Advisory Council for providing the report on digital infrastructure. We also thank the Organisation for Economic Co-operation and Development (OECD) for its contribution, including providing boxes and peer reviewing the report.

Australia and New Zealand have generously provided the funding for this year's report. We would particularly like to express our gratitude to New Zealand for leading the core team, and to the core team members from: Australia; Canada; China; Indonesia; Japan; Mexico; Papua New Guinea; the Philippines; Thailand; the United States; and Viet Nam. We also thank the APEC Secretariat for its valuable advice and the APEC Policy Support Unit, which did an excellent job of managing the overall production of the report, including the drafting of Part 1. Finally, we thank the consultancy, Castalia Strategic Advisors, for their input into Part 2.

We sincerely hope that the information and recommendations in the 2018 AEPR will help APEC economies to meet their infrastructure challenges and galvanize collaborative APEC work in this area in the coming years.

Robert Logie
Chair, APEC Economic Committee

Andrew Oaeko
Chair, Finance Minister's Process

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LIST OF ABBREVIATIONS

ABAC	APEC Business Advisory Council
AEPR	APEC Economic Policy Report
APEC	Asia-Pacific Economic Cooperation
CFE	Comisión Federal de Electricidad (Federal Electricity Commission), Mexico
FCC	Federal Communications Commission, USA
FDI	Foreign Direct Investment
GDP	Gross domestic product
GFCF	Gross fixed capital formation
GHG	Greenhouse gas
ICT	Information and communications technology
IER	Individual Economy Report
IMF	International Monetary Fund
ISP	Internet service provider
MSME	Micro, small and medium enterprise
OECD	Organisation for Economic Co-operation and Development
PEMEX	Petróleos Mexicanos, Mexico
PPP	Public–private partnership
PSU	Policy Support Unit (APEC)
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
WTO	World Trade Organization

EXECUTIVE SUMMARY

In the 2017 APEC Leaders' Statement, the importance of quality infrastructure for sustainable economic growth and prosperity was recognized and the leaders pledged to promote infrastructure development in terms of both quantity and quality. This recognized that infrastructure supports prosperity both through supporting economic growth (e.g., through improving productivity and facilitating the movement of goods and people and thereby trade) and through improving other aspects of welfare (e.g., the delivery of essential services such as health and sanitation). Infrastructure can also support inclusive growth by contributing toward poverty reduction and connecting remote regions.

The 2018 APEC Economic Policy Report (AEPR) is on the topic of 'structural reform and infrastructure' and represents a collaboration between the APEC Economic Committee and the Finance Ministers' Process. The main report consists of two parts:

- Part 1 discusses infrastructure needs in the APEC region, the relationship between infrastructure and economic growth, the infrastructure challenges faced by APEC economies and the role of APEC in promoting structural reform for infrastructure.
- Part 2 discusses structural policy settings and reforms, drawing on case studies from member economies.

The annexes to the report present the case studies and Individual Economy Reports submitted by member economies. The APEC Business Advisory Council (ABAC) has also provided a companion report on digital infrastructure. The ABAC report highlights that providing adequate digital infrastructure is important for participation in the digital economy and identifies seven key conclusions relating to digital infrastructure.

The key messages from this report are as follows:

Part 1: Infrastructure Needs and the Impact of Investment in Physical and Digital Infrastructure on Growth and Connectivity

APEC economies identified a number of drivers of infrastructure needs, including: population growth; aging populations; transport and connectivity needs; the rise of digital infrastructure; the need to ensure crisis-ready infrastructure and the need to renew aging infrastructure. Many APEC economies face significant infrastructure financing gaps, estimated to range from USD 7.5 million to USD 102 billion. Given these gaps, the APEC region is expected to dominate the infrastructure investment market over the coming years, with China; Russia; and the United States estimated to have the largest infrastructure financing gaps.*

Public investment in infrastructure is traditionally important and will remain so going forward. One estimate suggests that 75 per cent of global infrastructure assets are publicly owned. There is evidence that the efficiency of public investment can be further improved to maximize the financial return as well as to strengthen the broader impact of infrastructure on economic and social development.

However, given the size of the infrastructure financing gaps, mobilization of private finance for infrastructure will be necessary for many APEC economies. To facilitate private sector investment, APEC economies have been active in undertaking reforms to legal frameworks and government procurement practices.

Aside from investing in infrastructure, governments also play an important role with regard to infrastructure as the regulator. This role arises for a number of reasons, including: infrastructure assets are often natural monopolies; infrastructure provision often gives rise to negative

spillovers such as environmental degradation or social impacts; technological change requires regulatory systems to be adaptive; and structural policy can help to ensure assets and entities maintain sufficient levels of resilience such that economies can absorb and adapt to shocks and climate change. APEC economies continue to engage in a range of structural reform policies with respect to infrastructure, including deregulating network industries, adapting regulatory systems in light of technological change and reforming institutions such as state-owned enterprises and infrastructure funding models.

Part 2: Structural Policies to Enable the Efficient Provision and Management of Infrastructure

Taking into account the considerations from Part 1, this report finds nine key outcomes that are important to promoting quality infrastructure and discusses a number of policies in relation to these outcomes. The range of policy considerations demonstrates that developing quality infrastructure to support inclusive growth requires a mix of structural policies and an integrated, interlinked approach across many policy areas. The outcomes highlighted in this report are outlined below:

- **Sound infrastructure governance and project prioritization processes** are necessary to ensure resources are allocated to initiatives with the highest value or return. Elements of governance and prioritization processes discussed include: the use of standardized investment assessments, adequate independence between assessment and operational functions, the use of long-term plans, and funding models that strike the right balance between efficiency and social objectives.
- **Fiscal sustainability** is important to ensure economies can manage risks holistically and over the long term. This is supported through the effective identification of risks and contingent liabilities, adequate fiscal buffers and insurance, and adequate *ex-post* monitoring of procurement processes.
- **The reliable operation and management of infrastructure** over its life-cycle, and sound procurement, is important to ensure asset quality and minimize costs. This can be supported by the use of governance standards such as procurement, data and asset management standards.
- **Ensuring institutional arrangements allow for private sector involvement and competition where possible** can improve affordability and efficiency and reduce fiscal burdens. Governments have implemented a range of policies to support competition, such as unbundling competitive and non-competitive elements of services; introducing open procurement processes; and reducing red tape. However, several infrastructure sectors are typically natural monopolies and hence government regulation is necessary to ensure consumers are charged prices that reflect costs for a given service level.
- **Providing an institutional environment that supports private sector financing** for infrastructure. Private sector financing can assist in filling the infrastructure financing gaps faced by APEC economies. Governments can take several steps to attract greater private sector financing, which includes: ensuring the institutional environment is stable and predictable, ensuring the legal environment supports the use of a diversity of funding vehicles as well as ensuring adequate project preparation and evaluation.
- **Institutional settings promote and adapt to technological change.** Technological change brings with it benefits to productivity and wellbeing, but regulatory systems need to be adaptable to allow change. New technology can bring widespread social

benefits, which may justify government support where financial returns are lower than net social benefits.

- **Infrastructure decisions are aligned with economic and development objectives.** Infrastructure investments can assist governments in meeting broader social goals, such as poverty reduction. In making investment decisions, the social impacts of investments should be taken into account. At times there can be a trade-off between efficiency-based funding models and social goals. Governments can use policy overlays, such as subsidies, to help address social goals.
- **The social and environmental impacts of infrastructure are appropriately mitigated.** While infrastructure provides social benefits, it may also have negative impacts on the environment and communities, and these need to be appropriately considered during decision making. Structural policies such as responsible business conduct standards, environmental standards and community consultation requirements can assist in ensuring costs are appropriately mitigated.
- **Resilience considerations are incorporated into decision making.** Resilience refers to the ability of a system to adapt to a shock and should consider adapting to slow-moving risks such as those arising from climate change and security risks. Ensuring a system as a whole is resilient requires the consideration of a range of factors in addition to the robustness of a particular asset, such as sufficient access to infrastructure in the event of a shock, community preparedness and adequate financial strength.

These outcomes closely align with the G7 Ise-Shima Principles for Promoting Quality Infrastructure Investment. A major element of an adequate policy approach is to consider all these elements in a strategic, interconnected and coordinated way.

Moving forward, member economies envisage a number of areas where APEC could continue to play a role with regard to structural reform and infrastructure, including: (1) expanding or deepening APEC's role in sharing knowledge and best practices; working with the private sector; and promoting homogenization of standards; and (2) strengthening capacity-building initiatives to improve institutional capacity relevant for the region.

Furthermore, this report notes that cross-fora and international collaboration on infrastructure has been beneficial and should continue as it allows resources and expertise to be pooled together.

INTRODUCTION

In the 2017 APEC Leaders' Statement, the importance of quality infrastructure for sustainable economic growth was highlighted and the leaders pledged to promote infrastructure in terms of both quantity and quality through adequate investment and strengthened public–private partnerships (PPPs). The leaders also encouraged further collaboration and synergies among the various connectivity initiatives as well as work that advances economic development and integration of sub-regional, rural and remote areas in the region. These efforts include the development of safe, secure, resilient, efficient, affordable and sustainable transportation systems.

The 2018 APEC Economic Policy Report (AEPR) on *Structural Reform and Infrastructure* builds on this work. It includes the following parts:

- **Part 1** presents a discussion of infrastructure needs in the APEC region and the impact of investment in physical and digital infrastructure on economic growth, connectivity and social inclusion, including a summary of key points from Individual Economy Report (IER) questionnaires. Section 1.8.2 provides a stock-take of existing APEC work on infrastructure.
- **Part 2** presents a discussion of structural reforms and infrastructure, drawing on case studies provided by individual economies. The discussion is organized under four headings:
 - Delivering value for money and quality infrastructure
 - Improving the efficiency of outcomes in infrastructure and related markets
 - Promoting inclusive growth, environmental sustainability and resiliency
 - Policy conclusions and way forward.
- **Annex 1** presents case studies provided by APEC economies.
- **Annex 2** presents the IER questionnaires completed by APEC economies.

The APEC Business Advisory Council (ABAC) has provided a companion report on structural reform and digital infrastructure.

This report aligns closely with the G7 Ise-Shima Principles for Promoting Quality Infrastructure Investment (see Section 2.1).

This report represents a collaboration between the APEC Economic Committee and the Finance Ministers' Process. Collaboration across APEC fora continues to deliver high-quality products and processes to promote best practice policies to support high-quality investment in the right infrastructure. Accelerating Infrastructure Development and Financing is one of the priority areas for the Finance Ministers' Process. Activities under this priority include: organizing a policy seminar on planning, financing and delivering quality infrastructure; developing a capacity-building package on Effective Approaches to Financing Infrastructure in APEC Economies; and exploring ways to encourage the expansion of a pipeline of 'bankable' infrastructure projects in APEC economies. The Economic Committee supports APEC's structural reform agenda, which emphasizes the three pillars of: (1) more open, well-functioning, transparent and competitive markets; (2) deeper participation in those markets by all segments of society; and (3) sustainable social policies. Continued collaboration between the Economic Committee and the Finance Ministers' Process on structural reform and infrastructure can assist in meeting joint goals across the fora.

PART 1: INFRASTRUCTURE NEEDS AND THE IMPACT OF INVESTMENT IN PHYSICAL AND DIGITAL INFRASTRUCTURE ON GROWTH AND CONNECTIVITY

Part 1 discusses infrastructure needs and financing within APEC economies, the impact of infrastructure on inclusive growth and summarizes key points from the IERs that were submitted by member economies during the development of the AEPR. It also provides a stock-take of work already undertaken by APEC on infrastructure.

1.1 INFRASTRUCTURE DEVELOPMENT IN THE APEC REGION

The term ‘infrastructure’ could broadly mean the following facilities:¹

- **Transport:** roads; rail systems; airports; harbors and ports
- **Power and energy:** electrical generation units; natural gas and petroleum pipelines and distribution centers; smart transport grids
- **Water and sewage:** canals and irrigation systems; water pipelines; sewage pipelines
- **Telecom:** landline telephone systems; landline cable and broadband systems
- **Social:** public housing; schools; hospitals.

These infrastructure facilities provide essential services to the public to support economic and social activity. In addition, these assets are often distinguished from others based on key characteristics such as requiring large initial capital outlays, involving long-term contracts, being monopolistic and exhibiting regulatory dependency.² Such investments are important: without adequate transport infrastructure, business and logistics services will be affected; lack of water and sanitation facilities could create health hazards and affect the quality of life of many citizens; and lack of telecommunications may impede the development of inclusive digital economies. Conversely, the presence of extensive road networks, vibrant ports and adequate telecommunications systems strengthens economic competitiveness, inclusiveness and connectivity as well as increases the attractiveness of a business location to investors.

Building infrastructure facilities involves many strategic and long-term considerations given its unique characteristics of being long term, capital intensive and involving high sunk costs. Long-lived assets pose time inconsistency problems, require maintenance over their lifetime and give rise to risk management issues.

Traditionally, governments are the largest provider of infrastructure facilities. This arises as many key infrastructure assets have characteristics of public or essential goods and services, such as infrastructure required for transportation, electricity transmission, health and clean water, and because in many cases social returns exceed private returns (as infrastructure creates positive externalities). Ingo Walter estimates that among global infrastructure assets, 75 per cent are owned by the government while only 25 per cent are privately owned.³ While private

¹ Ingo Walter, ed., *The Infrastructure Finance Challenge* (Cambridge, UK: Open Book Publishers, 2016).

² EY, “Infrastructure Investments: An Attractive Option to Help Deliver a Prosperous and Sustainable Economy” (EYGM Limited, 2015), [https://www.ey.com/Publication/vwLUAssets/EY-infrastructure-investments-for-insurers/\\$FILE/EY-infrastructure-investments-for-insurers.pdf](https://www.ey.com/Publication/vwLUAssets/EY-infrastructure-investments-for-insurers/$FILE/EY-infrastructure-investments-for-insurers.pdf).

³ Ibid.

involvement in infrastructure development and investment has soared since the 1990s, governments will continue to play a large and pivotal role going forward.

The decisions governments make regarding infrastructure investment have implications for economic and social development goals. Furthermore, the role of governments within the infrastructure sector as regulator is vital. This role includes initiating structural reforms to encourage and boost competition, reducing the regulatory burden within key industries (e.g., energy and transportation), regulating sectors that remain natural monopolies, encouraging innovation and setting minimum standards (e.g., environmental standards).

The private sector also has a key role in infrastructure provision and management. The United Nations Development Programme (UNDP) asserts that efficiency does not depend on a certain type of ownership (public, private or mixed); the efficiency of service provision under all ownership models depends on factors such as competition, regulation, autonomy in recruitment and salary as well as wider financial and legal institutional development.⁴ However, private provision of services can in some cases improve performance and management capability.⁵ This is especially so in circumstances where the average return on assets for government enterprises is lower than their private sector counterparts, for example, where government enterprises are constrained by multiple, unclear or conflicting financial and social objectives.⁶

In short, infrastructure touches on a range of government policy areas and an integrated, interlinked approach is needed across policy areas to ensure infrastructure investment does indeed best support public wellbeing in a comprehensive manner.

1.2 INFRASTRUCTURE GAPS WITHIN APEC

Based on projections by the Organisation for Economic Co-operation and Development (OECD), between 2016 and 2030, global infrastructure needs for energy, transport, water and telecommunications will total USD 95 trillion. This equates to approximately USD 6.3 trillion per annum should climate concerns not be taken into account.⁷ Asia is expected to dominate the infrastructure market in the future given that it is projected to account for 54 per cent of global infrastructure investment by 2040. It is interesting to note that three of the four economies expected to contribute to a large proportion of the investment needed are APEC economies; specifically, China; Japan; and the United States.⁸

For the APEC region, the Global Infrastructure Hub estimates that investment needs have, on average, reached USD 1.3 trillion per annum for the period 2010–2015 (Figure 1.1). The figures are expected to increase by 56 per cent to an average of USD 2 trillion per annum in

⁴ Global Centre for Public Service Excellence (GCPSE), *Is the Private Sector More Efficient? A Cautionary Tale* (Singapore: GCPSE, 2015), [http://www.undp.org/content/dam/undp/library/capacity-development/English/Singapore Centre/GCPSE_Efficiency.pdf](http://www.undp.org/content/dam/undp/library/capacity-development/English/Singapore%20Centre/GCPSE_Efficiency.pdf).

⁵ Theodore Panayotou, “The Role of the Private Sector in Sustainable Infrastructure Development”, *Yale F&ES Bulletin (Bridges to Sustainability: Business and Government)*, no. 101 (1997): 46–69, <https://environment.yale.edu/publication-series/documents/downloads/0-9/101panayotou.pdf>.

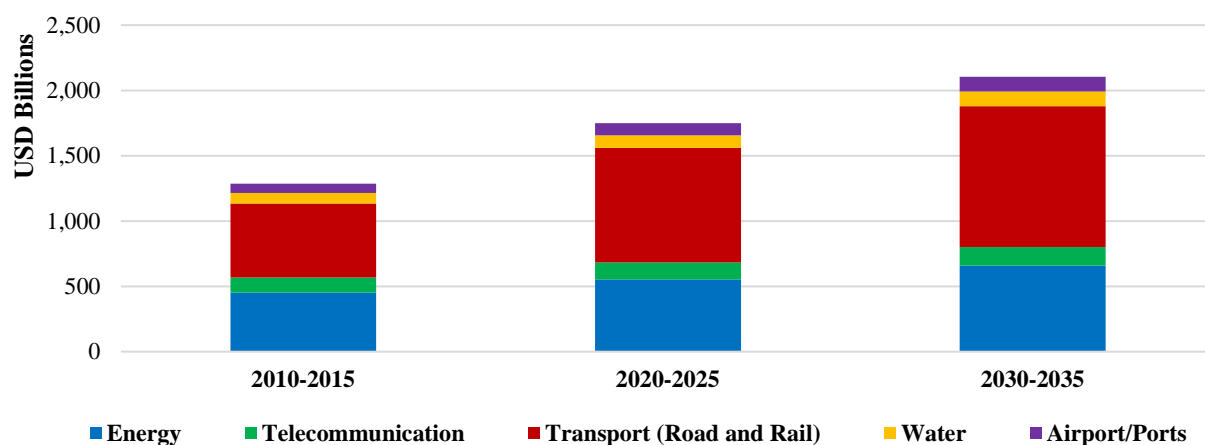
⁶ Arief Budiman, Diaan-Yi Lin and Seelan Singham, “Improving Performance at State-owned Enterprises”, McKinsey & Company, May 2009, <https://www.mckinsey.com/industries/public-sector/our-insights/improving-performance-at-state-owned-enterprises>.

⁷ Organisation for Economic Co-operation and Development (OECD), *Investing in Climate, Investing in Growth* (Paris: OECD Publishing, 2017), <http://dx.doi.org/10.1787/9789264273528-en>.

⁸ Global Infrastructure Hub and Oxford Economics, *Global Infrastructure Outlook*, accessed 6 June 2018, <https://www.outlook.gihub.org/>.

2020–2025.* In addition, the Global Infrastructure Hub predicts the largest investment needs to be in transport (road and rail), followed by energy and telecommunication.

Figure 1.1: APEC infrastructure needs, 2010–2035

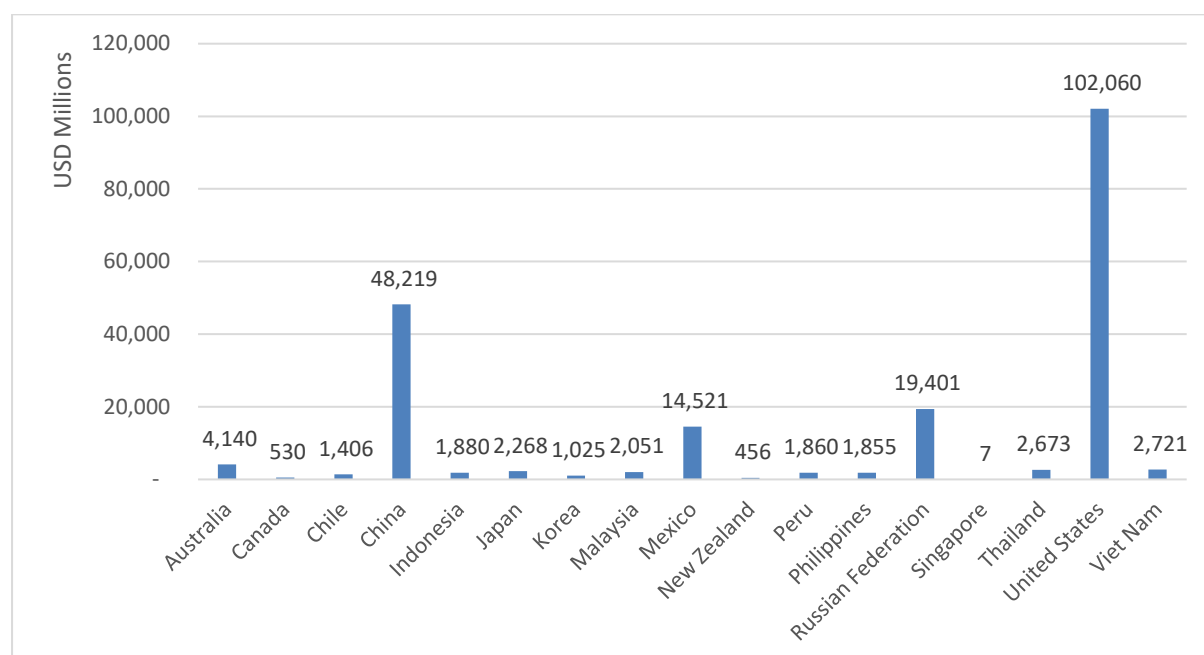


Note: Data from 17 economies were available.

Source: Global Infrastructure Hub – *Global Infrastructure Outlook*.

Figure 1.2 illustrates total infrastructure gap for the APEC region (energy, telecommunications, road transport, rail transport, water and airport/ports) at the economy level. Within APEC, the infrastructure gap is widespread, ranging from a low of USD 7.5 million (Singapore) right up to highs of USD 48 billion (China) and USD 102 billion (United States).*

Figure 1.2: Infrastructure gap within APEC economies in 2017*



Source: Global Infrastructure Hub – *Global Infrastructure Outlook*.

The infrastructure gap highlighted above represents untapped growth opportunities that have limited the development of economies. Additionally, underinvestment can lead to lower or deteriorating infrastructure quality, thereby affecting the quality of life and welfare of many as

a result of unproductive time spent in traffic jams, bottlenecks, days spent ill due to inaccessible health services, or disrupted work due to frequent blackouts, among others.⁹

For the case of digital infrastructure investment, the World Investment Report 2018 by the United Nations Conference on Trade and Development (UNCTAD) explained that infrastructure investments for digital development include major long-term investments in four layers of connectivity:¹⁰

- **International connectivity:** through fiber-optic cables (including submarine cables and terrestrial cables) to connect an economy or region to the global Internet
- **Economy-wide connectivity** ('backbone'): typically, through fiber-optic cables, used to connect points within an economy and by Internet service providers (ISPs) to access international capacity; also used to connect among operators
- **Metro connectivity:** used within a city to connect operators to each other and to connect larger customers directly
- **Last-mile connectivity:** used by ISPs to reach end users, often through wireless connections provided by mobile operators; also, through fixed connections using copper, fiber or coaxial cables.

The UNCTAD report estimates that the total investment required to build universal basic 3G coverage could be approximately USD 95 billion in developing and transition economies and USD 36 billion for less developed economies (LDEs).

Through the IERs, a few member economies provided estimates on their individual financing gaps. While there are no official estimates for Peru's infrastructure gap, one study estimated the gap to be USD 159 billion for the period 2016 to 2025, and another estimated the gap to be USD 200 billion to 2062. In the case of Canada, the infrastructure gap in the economy is estimated to range from CAD 150 billion to CAD 1 trillion (around USD 115 billion to USD 767.5 billion¹¹) in 2016.¹² Indonesia has infrastructure projects listed under its National Strategic Project valued at IDR 4,796 trillion (USD 331 billion), for which it plans to get 41 per cent financing from the government budget, 22 per cent from state-owned enterprises and 37 per cent from the private sector. Similarly, China notes the significant discrepancy between the demand for infrastructure within its economy and the financial capacity of its local governments.

Apart from impeding growth, infrastructure deficits have affected business operations at the firm level. Table 1.1 shows the proportion of firms in the world that have identified infrastructure availability as an impediment to business operations. Electricity service emerges at the top of the list, followed by transportation and water. The table also shows significant improvements made by the electricity and water sector, but less so for transportation in low-income and developing economies. Infrastructure deficits seem to be less of a concern for advanced economies compared to emerging markets and low-income developing economies. However, some advanced economies have shown signs of aging infrastructure in which

⁹ Hugh Mackenzie, "Canada's Infrastructure Gap: Where It Came from and Why It Will Cost So Much to Close" (Ottawa: Canadian Centre for Policy Alternatives, 2013).

¹⁰ United Nations Conference on Trade and Development (UNCTAD), *World Investment Report 2018: Investment and New Industrial Policies* (Geneva: United Nations Publication, 2018).

¹¹ Based on the current USD exchange rate. From this point onwards, for simplicity, current USD exchange rate will be used.

¹² Advisory Council on Economic Growth, "Unleashing Productivity through Infrastructure" (Ottawa: Government of Canada, 2016), 4, <https://www.budget.gc.ca/aceg-ccce/pdf/infrastructure-eng.pdf>.

insufficient maintenance and investment are affecting the quality of the existing infrastructure stock.¹³

Similarly, PwC conducted a survey in 2012 and 2014 that noted that comparing the APEC region over time saw bottlenecks across a range of sectors narrowing, but not as fast as businesses would have hoped (Figure 1.3).

Table 1.1: Infrastructure and economic activity

Economy	AE (Advanced Economy)	EM (Emerging Market)	LIDE (Low-Income Developing Economy)
Percent of firms:^a			
Identifying electricity as a major constraint	14.6	26.3	39.3
Experiencing water insufficiencies	4.6	12.8	22.1
Identifying transportation as a major constraint	9.2	15.0	22.1
Number of economies surveyed	33	165	114
Change in the per cent of firms:^b			
Identifying electricity as a major constraint	-7.2	-10.5	-9.4
Experiencing water insufficiencies	-2.7	-2.3	-5.4
Identifying transportation as a major constraint	-6.7	-2.5	-0.1
Number of survey pairs	6	48	41

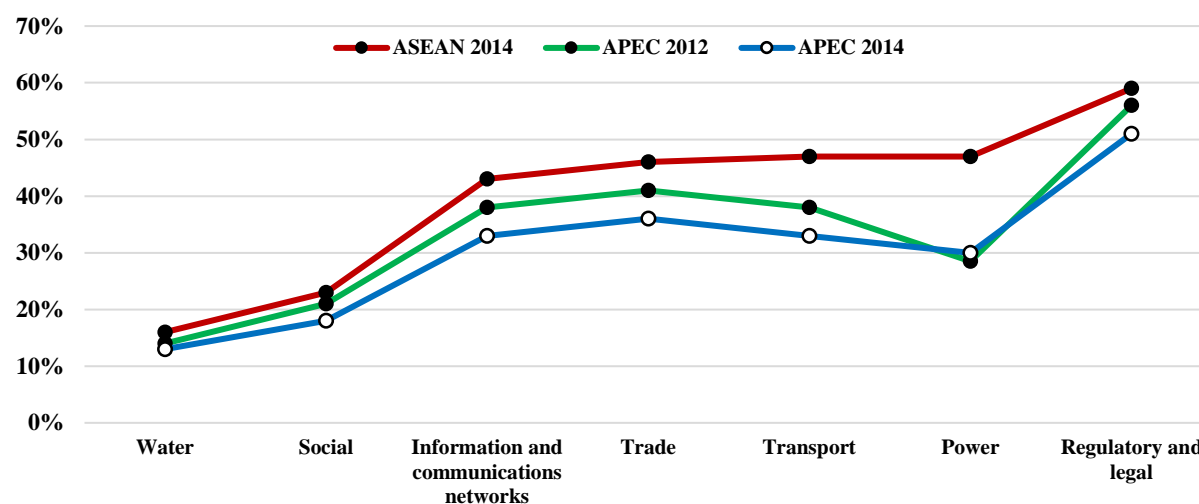
Notes:

^a Surveys evaluated were carried out between 2006 and 2016.

^b Reports changes between the most recent survey and the first one, starting in 2006.

Source: Daniel Gurara, Vladimir Klyuev, Nkunde Mwase, Andrea Presbitero, Xin Cindy Xu and Geoffrey J. Bannister, “Trends and Challenges in Infrastructure Investment in Low-Income Developing Countries” (IMF Working Papers, no. 17(233), 2017), <https://www.imf.org/en/Publications/WP/Issues/2017/11/07/Trends-and-Challenges-in-Infrastructure-Investment-in-Low-Income-Developing-Countries-45339>.

Figure 1.3: Infrastructure bottlenecks in the Asia-Pacific



Source: PwC, “Infrastructure Development in Asia Pacific (APEC): The Next 10 Years” (PwC, 2014), <https://www.pwc.com/gx/en/industries/capital-projects-infrastructure/publications.html>.

¹³ David Egan, “Perspectives on Public Infrastructure Investment” (presentation, 18 November 2015), http://www.fmi.ca/media/765234/2015-11-18_PwCPublicInfraInvest.pdf; Nicklas Garemo, Martin Hjerpe and Jan Mischke, “The Infrastructure Conundrum: Improving Productivity”, McKinsey & Company, July 2015, <https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/the-infrastructure-conundrum-improving-productivity>.

1.3 HIGHLIGHTS FROM INDIVIDUAL ECONOMY REPORTS: INFRASTRUCTURE NEEDS

Member economies provided information on their key priorities and the drivers of infrastructure needs at the individual economy level, some of which have been highlighted as follows.

Population growth and aging population

High population growth and an aging population have been cited as key drivers toward developing transportation infrastructure and facilities. Population growth, pollution and demand for better services especially in health and education have been identified as issues affecting the future infrastructure needs of economies. While population growth is highlighted as an issue for some economies, declining birth rates is the trend for others. With these trends, the application of universal design (e.g., to increase accessibility for and support longer civic participation among seniors) into infrastructure projects will be important for economies facing an aging population, as mentioned by Canada. Similarly, Japan has implemented an act to allow integration of the universal design concept of accessibility into its infrastructure.

Transportation or connectivity needs

Transportation or connectivity needs, such as roads, highways to connect rural/remote areas, metros and airports, and energy infrastructure and facilities, were common priorities. For instance, China has highlighted needs such as infrastructure scarcity within remote areas and the uneven infrastructure levels among different regions. In response, it has implemented the ‘ten in the lengthwise and ten in the transverse’ initiative to increase transportation convenience for individuals. Similarly, Indonesia, having identified such gaps, has increased its budget allocation for infrastructure from IDR 177.9 trillion in 2014 to IDR 410 trillion in 2018 (from approximately USD 12 billion to USD 28.5 billion) to invest in connectivity and energy infrastructure, which has been facilitated by infrastructure provisions through PPP schemes. Malaysia is currently building an integrated needs-based transport system to enhance connectivity across transport modes and regions. It has also made efforts to improve the safety, efficiency and service levels of transport operations through measures such as road safety audits.

Russia has allocated RUB 77.5 trillion (approximately USD 123 billion) to the complex development of transportation in the next four years through the implementation of a federal program (Development of Transportation System 2018–2021) to improve the quality of roads; to modernize long-distance transportation systems (including transport routes) connecting Europe and China, and high-speed railway systems between large cities; to shorten the transit time for containers by railways from the Far East to the western border to seven days; and to increase the loading capacities of the Northwestern, Far Eastern, Volga-Caspian and Black Sea port networks and the Northern Sea Route.

Apart from transport connectivity, Thailand in 2016 established the Ministry of Digital Economy and Society to promote, develop and implement activities geared toward creating a digital economy. It has also sped up the launch of a public broadband project to lay down broadband Internet for 24,700 villages.

Crisis-ready infrastructure

Other drivers of future infrastructure needs highlighted by the IERs include disaster management/preparedness, green investment and climate change. To strengthen disaster resilience, Brunei Darussalam has built infrastructure to alleviate the regular instances of flash floods and it has been able to avoid any major disruptions and shocks. Japan has increasingly looked into developing several strategies focused on mitigating and reducing damage from natural disasters such as floods, volcanic eruptions, storm surges, coastal erosion and tsunamis. Canada's 'Investing in Canada' plan aims to ensure federal infrastructure investments reduce and minimize greenhouse gas (GHG) emissions and enhance resilience to climate change. Meanwhile, New Zealand considers resilience broadly to include shocks like earthquakes and infrastructure failure as well as slow-moving events like climate change and vulnerabilities due to dependencies within and between systems.

Aging infrastructure

Apart from increasing infrastructure provision, there is also a need to maintain infrastructure as well. Aging infrastructure leads to the deterioration of physical infrastructure and is seen as an important issue for developed economies. In tackling the issue, the Canadian federal government has partnered with the Federation of Canadian Municipalities to implement and deliver the Municipal Asset Management Program to harmonize asset management standards at the domestic level. On the other hand, Japan aims to tackle this through the development of maintenance cycles to reduce costs. This is aimed at ensuring steady execution as well as enhancing the competitiveness of the maintenance industry through hiring and training engineers and introducing new technology.

1.4 PUBLIC AND PRIVATE INFRASTRUCTURE FINANCING WITHIN APEC

This section discusses the levels of public and private infrastructure financing within APEC. There are often complexities in delineating private and public capital due to issues such as corporatization, privatization or market liberalization, which often transfers assets that are originally public capital investments into private capital. Furthermore, privately provided infrastructure is often regulated, meaning public investment is not the sole indicator of government involvement. Bearing in mind these limitations, the following sections discuss the current private and public financing levels based on the available data.

1.4.1 Current public investment levels

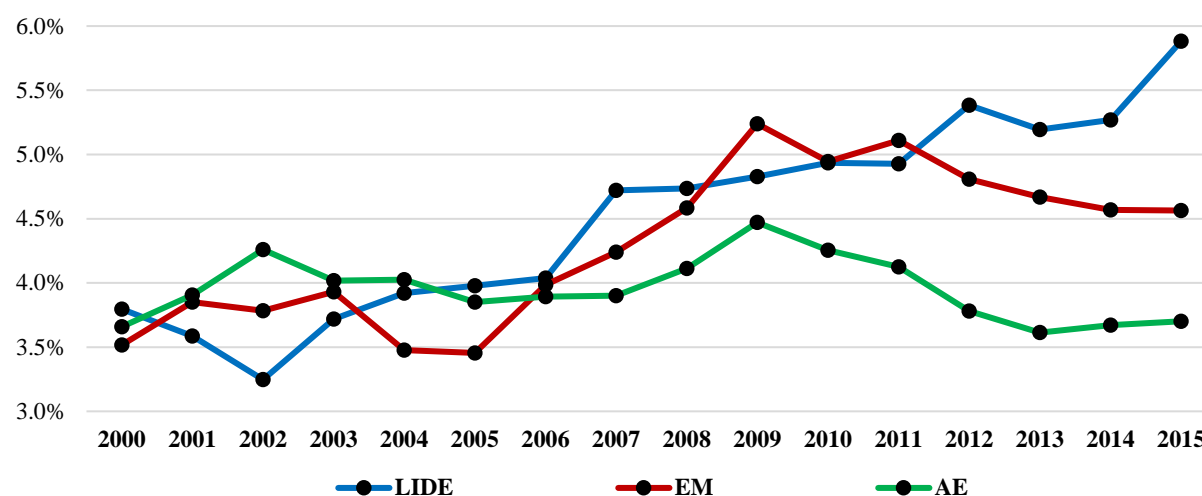
As shown in Section 1.2, the size and nature of the infrastructure gaps differ across developed and developing economies. For developing economies, where at least 663 million people lack access to safe drinking water and 1.2 billion people continue to live without electricity, closing the infrastructure gaps signifies a reduction of poverty and an increase in quality of life.¹⁴ Public investment in infrastructure is important; it has been estimated that as much as three-quarters of global infrastructure assets are owned by governments.¹⁵

¹⁴ World Bank, "Spending More and Better: Essential to Tackling the Infrastructure Gap", 16 April 2016, <http://www.worldbank.org/en/news/feature/2016/04/16/spending-more-and-better-essential-to-tackling-the-infrastructure-gap>.

¹⁵ Walter, *The Infrastructure Finance Challenge*.

Low-income developing economies presently have marginally higher public investment to gross domestic product (GDP) ratios than advanced economies and these ratios have increased over recent years (Figure 1.4). Using the median values of public investment as a proportion of GDP from 2000–2015, low-income developing economies have seen an increase in public investment spending from 4 per cent to 6 per cent, while emerging markets experienced an increase from 4 per cent to 5 per cent. For advanced economies, the share of public investment in GDP can be seen to stabilize at 4 per cent in the same period with a declining trend noted after the global financial crisis (from 4.5 per cent in 2009 to 3.7 per cent in 2015). For the 19 APEC economies for which data were available, government capital stock per capita was found to have grown by 3.21 per cent per annum from 2000–2015.¹⁶

Figure 1.4: Public investment, 2000–2015 (median values, per cent of GDP)



LIDE = low-income developing economy; EM = emerging market; AE = advanced economy

Source: IMF Investment and Capital Stock Dataset, 1960–2015 (version: January 2017), data from 170 economies.

1.4.2 Current private investment levels

Private investment supports infrastructure development and contributes toward bridging the financing gap, especially during periods of strained government finances. However, for certain basic infrastructure in developing economies, the unfavorable risk profile and low return on investment may affect the ability to attract private capital easily (if at all).¹⁷ As such, the government's role, either as a guarantor, regulator or financier (for instance, through blended finance models¹⁸), remains paramount.

PPPs are an important mechanism to attract private sector finance (see Box 2.9). PPP data are not comprehensive, but some studies suggest that advanced economies, in some cases, are more

¹⁶ APEC Policy Support Unit (PSU) calculation using International Monetary Fund (IMF) Investment and Capital Stock Dataset.

¹⁷ W. Gyude Moore, "Rethinking the Infrastructure Gap in the Poorest Countries", Center for Global Development, 16 May 2018, <https://www.cgdev.org/blog/rethinking-infrastructure-gap-poorest-countries>.

¹⁸ Blended finance is the strategic use of development finance for the mobilization of additional finance toward sustainable development in developing economies, based on: "Blended Finance", OECD, accessed 19 September 2018, <http://www.oecd.org/dac/financing-sustainable-development/development-finance-topics/blended-finance.htm>.

likely to attract private investment through PPPs than developing economies. For example, according to a report by McKinsey Global Institute, PPPs accounted for 10 to 15 per cent of infrastructure investment spending within some advanced economies while for major developing economies, PPPs accounted for an average of 7.5 per cent of infrastructure investment.¹⁹ Zia Qureshi notes that the private sector typically accounted for approximately two-thirds of infrastructure investment in advanced economies.²⁰ Table 1.2 presents data for 10 APEC economies for the period of 2000–2015 and shows that PPP investment has totaled USD 602 billion in those economies (in constant 2011 international dollars).²¹

Table 1.2: Cumulative value of PPP investment in 10 APEC economies, 2000–2015
(billions of constant 2011 international dollars)

Economies	PPP Investment	Public Capital	PPP Investment as a Proportion of Public Capital
Chile	30.80	97.6	31.5%
China	167.39	28866.3	0.6%
Indonesia	91.77	932.8	9.8%
Malaysia	62.73	1141.5	5.7%
Mexico	64.87	769.0	8.2%
Peru	22.48	130.7	17.2%
Philippines	56.20	191.6	29.3%
Russia	33.88	1143.0	3.0%
Thailand	45.78	733.6	6.2%
Viet Nam	26.07	368.8	7.1%
Total	601.97	34374.9	1.8%

Source: IMF Investment and Capital Stock Dataset, 1960–2015 (version: January 2017).

The World Bank found that private investment commitments in energy, transport, information and communications technology (ICT) backbone and water infrastructure within low- and middle-income economies reached USD 93.3 billion in 2017.²² In addition, 58 per cent of total global private investment had been channeled toward China; Indonesia; Mexico; Brazil; and Pakistan (the top five). The report also observed that 30 per cent of projects received direct government support while 15 per cent received indirect government support.

¹⁹ McKinsey Global Institute, “Bridging Global Infrastructure Gaps” (McKinsey & Company, 2016).

²⁰ Zia Qureshi, “The Global Infrastructure Challenge and the Role of G20 and BRICS” (in Russian and English), *International Organisations Research Journal* 12, no. 2 (2017): 164–93, doi: 10.17323/1996-7845-2017-02-164.

²¹ Data from domestic sources may not be comparable with the cited IMF database. For instance, Reuters indicates that the value of China’s 14,220 existing PPP projects has reached CNY 17.8 trillion (USD 2.69 trillion) by end-September 2017, which differs from the numbers in Table 1.2. See Reuters, “China Overhauls \$2.69 Trillion Public–Private Projects as Debt Fears Rise”, 17 November 2017, <https://www.reuters.com/article/us-china-economy-ppp/china-overhauls-2-69-trillion-public-private-projects-as-debt-fears-rise-idUSKBN1DH0DE>.

²² World Bank, *2017 Private Participation in Infrastructure (PPI) Annual Report* (World Bank, 2017), http://ppi.worldbank.org/~media/GIAWB/PPI/Documents/Global-Notes/PPI_2017_AnnualReport.pdf.

1.5 IMPACT OF INFRASTRUCTURE INVESTMENT

1.5.1 Relationship between infrastructure investment and growth

Several relationships between infrastructure investment and growth have been highlighted in the literature. For instance, Cesar Calderón and Luis Servén find that a one-standard deviation improvement in the index of infrastructure stocks and quality would raise growth by 2.9 and 0.68 percentage points, respectively.²³ On the digital infrastructure front, Harald Edquist et al. argue that the introduction and penetration of mobile broadband affected GDP growth rather than vice versa.²⁴ Their results suggest that a 10 per cent increase in mobile broadband penetration may cause a 0.6 to 2.8 per cent increase in GDP. The ABAC report further discusses the impact of broadband penetration rates upon GDP per capita, and policies that will enable and maximize the opportunities brought about by digital technologies.

To further explore the relationship between output per capita growth and infrastructure (public capital), the APEC Policy Support Unit (PSU) has undertaken empirical estimation by adopting David Aschauer's approach in which he investigated the importance of three types of capital (human capital, private physical capital and public physical capital) to growth in output per worker.²⁵ Using data from 124 economies from the period of 1970–2014 (Table 3.1 in the Appendix), the model estimates the impact of an increase in private physical capital, human capital (average years of schooling) and public physical capital on output per worker. The initial estimation finds that the implied value of the output elasticity of public capital is 0.11; hence a +10 per cent change in public capital induces a +1.1 per cent change in output. The output elasticity of private capital is 0.15; and human capital brings the largest impact with an output elasticity of 0.53.

The OECD conducted a study through a multi-annual cross-section growth regression and found that greater provision of infrastructure is associated with higher subsequent growth rates. Also, the potential impact of increased infrastructure provision is higher for economies with lower initial levels of infrastructure provision.²⁶ Manuk Ghazanchyan et al. acknowledge that empirical evidence on the impact of public investment on growth remains mixed: individual infrastructure projects may often generate relatively high returns on investment but their impact on GDP growth is more uncertain.²⁷ Nevertheless, Abdul Abiad et al. argue that, for economies with clearly identified infrastructure needs and efficient public investment processes

²³ Cesar Calderón and Luis Servén, "The Effects of Infrastructure Development on Growth and Income Distribution" (working paper, Central Bank of Chile, 2004), doi:10.1596/1813-9450-3400.

²⁴ Harald Edquist, Peter Goodridge, Jonathan Haskel, Xuan Li and Edward Lindquist, "How Important Are Mobile Broadband Networks for Global Economic Development?" (Imperial College Business School Discussion Paper, no. 2017/05, London: Imperial College Business School, 2017).

²⁵ David Alan Aschauer, "Public Capital and Economic Growth: Issues of Quantity, Finance, and Efficiency", *Economic Development and Cultural Change* 48, no. 2 (2000): 391–406, <https://doi.org/10.1086/452464>.

²⁶ Balázs Égert, Tomasz Koźluk and Douglas Sutherland, "Infrastructure and Growth: Empirical Evidence" (OECD Economics Department Working Papers, no. 685, Paris: OECD Publishing, 2009), <https://doi.org/10.1787/225682848268>.

²⁷ Manuk Ghazanchyan, Ricardo Marto, Jiri Jonas and Kaitlyn Douglass, "Collect More, Spend Better: Public Investment in Asian Frontier Markets" (working paper, Washington, DC: IMF, 2017), <https://www.imf.org/en/Publications/WP/Issues/2017/01/24/Collect-More-Spend-Better-Public-Investment-in-Asian-Frontier-Markets-44575>.

(combined with economic slack and monetary accommodation), there is a strong case to increase public infrastructure investment.²⁸

In addition, Walter has suggested that to achieve 6 to 7 per cent economic growth, public investment needs to be between 5 and 7 per cent of GDP and private investment between 20 and 25 per cent.²⁹ Using the International Monetary Fund (IMF) Investment and Capital Stock data between 1970 and 2015, the public investment (non-weighted) in APEC economies was found on average to be 5.6 per cent of GDP whereas private investment reached 17.3 per cent of GDP (non-weighted average).

However, while many economies would benefit from increased investment in infrastructure, as discussed in Part 2, it is important to ensure infrastructure projects are prioritized and subject to rigorous cost–benefit analysis to ensure resources are allocated to their best use. This underpins the need for good structural policy with respect to infrastructure. For example, the IMF has emphasized that the economic and social impact of public investment is largely dependent on its efficiency.³⁰ It estimates average inefficiencies in public investment processes to be approximately 30 per cent; as such, there is substantial scope for improving public investment efficiency in most economies.³¹ A study by Bent Flyvbjerg et al. reveals that most cost estimates used to decide whether infrastructure projects should be built were systematically misleading.³² In general, high public investment efficiency is associated with good institutional quality, and therefore, improving public investment management institutions brings the highest benefit for emerging markets and low-income developing economies.

1.5.2 Relationship between infrastructure investment and social inclusion (inclusive growth)

Infrastructure development plays a key role in promoting inclusive growth. Indirectly, infrastructure development creates the conditions for economic growth and job creation, enabling workers to find work and earn wages. More directly, infrastructure gives people and households access to services and economic opportunities. Infrastructure is necessary for individuals of all backgrounds (e.g., for farmers to sell their produce, workers to go to work, and students to study). Infrastructure also enables governments and the private sector to provide essential services such as education, healthcare, and water and sanitation, which contribute toward improved living standards.

Figure 1.5 presents a simple analytical framework illustrating the various channels through which infrastructure contributes toward poverty reduction. Investments in infrastructure such as roads, electricity and irrigation can improve employment opportunities and productivity in the agricultural and non-agricultural sectors. This directly contributes to inclusion by providing workers with employment opportunities and improved wages. Indirectly, improved rural

²⁸ Abdul Abiad, Davide Furceri and Petia Topalova, “The Macroeconomic Effects of Public Investment: Evidence from Advanced Economies” (working paper, Washington, DC: IMF, 2015), <https://www.imf.org/external/pubs/ft/wp/2015/wp1595.pdf>.

²⁹ Walter, *The Infrastructure Finance Challenge*.

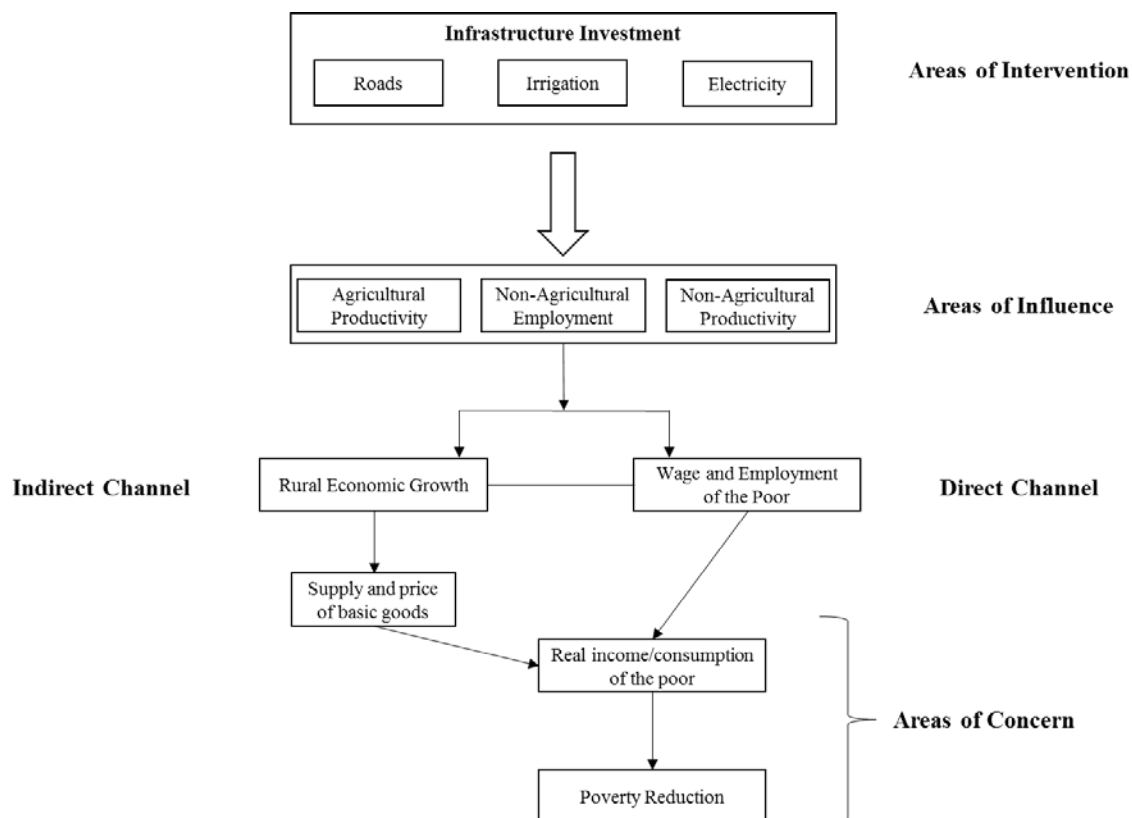
³⁰ IMF, “Making Public Investment More Efficient” (policy paper, Washington, DC: IMF, 2015), <https://www.imf.org/en/Publications/Policy-Papers/Issues/2016/12/31/Making-Public-Investment-More-Efficient-PP4959>.

³¹ Ibid. In the paper, the IMF defines efficiency based on the institutional environment underpinning public investment management across four different stages: project appraisal, selection, implementation and evaluation.

³² Bent Flyvbjerg, Mette Skamris Holm and Søren Buhl, “Underestimating Costs in Public Works Projects: Error or Lie?” *Journal of the American Planning Association* 68, no. 3 (2002): 279–95.

productivity can increase the supply of raw materials and basic goods, and reduce real consumer prices, thereby increasing real incomes. The combined effects of greater economic opportunity for workers and improved purchasing power for households contribute toward poverty reduction and higher living standards.

Figure 1.5: Linkages between infrastructure and poverty reduction



Source: Ifzal Ali and Ernesto M. Pernia, “Infrastructure and Poverty Reduction – What is the Connection?” (ERD Policy Brief, no. 13, Manila: Asian Development Bank, 2003).

These linkages between inclusive growth and infrastructure are supported by empirical research. Shenggen Fan et al. find that 3.2 individuals were lifted out of poverty in China for every CNY 10,000 (approximately USD 1,500) invested in rural infrastructure.³³ Meanwhile, the OECD shows that geographic targeting of transport infrastructure may make investments more pro-poor.³⁴ Additionally, Wei Zou et al. suggest that reducing transport bottlenecks improves the mobility of production factors such as labor, capital and information, thus supporting stronger economic growth and poverty alleviation in poor areas.³⁵ Robert Crandall et al. make the case that for every one percentage point increase in broadband penetration (equal to roughly 3 million lines), employment is projected to increase by 300,000 jobs.³⁶

³³ Shenggen Fan, Linxiu Zhang and Xiaobo Zhang, “Growth, Inequality, and Poverty in Rural China: The Role of Public Investments” (Washington, DC: International Food Policy Research Institute, 2002).

³⁴ OECD, “Assessing the Effects of Infrastructure on Pro-Poor Growth”, in *Promoting Pro-Poor Growth: Policy Guidance for Donors* (Paris: OECD Publishing, 2007), 269–71, doi:10.1787/9789264024786-25-en.

³⁵ Wei Zou, Fen Zhang, Ziyin Zhuang and Hairong Song, “Transport Infrastructure, Growth, and Poverty Alleviation: Empirical Analysis of China”, *Annals of Economics and Finance* 9, no. 2 (2008): 345–71.

³⁶ Robert W. Crandall, William Lehr and Robert E. Litan, “The Effects of Broadband Deployment on Output and Employment: A Cross-Sectional Analysis of U.S. Data” (Issues in Economic Policy, Washington, DC: The Brookings Institution, 2007).

The identified linkages are supported by the PSU's estimations that investigate the elasticities of poverty headcount with respect to various variables (as shown in Table 3.2 in the Appendix). As expected, economic growth is associated with poverty reduction while population growth and a rising Gini index (an indicator of inequality) worsen poverty in an economy. Using gross fixed capital formation (GFCF) from the IMF Investment and Capital Stock Dataset as a proxy for infrastructure investment, the PSU's estimation finds that even after controlling for indirect effects through GDP growth, every 1 per cent increase in GFCF is correlated with a 0.448 per cent decrease in the number of poor people (those living on less than USD 2.00 purchasing power parity per person per day) in an economy. However, the linkage is much weaker with respect to extreme poverty (those living on less than USD 1.25 purchasing power parity per person per day), where there is no significant association between GFCF and extreme poverty reduction.

In addition, the results obtained point to the nuances in the linkages between infrastructure and inclusive growth (in this case defined as poverty reduction). People from poor households may be marginally more capable of taking advantage of opportunities opened up by infrastructure development than people from extremely poor households. It should be noted that infrastructure development is a necessary, but not sufficient, condition for inclusive growth. It needs to be coupled with other policies to realize its potential for inclusive growth. These enabling policies include increasing access to education and health services, introducing social inclusion policies that improve economic participation (e.g., non-discrimination and labor standards) and providing social protection and safety nets.³⁷

Despite the linkages, an unbalanced program of infrastructure development could lead to greater inequality between geographical units within economies. Studies by Benjamin Faber and by Dan Zheng and Tatsuaki Kuroda show that disparities in infrastructure development within China contributed to greater income inequality within the economy, with production and incomes in connected cities growing rapidly while areas in the periphery lagged behind.³⁸ Dave Donaldson finds the same effects in India, where the expansion of the rail system was a key determinant of spatial income inequality.³⁹ Also, Irene Bertsek et al. find that broadband adoption is typically accompanied by a pronounced skill bias regarding workers' labor market outcomes that strongly favors highly skilled workers.⁴⁰ While skilled workers enjoy higher wages and employment rates as well as a rise in productivity as a consequence of broadband adoption, workers with lower skill levels experience higher unemployment and lower wages. These facts prove that more research is needed to find ways to reduce disparities between regions and provide people living in remote areas with better economic empowerment and living standards.

³⁷ Asian Development Bank (ADB), "Infrastructure for Supporting Inclusive Growth and Poverty Reduction in Asia" (Mandaluyong City: ADB, 2012).

³⁸ Benjamin Faber, "Trade Integration, Market Size and Industrialization: Evidence from China's National Trunk Highway System" (CEP Discussion Paper, London: Centre for Economic Performance, London School of Economics, 2013); Dan Zheng and Tatsuaki Kuroda, "The Role of Public Infrastructure in China's Regional Inequality and Growth: A Simultaneous Equations Approach", *The Developing Economies* 51, no. 1 (2013): 79–109.

³⁹ Dave Donaldson, "Railroads of the Raj: Estimating the Impact of Transportation Infrastructure" (working paper, Cambridge, MA: National Bureau of Economic Research, 2010).

⁴⁰ Irene Bertsek, Wolfgang Briglauer, Kai Hüschelrath, Benedikt Kauf and Thomas Niebel, "The Economic Impacts of Telecommunications Networks and Broadband Internet: A Survey" (ZEW Discussion Papers, no. 16-056, Mannheim: ZEW, 2016), <http://nbn-resolving.de/urn:nbn:de:bsz:180-madoc-414107>.

1.6 HIGHLIGHTS FROM INDIVIDUAL ECONOMY REPORTS: INFRASTRUCTURE CHALLENGES

Member economies provided information on key challenges identified in their economy in regards to infrastructure provision and management, some of which have been highlighted below.

1.6.1 Lack of data availability

A lack of data has been highlighted by Canada and Brunei Darussalam as an impediment to the implementation of structural reforms and investment in infrastructure. To fill this gap, Brunei Darussalam has suggested integrating data from all relevant sectors into one platform through a cross-sectoral mechanism. Canada launched the Core Public Infrastructure survey in 2017 to improve knowledge and understanding of its core infrastructure assets.

1.6.2 Lack of inclusiveness and connectivity in remote areas

Particularly for developing economies within APEC, infrastructure delivery is impeded by geographical issues. As such, improving basic connectivity to remote areas both physically (e.g., by road) and institutionally (e.g., through connections between different levels of government) continues to be a challenge.

In Papua New Guinea, approximately 14 per cent of its population live in urban areas. As such, it faces challenges both with ensuring the availability of transport infrastructure and with securing sustainable domestic power solutions to meet its goal of delivering electricity to more than 55 per cent of households by 2025. This is further complicated by land acquisition issues, especially those relating to customary land ownership which involves ensuring the fair treatment of stakeholders (about 3 per cent of the land is available to the government; the rest is customary land).

Similarly, Brunei Darussalam has closely monitored the disparity in rural and urban development to strike a balance between the two and to promote inclusivity. It does so by ensuring that physical planners are guided by the National Land Use Master Plan 2006–2025, which specifies 26 key planning policy areas.

In Indonesia, the Ministry of Communication and Information Technology has put in place a ‘universal service obligation’ policy to improve telecommunication and information technology in rural and remote areas. Under this policy, 1.25 per cent of the total profit made by businesses in the telecommunication sector is collected to develop the telecommunications infrastructure along Indonesia’s border and in its remote and rural areas, to foster economic activities and improve the quality of education. Several projects have been funded through this scheme, such as *Desa Broadband* (Village broadband), the District Internet Service Center initiative and the development of a base transceiver station in eastern Indonesia.

Russia’s plan to reduce digital inequality aims to provide Internet at a minimum speed of 10Mbps/s to over 13,000 settlements of 250 to 500 people. It does so through the creation of access points connecting small settlements through fiber-optic lines. To further increase the accessibility of the Internet, a special program to provide free Wi-Fi to the population of those settlements was launched in 2017. At the same time, the cost of accessing the Internet is considered one of the lowest in the world thereby increasing its use and application by businesses and the public in Russia.

Canada in its submitted case study highlighted the difficulty of providing broadband infrastructure to rural and remote regions. In 2016, Canada initiated the ‘Connect to Innovate’ program to expand broadband access in remote and rural communities.

1.6.3 Public infrastructure congestion

Congestion of public infrastructure services has been identified within several economies in APEC and is noted to impede the movement of goods, services and people.

Canada continues to experience road congestion in large urban centers and a lack of telecommunications infrastructure in its rural and northern communities. Its trade corridors also need to be enhanced to ensure that its goods and resources can be moved to domestic and international markets efficiently. Sound asset management strategies and practices are important, particularly for provinces, territories and municipalities that operate core public infrastructure. As such, it has attempted to provide financial support to municipalities to develop these practices.

1.6.4 Technological change

Several economies mentioned the challenges of providing for, and managing the impacts of, technological change.

Australia, for example, aims to increase access to fast broadband by 2020, at affordable prices and at least cost. It sees increased flexibility in its regulation as an important enabler of this.

Korea believes that to integrate new technologies, partnerships are required between government and businesses. It has done so through comprehensive policy support to the private sector to diversify funding sources.

Similarly, Japan has increasingly applied new technology to increase the sophistication of its water management and disaster prevention efforts. It has also promoted the use of ICT to increase productivity, which has led to the development of estimation standards for ICT construction.

1.6.5 Lagging institutional structures

Regulatory challenges continue to impede the development of quality infrastructure projects due to the lack of institutional structures to tackle issues such as feasibility, risk transfer and barriers to entry. The IERs have identified that the lack of such structures leads to reduced efficiencies as well as increased cost and time. In response, economies have looked toward changing their laws to better evaluate and invest in projects.

For instance, Indonesia has focused, in relation to its PPP scheme, on applying the use of studies (e.g., value for money and environmental studies); regulating the quality of infrastructure services provided by the private party; and accelerating infrastructure market development (e.g., through viability gap funding, government guarantees and the Infrastructure Financing Fund). In addition, it has also published laws on land acquisition and established the Public Services Agency to facilitate the process.

Peru has made two legislative decrees relating to public investment, which sets out the legislative framework for PPPs by clarifying the roles of government actors. It has also introduced more risk analysis and mitigation into the business case methodology and may divert tax revenue away from overly guaranteed PPPs.

China has also introduced central–provincial government coordination to provide a more diversified fundraising model for infrastructure projects. It has implemented this co-financing model in railway construction and has made significant headway in the construction of railways, particularly high-speed railways, in the past few years.

Russia in 2015 introduced a new law on PPPs aimed at increasing private participation in infrastructure projects, including foreign investors. It also maintains a federal platform to support PPP project implementation. The platform provides investors with up-to-date information on recent PPP developments in Russia and supports the application and implementation of PPP infrastructure projects. The platform is being maintained by the National PPP Center with the support of the Ministry of Economic Development.

Chinese Taipei uses the life-cycle assessment of public construction approach where reasonability, technical feasibility and cost-effectiveness are considered in the evaluation process. It has also introduced financial reforms to the Taipei–Kaohsiung High Speed Rail in which the government has agreed to implement certain reforms, such as reversing a stock split, extending the concession period, providing capital injection and terminating the station development concessionaire in order to tackle financial issues.

1.6.6 Increasing need for quality digital infrastructure

With economies developing strongly in recent years, there has been an increase in demand for better quality and more affordable digital services. Member economies have attempted to tackle this through a range of initiatives, from improving tower infrastructure to creating new digital infrastructure plans.

Malaysia is improving their bandwidth capacity to meet expected demand. It is boosting connectivity through the High-Speed Broadband 2 and Suburban Broadband projects, and by increasing the number of towers for mobile broadband services as well as upgrading existing towers to 4G services. The capacity for high-speed broadband and data traffic will be increased through a new submarine cable system between Peninsular Malaysia and Sabah and Sarawak.

Similarly, Mexico has increased its digital penetration levels and improved the quality of its telecommunication services. Prices for telecommunication services have decreased and this has led to an increase in subscriptions, particularly in its mobile markets. Also, its foreign investment levels have increased, and this has led to the introduction of a third free-to-air television network.

The Philippines has created an economy-wide broadband plan that focuses on three strategies, namely, policy and regulatory reform; investment in infrastructure through the Philippine Integrated Infrastructure (Information Infrastructure – PhII), and through the creation of local content to support broadband demand.

Under the federal Digital Economy Program, the Russian Federation has set the following goals: 97 per cent of its households and 100 per cent of its public entities connected to broadband with a minimum speed of 10Mbits/s; all cities with populations of over 50,000 people to have 4G coverage by 2024; and all cities with populations of over 1 million people to have 5G coverage by 2024.

In the United States, the Federal Communications Commission (FCC) is pursuing a number of policies to maximize investment in broadband communications infrastructure. The FCC has

launched a series of proceedings to eliminate unnecessary barriers to investment and make it easier to install wired and wireless infrastructure, which will, among other benefits, allow for the rapid introduction of next-generation technologies, such as 5G networks and services.

The report prepared by ABAC on structural reform and infrastructure discusses the importance of fixed line broadband for APEC economies (Box 1.1).

Box 1.1: Importance of fixed line broadband

A well-developed broadband infrastructure is key to enhancing the connectivity of digital economies. A higher fixed broadband penetration rate has been found to drive the uptake of cloud computing, which enables a whole suite of new digital services and technologies including the Internet of Things.

Although mobile broadband has increased in popularity in recent years, it is important to understand that the underlying data traffic for the most part is routed through fixed line broadband. This may involve long-distance transmission over an economy-wide fiber backbone and/or a submarine cable. While some mobile network-to-network traffic will remain wireless if it is local, most data traffic relies upon broadband fixed lines hidden from the view of the average smartphone user. Without fixed broadband, broadband mobile cannot be an effective driver of the digital economy, and for this reason, APEC economies need to give great attention to the ways and means to stimulate further investment in fixed broadband networks.

Models for broadband infrastructure development

Providing ubiquitous access to high-speed Internet requires substantial investment. However, there is no ‘one size fits all’ model for the development of telecom networks. In economies with many mountainous and inaccessible locations, such as Papua New Guinea and certain areas of Peru, and where per capita incomes are generally low, the barriers to entry are both physical and commercial.

In a geographically compact, low-lying, high-income economy such as Singapore, the commercial opportunities for telecommunications service providers are many; but even in Singapore, the capital costs of building fixed line broadband networks are too high to sustain multiple wholesale carriers. Instead the authorities in Singapore awarded the rights to a Passive Infrastructure Company (i.e., ‘NetCo’) to design, build and operationalize the nationwide fiber infrastructure (i.e., fiber and ducts), and an Active Infrastructure Company (i.e., ‘OpCo’) to design, build and operationalize the nationwide fiber network’s active infrastructure (i.e., bandwidth services). Structural separation and operational separation were required of the NetCo and OpCo respectively to ensure open access and fair competition. The fixed line broadband wholesale–retail model has also been adopted in Australia and Malaysia, although in both cases, the incumbent retains ownership of the network, giving rise to cases of competitors complaining of unequal terms of access or excessive wholesale pricing giving rise to a ‘profits squeeze’^a. But in all three cases, governments have provided financial support for the network buildout, making them in effect PPPs.

In other APEC cases, such as in the high-income economies of Canada; Hong Kong, China; Japan; Korea; and the United States, multiple private carriers have invested in fixed broadband networks, providing a strong framework to support highly competitive broadband mobile markets. Of the three APEC economies in Latin America, only Chile has a competitive market in fixed broadband, while incumbent carriers dominate the markets in Peru and Mexico. Both Chile and Peru have achieved competitive mobile markets, while in 2017, Mexico’s Supreme Court ruled that it is up to the regulator, not the policymakers in the legislature, to enforce the rules of competition in the mobile market.

Conclusions

Although a fixed line broadband network is much costlier to build than a wireless mobile network (even when use is made of a mix of technologies such as fixed wireless, microwave and satellite to complement fiber, especially in the ‘last mile’ to buildings), there are conditions that can make this commercially viable. In Hong Kong, China, for example, economies of density arise from the short distances between the clustering of premises. In Japan and Korea, population densities and thriving

retail and Internet markets sustain a high demand for long-distance transmissions, although government support in Korea was forthcoming in the early build-outs. In Canada and the United States, long distances connect the demand of major cities, but serving the rural areas remains a challenge that frequently requires additional funding.^b

However, if favorable local circumstances do not exist, fixed broadband networks may be regarded as a natural monopoly, and will need to be regulated as such. In all the APEC economies, there is a dominant player in the fixed line market. But even in the case of Papua New Guinea, where the geographical conditions seem most hostile, there are options for a new generation of small HFS (high frequency) low-earth orbiting satellite services to provide connectivity to earth stations in highly remote regions. However, equal access regulations are still necessary to ensure competition in downstream markets such as Internet services and mobile.

Notes:

^a A ‘profits squeeze’ implies high wholesale prices shrinking the retail margins of the incumbent and competitors alike, but the incumbent gains from a higher wholesale margin.

^b In January 2018, the Chair of the FCC proposed an order to ‘provide over \$500 million in additional funding for cooperatives and small rural carriers’. See FCC, “Chairman Proposes over \$500 Million in Funding to Promote Rural Broadband Deployment”, media release, 16 January 2018, https://transition.fcc.gov/Daily_Releases/Daily_Business/2018/db0116/DO-348723A1.pdf.

Source: ABAC Report on Structural Reform and Digital Infrastructure.

1.7 HIGHLIGHTS FROM INDIVIDUAL ECONOMY REPORTS: STRUCTURAL REFORM EFFORTS

Member economies provided information on key structural reform policies they have effectively undertaken to meet the objectives of cost-effectiveness, resilience and inclusion, some of which have been highlighted as follows.

1.7.1 Promoting institutional reform

Brunei Darussalam has streamlined the construction approval process such that it only takes seven days for companies to obtain planning permission. In addition, the construction permit process has been consolidated such that it now only requires six steps.

To ensure better alignment of priorities and initiatives, Canada, under the ‘Investing in Canada’ plan, has moved toward establishing partnerships between different levels of government. It aims to increase the climate-resilient nature of infrastructure; improve air, water and soil quality; and attempt to reduce carbon emissions.

Mexico has modernized and consolidated state-owned enterprises such as *Petróleos Mexicanos* (PEMEX) and *Comisión Federal de Electricidad* (CFE), and this has increased investments and led to a rise in the supply of oil and natural gas. Furthermore, quality and coverage have increased with more competitive prices.

In addition to introducing the law on PPPs and municipal–private partnerships in 2015, Russia has also introduced initiative procedures and guarantees for private investors. Doing so has led to an increase in private investment from RUB 480 billion (approximately USD 6.5 billion) in 2015 to RUB 1.3 trillion (approximately USD 20.6 billion) in 2016.

Thailand carried out reforms within the aviation sector to increase their oversight of carriers and to address safety concerns highlighted by the International Civil Aviation Organization. The reforms introduced the Ministry of Transport as a regulator, and increased collaboration

between both public and private parties; and Thailand's 'red-flag' status was removed in October 2017.

1.7.2 Infrastructure project development

Indonesia has established regulations on project planning and created access to facilities to help government contracting agencies develop projects. In addition, it has encouraged improvements in the management of infrastructure under its universal/public service obligation. Leading practices are found within the National Strategic Project Development and an increased budget allocation has been directed toward infrastructure. It has also implemented regulations to support PPPs, particularly in financing and accelerating infrastructure development as well as assisting in PPP project agreements.

Russia ensures that a public audit is conducted for most projects with government participation. In 2017, an audit was conducted for all projects with a total value of RUB 3 billion (approximately USD 47.5 million) or higher. The threshold is expected to decline to RUB 1.5 billion (approximately USD 23.75 million) in 2018.

China has introduced the use of social funds in infrastructure construction to diversify the available sources of financing. This has both lowered the cost of financing and introduced better governance structures and advanced operation experience to project proponents. Through its implementation, development models have been created (e.g., 'rail + property management' or 'rail + town') that have facilitated rail transport construction.

In the United States, the Build America Bureau, launched in July 2016, is responsible for driving transportation infrastructure development projects. The bureau streamlines credit opportunities and grants, and provides access to these credit and grant programs with more speed and transparency, while also providing technical assistance and encouraging innovative best practices in project planning, financing, delivery and monitoring. The US Department of Transportation is encouraging project planners to make the bureau their first stop when thinking about accessing federal credit programs, or if they are interested in pursuing other innovative finance strategies through a PPP.

1.7.3 Reducing barriers to entry

Australia has identified reductions in red tape of AUD 4.8 billion between September 2013 and December 2015. It plans to further strengthen the reform agenda to focus on changes that enhance innovation, competition and productivity.

Brunei Darussalam has introduced alternative financing and procurement through the implementation of the design-build-operate-transfer model. It aims to increase the participation of private developers or investors to improve the quality and sustainability of its infrastructure.

Mexico has attempted to address asymmetric regulation to foster competition and has done so by removing restrictions on foreign investment in the telecommunication sector. It aims to set a legal framework to increase private sector participation through energy, tax, telecommunication and anti-trust reforms.

Thailand has enacted its Private Investment in State Undertaking Act 2013 to increase the participation of the private sector in transport infrastructure through PPPs. In addition, the economy's PPP Fast Track program has reduced red tape and bottlenecks resulting in less time required for approval, down to 9 months from the initial 25 months.

Implementing flexibility in regulation – to realize technological benefits, reduce barriers to competition in infrastructure services and deliver efficiency gains to consumers and businesses – has seen good results. APEC and the OECD have previously developed a checklist on regulatory reforms to improve capacities for quality regulation (Box 1.2).

Box 1.2: APEC–OECD Integrated Checklist on Regulatory Reform (2005)

In 2000, member economies of APEC and the OECD recognized the importance of regulatory reform to support open and competitive markets, economic efficiency and consumer welfare. As a result, they endorsed a Co-operative Initiative on Regulatory Reform at the APEC Ministerial Meeting of November 2000 with the aim to build domestic capacities for quality regulation. This initiative led to the adoption of the APEC–OECD Integrated Checklist on Regulatory Reform by the respective APEC and OECD executive bodies in 2005.

The checklist is a voluntary self-assessment tool to evaluate regulatory reform efforts, building on the knowledge of APEC and the OECD of regulatory, competition and market openness policies. It adopts a whole-of-government approach that integrates the APEC and OECD principles on regulatory reform; the three policy areas mentioned earlier; and various governance perspectives (transparency, accountability and performance). In evaluating reform efforts and the implementation of regulatory policy, it was recognized that there was a need for a flexible method in the application of the checklist that takes into account the diversity of economic, social and political environments and values of APEC member economies.

While only six economies have published their self-assessment reports based on the checklist (Australia; Hong Kong, China; Japan; Korea; Chinese Taipei; and the United States), it provides cross-border comparisons of normative frameworks and identifies good regulatory practices.

In August 2017, a number of APEC economies gathered in a workshop on Exploring Options for Future APEC–OECD Cooperation on Good Regulatory Practice and reasserted their commitment to the checklist. They acknowledged that good regulatory practices continue to be central to improving regulatory quality and delivering competitive and open markets. They recognized that the APEC–OECD Integrated Checklist remains fit for purpose and should be used more systematically. They also identified a number of areas where further cooperation between APEC and OECD economies that builds on the checklist would be mutually beneficial, including international regulatory cooperation and regulatory delivery.

Sources:

- “APEC–OECD Integrated Checklist on Regulatory Reform”, APEC, accessed 12 September 2018, <https://www.apec.org/Groups/Economic-Committee/Toolkit-for-Structural-Reform/APEC-OECD-Integrated-Checklist>. See the latest at: APEC, “2016 Final Report on Good Regulatory Practices in APEC Economies” (Singapore: APEC, 2017), www.apec.org/Publications/2017/08/2016-Final-Report-on-Good-Regulatory-Practices-in-APEC-Economies.
- OECD, “Recommendation of the Council on Regulatory Policy and Governance” (OECD, 2012), <http://www.oecd.org/governance/regulatory-policy/49990817.pdf>.
- See, for example: OECD, “Regulatory Policy in Peru: Assembling the Framework for Regulatory Quality” (Paris: OECD Publishing, 2016), <https://doi.org/10.1787/9789264260054-en>; APEC, “Annex 3 – Report from APEC Economic Committee Workshop on Exploring Options for Future APEC–OECD Cooperation on GRP” (Singapore: APEC, 2017), http://mddb.apec.org/Documents/2017/SOM/SOM3/17_som3_025anx3.pdf.
- Compiled by the OECD.

1.7.4 Promoting inclusion

Korea has introduced an initiative to expand the broadband convergence network to rural areas and looks to construct physical subscription networks; develop services with the constructed networks; and stimulate the utilization of networks and services. Its implementation has led to an increase in household income by KRW 980,000 and has reduced cost.

China has implemented the ‘boosting network coverage in every village’ project to improve the inclusiveness of its information infrastructure. Thailand’s Ministry of Transport is in the process of conducting a study on universal design for vehicles and transport facilities to

accommodate all groups of people including children, the elderly and the disabled. As discussed in Part 2, social inclusion has been an objective of the ‘Investing in Canada’ plan.

1.8 APEC’S ROLE IN PROMOTING STRUCTURAL REFORM FOR INFRASTRUCTURE

1.8.1 Potential areas of cooperation

In their IER responses, economies identified a number of areas where regional cooperation is useful to catalyze structural reform for infrastructure and improve infrastructure development, such as:

- APEC can play a role in improving infrastructure in the region by sharing and exchanging (technical) knowledge and best practices (and even failures) among members, including on topics such as infrastructure management and maintenance (e.g., the High-Level Meeting on Quality Infrastructure) and by launching a regulatory dialogue on the development of common approaches and principles for infrastructure development in APEC.
- A business hub or a center that accommodates the interests of the private sector in infrastructure development would be useful to address the infrastructure financing gap. Regional articulation of infrastructure needs could attract private infrastructure firms to the region. Additionally, there could be opportunities for creating a joint funding mechanism to allow for greater collaboration and for high-impact projects to be implemented.
- Sharing information also allows opportunities for coordination to be identified. Sharing data and key resources could be optimized through means such as capacity-building initiatives and workshops. APEC should continue organizing events to discuss the future development and challenges of sustainable infrastructure.
- Through work on standards and conformity assessment processes for ICT products and services in APEC, economies can work toward regulatory coherence and improve connectivity and interoperability. APEC can aid in achieving this by promulgating rules, norms and standards that support high-quality, sustainable and transparent infrastructure that meets stakeholder needs. Additionally, APEC could discuss ways to implement international ICT standards set by organizations such as the International Telecommunication Union. The grouping should also encourage capacity-building programs for micro, small and medium enterprises (MSMEs) to learn from successful infrastructure market players.
- Increased engagement with international organizations such as the OECD and the World Bank, which can provide APEC with technical assistance in attracting foreign direct investment (FDI), was also considered beneficial. Thus far, APEC has either collaborated or participated in several initiatives organized by international organizations such as:⁴¹
 - **OECD Workshop on Infrastructure as an Asset Class and Data Collection for Long-term Investment:** The thematic focus of the workshop was on data issues related to the promotion of the financing of long-term infrastructure investment and the necessity to establish environmental, social and governance as well as financial benchmarks for infrastructure investment to make the asset class more accessible to private investors.

⁴¹ Box 2.12 further discusses APEC–OECD collaboration in respect of infrastructure financing.

- **OECD Selected Good Practices for Risk Allocation and Mitigation in Infrastructure in APEC Economies:** The report was published in cooperation with the Global Infrastructure Hub and the Asian Development Bank. It builds on the discussion among APEC economies during the APEC Seminar on Long Term Investment in Infrastructure held at Ninh Binh, Viet Nam, in 2017.
- **APEC/OECD Seminar on Infrastructure Financing:** This is part of the OECD's high-level Seminar on Enhancing the Role of Institutional Investors in Infrastructure Financing. It was held alongside APEC's Workshop on Infrastructure 2013 in Indonesia.
- **ADB Infrastructure Public–Private Partnership Pipeline Development Support:** This provides preparatory due diligence work to enable infrastructure projects and gives priority to APEC members.

1.8.2 Key APEC initiatives on infrastructure issues

Existing APEC work on infrastructure issues covers a wide range of areas and working groups. Some of the issues being addressed include reviewing and conducting capacity building on PPP regulatory and policy practices and evaluating policy approaches to support long-term financing in infrastructure, connectivity and economic inclusion.

The APEC Guidebook on Quality of Infrastructure Development and Investment was highlighted by member economies in their IERs.⁴² The guidebook notes several areas that government officials and stakeholders within APEC should consider during the development of infrastructure. It mentions the power sector as one of the prominent sectors, and an APEC Guideline for Quality Electric Power Infrastructure was developed in 2016. Furthermore, the guidebook has been applied to several projects, including the Peer Review and Capacity Building on APEC Infrastructure Development and Investment initiative. Since 2016, peer review and capacity-building activities have been conducted for the Philippines and Viet Nam, and in 2018, Indonesia began participating in the Peer Review as the next reviewed economy.

To build on the achievements in APEC, in 2017, APEC agreed to upgrade the Guidebook on Quality of Infrastructure Development and Investment, with the aim to also develop a guideline specifically for the water and sewage sector (APEC Guideline for Quality of Water Infrastructure).

Member economies also mentioned that the APEC Connectivity Blueprint (2015–2025) should be implemented to ensure maximum connectivity within the APEC region.⁴³ Finally, close cooperation in implementing the Multi-Year Plan on Infrastructure Development and Investment (as instructed by APEC Leaders in 2013) should be continued.⁴⁴ Improved physical and digital infrastructure will also support the outcomes from agreements such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership and other international or regional initiatives.

The main initiatives already undertaken by APEC are further discussed as follows.

⁴² APEC, “APEC Guidebook on Quality of Infrastructure Development and Investment” (Singapore: APEC, 2014), <https://www.apec.org/Publications/2014/11/APEC-Guidebook-on-Quality-of-Infrastructure-Development-and-Investment>.

⁴³ “Annex D – APEC Connectivity Blueprint for 2015–2025”, APEC, 2014, https://www.apec.org/Meeting-Papers/Leaders-Declarations/2014/2014_aelm/2014_aelm_annexd.

⁴⁴ “Annex B – APEC Multi Year Plan on Infrastructure Development and Investment”, APEC, 2013, https://www.apec.org/Meeting-Papers/Leaders-Declarations/2013/2013_aelm/2013_aelm_annexB.

1. **Peer Review and Capacity Building on APEC Infrastructure Development and Investment (2015):** An initiative under the Committee on Trade and Investment, the peer review process aims to evaluate the laws, policies and practices in place and identify the capacity-building requirements within reviewed APEC economies according to certain criteria, particularly those related to principles of PPP best practices, life-cycle cost and value for money – based on the 2014 APEC Guidebook on Quality of Infrastructure Development and Investment. Thus far, studies of the infrastructure markets of the Philippines (road sector) and Viet Nam (road and water sector) have been implemented.⁴⁵ The reports find that while government agencies to an extent are aware of concepts such as life-cycle cost and value for money, the wider application of such concepts in the implementation and development of infrastructure projects is required. The completed reports also highlight the importance of implementing a PPP law that is competitive for the investment environment, adapts to the regular changes in the structuring of PPP transactions, as well as defines more clearly the different PPP modalities and requirements for managing and coordinating PPP project implementation. Additionally, issues of clear risk-sharing and allocation mechanisms currently limiting international investor participation are discussed.
2. **Multi-Year Plan on Infrastructure Development and Investment (2013):** The plan was initiated in 2013 to boost APEC’s work on connectivity and infrastructure in the region. It aims to identify barriers to infrastructure development as well as solutions to overcome these hurdles. The four work streams covered by the plan are as follows:
 - Workstream 1: Fostering a business-friendly environment for infrastructure development and investment, through a solid regulatory framework that minimizes uncertainty and maximizes transparency and predictability
 - Workstream 2: Development and refinement of an integrated planning system mechanism
 - Workstream 3: Development of government capacity to identify and generate a pipeline of bankable infrastructure projects
 - Workstream 4: Development or further improvement of financing and funding environment to encourage long-term investors.
3. **APEC Connectivity Blueprint 2015–2025:** The blueprint aims to strengthen physical, institutional and people-to-people connectivity within the region. It contains current initiatives as well as proposes future initiatives for APEC to undertake. For the case of infrastructure, the physical connectivity aspect is of concern and involves improving the investment climate, boosting infrastructure financing through PPPs, adopting certain assessment criteria to evaluate the quality of infrastructure proposals and enhancing the application of good practices and people-centered investment for planning and implementing projects. In addition, the blueprint encourages transport and logistics facilitation by addressing trade facilitation as well as structural and regulatory reform.

⁴⁵ APEC, “Peer Review and Capacity Building on APEC Infrastructure Development and Investment: The Philippines” (Singapore: APEC, 2017), <https://www.apec.org/Publications/2017/05/Peer-Review-and-Capacity-Building-on-APEC-Infrastructure-Development-and-Investment-The-Philippines>; APEC, “Peer Review and Capacity Building on APEC Infrastructure Development and Investment: Viet Nam” (Singapore: APEC, 2018), <https://www.apec.org/Publications/2018/05/Peer-Review-and-Capacity-Building-on-APEC-Infrastructure-Development-and-Investment--Viet-Nam>.

4. **APEC Strategy for Strengthening Quality Growth for 2015–2030:** The strategy aims to strengthen APEC initiatives with a focus on achieving the five growth attributes identified in 2010, specifically, balanced, inclusive, sustainable, innovative and secure growth.⁴⁶ Key accountability areas specified in 2015 include institution building, social cohesion and environmental impact. Infrastructure-related actions included within the key accountability areas are:
- Facilitate growth through infrastructure development by promoting initiatives for innovative solutions, technical assistance and advisory services for raising private and public financing for infrastructure-related projects
 - Promote digital prosperity through investment in high-speed broadband infrastructure
 - Understand the environmental impact and the need to adapt to climate change through disaster preparedness and risk reduction by investing in disaster-resilient infrastructure.
5. **Cebu Action Plan (2015):** The Cebu Action Plan was launched in 2015 and provides a roadmap for creating a more financially integrated, transparent, resilient and connected region.⁴⁷ It does this through four main pillars: (1) promoting financial integration; (2) advancing fiscal reform and transparency; (3) enhancing financial resiliency; and (4) accelerating infrastructure development and financing.
- Under pillar 4, APEC has announced the creation of a Collaboration Action Plan between APEC economies and the Global Infrastructure Hub in the following areas: identifying opportunities for feedback on the Hub’s tools and resources by APEC member economies as they are developed; identifying opportunities for adoption of the Hub’s tools and resources by APEC member economies; providing APEC member economies with open access to the Hub’s knowledge platform; and other related activities that may be agreed upon.
6. **Action Agenda on Advancing Economic, Financial and Social Inclusion in the APEC Region (2017):** The action agenda was created to further advance APEC’s efforts toward achieving inclusive growth. The key pillars under this initiative include (1) economic inclusion; (2) financial inclusion; and (3) social inclusion.⁴⁸ The theme of infrastructure appears primarily under economic inclusion. Economic inclusion includes accelerating both the quality and quantity of infrastructure investment and enhancing physical, institutional and people-to-people connectivity including to areas that are underdeveloped, remote and rural.
7. **APEC work on PPP issues:** There have been several APEC initiatives related to PPPs including the APEC PPP experts advisory panel (now disbanded) and a pilot PPP center

⁴⁶ “Annex A: APEC Strategy for Strengthening Quality Growth”, APEC, 2015, https://www.apec.org/Meeting-Papers/Leaders-Declarations/2015/2015_aelm/2015_Annex-A.

⁴⁷ “Annex A – APEC Finance Ministers’ Process (FMP) Roadmap/Cebu Action Plan”, APEC, 2015, https://www.apec.org/Meeting-Papers/Sectoral-Ministerial-Meetings/Finance/2015_finance/annexa.

⁴⁸ “Annex A: APEC Action Agenda on Advancing Economic, Financial and Social Inclusion in the APEC Region”, APEC, 2017, https://www.apec.org/Meeting-Papers/Leaders-Declarations/2017/2017_aelm/Annex-A.

that was introduced during the 2013 APEC Finance Ministers' Meeting.⁴⁹ The Asia-Pacific Infrastructure Partnership was proposed in 2010 by ABAC and endorsed in 2011 by APEC Finance Officials to enable governments and the private sector to discuss the necessary political, economic, legal and regulatory conditions to incentivize private sector investment in infrastructure.⁵⁰ Dialogues between the Asia-Pacific Infrastructure Partnership and Indonesia have identified a number of key challenges to developing infrastructure through PPPs including: creating effective institutional arrangements for internal coordination and developing a pipeline of bankable projects; strengthening the project preparation process; expanding the options for financing Indonesian infrastructure; developing local financing sources and ensuring the availability of long-term local currency funding; improving capacity to mitigate non-commercial risks; and developing robust PPP frameworks.

8. **APEC Good Regulatory Practices (2011):** In 2011, APEC leaders agreed to undertake actions to strengthen regulatory practices in the region, in particular to:⁵¹
 - Develop, use or strengthen processes, mechanisms or bodies to enable a whole-of-government approach in the development of regulation, including coordination across regulatory, standards and trade agencies
 - Develop, use or strengthen mechanisms for assessing the impact of regulations, which involves the effective and consistent use of the tools and best practices for developing new regulations and reviewing existing regulations
 - Implement the principles related to public consultations from the regulatory policy section of the 2005 APEC–OECD Integrated Checklist on Regulatory Reform and the 2003 Leaders' Statement to Implement APEC Transparency Standards.⁵²

9. **APEC Internet and Digital Economy Roadmap (2017):** The roadmap identifies 11 key focus areas, including developing digital infrastructure in the region and achieving universal broadband access.⁵³ In addition, it promotes an enabling and competitive environment with pro-investment policies for the development of digital infrastructure; the development of holistic government policy frameworks for the Internet and digital economy; and coherence and cooperation in relation to the relevant regulatory approaches.

⁴⁹ “Annex A – An APEC PPP Experts Advisory Panel and Pilot PPP Centre”, APEC, 2013, https://www.apec.org/Meeting-Papers/Sectoral-Ministerial-Meetings/Finance/2013_finance/annexa.

⁵⁰ “Asia-Pacific Infrastructure Partnership”, RMIT University, accessed April 2018, <https://www.rmit.edu.au/about/our-education/academic-colleges/college-of-business/industry/australian-apec-study-centre/projects/asiapacific-infrastructure-partnership>.

⁵¹ “Annex D – Strengthening Implementation of Good Regulatory Practices”, APEC, 2011, https://www.apec.org/Meeting-Papers/Leaders-Declarations/2011/2011_aelm/2011_aelm_annexD.aspx.

⁵² “Regulatory Reform: APEC–OECD Integrated Checklist on Regulatory Reform”, OECD, April 2018, <http://www.oecd.org/regreform/apec-oecd-integrated-checklist-on-regulatory-reform.htm>; “Leaders' Statement to Implement APEC Transparency Standards”, APEC, 2003, https://www.apec.org/Meeting-Papers/Leaders-Declarations/2003/2003_aelm/leadersstimplapectranspstd.aspx.

⁵³ APEC, “APEC Internet and Digital Economy Roadmap” (Singapore: APEC, 2017), https://www.apec.org/-/media/Files/Groups/ECSG/17_csom_006.pdf.

PART 2:

STRUCTURAL POLICIES TO ENABLE THE EFFICIENT PROVISION AND MANAGEMENT OF INFRASTRUCTURE

2.1 NINE KEY OUTCOMES FOR DELIVERING QUALITY INFRASTRUCTURE

This part of the report discusses structural policy settings and reforms aimed at improving the quality of investment in, and regulation of, infrastructure in order to support inclusive and sustainable economic growth. It draws on a review of the literature and the experiences of member economies as provided in the case studies and IERs.

Structural policy reform refers to policy changes related to institutional frameworks, regulation and the process of government policy design that seek to minimize barriers to market-based incentives, competition, regional economic integration and improved economic performance.

Structural policy settings include a wide range of instruments, from fiscal policy settings to competition policy. The relevance of each policy in promoting quality infrastructure that supports inclusive and sustainable growth depends on the sector and economy. This report finds that structural reforms that promote nine key outcomes have been important to APEC economies in delivering quality infrastructure. These outcomes are in addition to ‘baseline’ policies economies should seek to achieve, such as ensuring the rule of law and adequate policy stability and predictability. The nine key outcomes are outlined below.

- **Sound infrastructure governance and project prioritization processes:** Governance and prioritization processes have a significant role in ensuring that society invests its resources in quality infrastructure projects. Institutional structures ought to clearly define project identification and evaluation responsibilities, provide standardized approaches to investment appraisal, have efficient and fair processes to allocate project costs, have a system that guards against corruption, and include processes for stakeholder consultation.
- **Fiscal sustainability:** Providing infrastructure requires decision makers to take into consideration debt sustainability and long-term fiscal soundness to ensure spending does not exceed available funding. Some highlighted measures include independent project evaluation, greater oversight and management as well as ongoing monitoring and evaluation of post-procurement processes, as well as ensuring governments and government entities have sufficient financial buffers and identify contingent liabilities.
- **The reliable operation and management of infrastructure:** Delivering quality infrastructure requires policies that focus on the quality of the asset and the final service provided, including ensuring reliable operation over the project’s lifespan. Domestic and international standards – including procurement, data and management standards – can support quality infrastructure, for example, by encouraging benchmarking between infrastructure providers to drive continuous improvement, by promoting transparency in procurement processes and by improving capability.
- **The institutional environment allows for private sector involvement and competition, where possible:** Open, competitive markets drive efficiency by promoting innovation, productivity and growth and can support affordability objectives by ensuring pricing reflects cost recovery. Structural policy can be used to promote competition. Where infrastructure sectors are naturally non-competitive, competition

regulation can improve efficiency and affordability by ensuring cost recovery-based pricing and supporting service quality.

- **The institutional environment supports private sector financing of infrastructure, including those with strong social benefits:** Infrastructure requires significant capital expenditure, and private sector investment can assist in bridging the infrastructure-financing gap facing economies, which is particularly important for projects with strong social benefits. Structural policy settings are key enablers of private sector investment; accessing greater levels of private sector financing requires a stable policy environment, the structuring of investments to generate an adequate risk–return profile and project-specific preparation to improve the bankability of projects.
- **Institutional settings promote and adapt to technological change:** Technological innovation is disrupting some traditional infrastructure sectors (e.g., the energy and transportation sectors) – with benefits for productivity and affordability.⁵⁴ Governments need to ensure that regulatory systems are able to adapt to technological change to harness these benefits, and also need to consider the benefits of new technology in funding decisions.
- **Infrastructure investment decisions are aligned with economic and development strategies:** Governments’ choices as to what infrastructure to invest in, and where, have implications for the distribution of benefits throughout society. For example, the regional distribution of infrastructure investment can affect where economic growth occurs and where jobs are created. Governments should consider aligning infrastructure investment choices (including the provision of subsidies and guarantees) with development strategies.
- **Social and environmental impacts are addressed and appropriately mitigated:** Infrastructure can give rise to negative impacts to the environment or community, such as pollution, risks to biodiversity or large-scale resettlement. As such, ensuring the quality of infrastructure includes ensuring that the environmental and social impacts of infrastructure provision and management are assessed and addressed through the life-cycle of the project. Regulations, standards, consultation, community engagement and application of responsible business standards, as well as other policies, can be used to ensure that negative impacts are mitigated and addressed.
- **Resilience considerations are incorporated into decision making:** Delivering quality infrastructure means decision makers need to consider future shocks and risks – such as disaster risk, climate change, energy security risks as well as digital security risks – that could disrupt services or impose unplanned expenses. Achieving resilient infrastructure requires more than just building stronger infrastructure; community preparedness and contingent financial planning are also important.

These outcomes closely align with the G7 Ise-Shima Principles for Promoting Quality Infrastructure Investment, which consider that delivering quality infrastructure means ensuring:

- Effective governance, reliable operation and economic efficiency that takes into account life-cycle cost as well as safety and resilience against natural disasters, terrorism and cyber-attack risks

⁵⁴ “Anticipating Disruption: Technology and Infrastructure”, KPMG, 30 November 2017, <https://home.kpmg.com/xx/en/home/insights/2017/11/anticipating-disruption-technology-and-infrastructure.html>.

- Job creation, capacity building, and the transfer of expertise and know-how to local communities
- Social and environmental impacts are addressed
- Alignment with economic and development strategies, including aspects of climate change and the environment at the domestic and regional levels
- Effective resource mobilization, including through PPP.

A major aspect of an adequate policy approach is to consider all these elements in a strategic, interconnected and coordinated way.⁵⁵ This calls for a long-term domestic strategy for infrastructure and structural reforms that transcends the various governmental and institutional structures in an economy.⁵⁶ Additionally, structural reforms should be subject to regulatory impact analysis to assess if they deliver net benefits to the economy and that all feasible options are considered.

The remainder of this part of the report discusses the above outcomes under the following headings:

- **Delivering value for money and quality infrastructure:** Achieving value for money relies on sound governance, including: requiring standardized assessments of project costs and benefits over the project life-cycle, long-term planning, adequate procurement and maintenance practices, and an appropriate funding model.
- **Improving the efficiency of outcomes in infrastructure and related markets:** Policies that support competitive markets, where workable, will improve infrastructure quality and support efficient pricing and innovation. Private sector financing of infrastructure can reduce fiscal burdens and promote innovation and affordability. Regulatory systems need to be adaptive to technology, and infrastructure investment can contribute toward the development of ‘smart cities’.
- **Promoting inclusive growth, environmental sustainability and resiliency:** Structural policy for infrastructure can promote inclusive communities where all individuals can participate in and contribute to society, including in remote areas. Environmental and social due diligence are important in ensuring quality infrastructure development. Structural policy can support resilient infrastructure that can anticipate, absorb, adapt and/or rapidly recover from a potentially disruptive event.

⁵⁵ G20 and OECD, “G20/OECD High-level Principles of Long-term Investment Financing by Institutional Investors” (Paris: OECD, 2013), <https://www.oecd.org/finance/private-pensions/G20-OECD-Principles-LTI-Financing.pdf>.

⁵⁶ OECD, *Getting Infrastructure Right: A Framework for Better Governance* (Paris: OECD Publishing, 2017), <http://dx.doi.org/10.1787/9789264272453-en>.

2.2 DELIVERING VALUE FOR MONEY AND QUALITY INFRASTRUCTURE

As governments are a major provider of infrastructure, it is important that infrastructure decisions are well prioritized to deliver the highest net social benefits and best meet governments' investment objectives. This is recognized in the G7 Ise-Shima Principles for Promoting Quality Infrastructure Investment, which note the importance of effective governance for infrastructure management. This section discusses the following key elements of public sector governance models for infrastructure, which assist in ensuring effective prioritization, allocation and management of government investments:

- Project pipelines
- Long-term planning
- Procurement, operational and management standards
- Funding models.

A critical precondition to ensuring the effective prioritization of infrastructure investment is that projects are subject to an economic or financial viability analysis before being considered for implementation. Ideally, such analysis will be undertaken through a standardized process that is transparent and credible. There are a range of economic and financial techniques that can be used to appraise the viability of a project, which can be categorized as:

- **Economic evaluation (or social cost–benefit analysis):** This considers all economic benefits and costs of a project to society. A project is economically viable if it increases the net welfare of society.
- **Financial evaluation:** This focuses on revenues and expenditures to determine the financial viability of a project. A project is financially viable when the parties undertaking the transaction can do so profitably.
- **Value for money evaluation:** This considers the total return to society for a given cost to government. A project delivers value for money if it provides an adequate social return for a given cost to government.

Additionally, government expenditure on infrastructure needs to fit within fiscal constraints.⁵⁷

For public policy analysis purposes, economic evaluation (or social cost–benefit analysis) is a very useful technique as it considers all costs and benefits. However, cost–benefit analysis should not be applied mechanically. For example, many costs and benefits are hard to quantify and the choice of discount factor affects the result. However, as well as assisting decision makers in prioritizing expenditure, a comprehensive cost–benefit analysis provides transparency and hence increases the accountability of decision makers. Value for money analysis is also useful as it provides decision makers with information on projects offering the best return for a given level of expenditure and therefore assists in allocating scarce resources.

Box 2.1 discusses the socioeconomic cost–benefit analysis. This is followed by a discussion of the four elements vital to public sector governance models (noted above).

⁵⁷ Ibid.

Box 2.1: Socioeconomic cost–benefit analysis

The socioeconomic cost–benefit analysis is the most common and comprehensive technique to estimate the benefits and costs of a project. It quantifies in monetary terms all the costs and benefits – costs and benefits that can be readily identified and valued, as well as other untraded impacts that are not typically captured in financial evaluations. These include intangible factors and externalities such as social and environmental costs and benefits while also taking account of resilience. It is not concerned with the distribution of costs and benefits and these must be judged separately.

There are different techniques available to value untraded or intangible impacts. The most common methods are:

- **Hedonic pricing:** The attribute may be traded in a related market and willingness to pay can be inferred via behavior in that market. For example, a new road project may increase noise levels at adjacent housing and affect the value of those houses. The hedonic pricing method would assess the change in house price per unit of noise level change to determine the net cost (benefit) of the project.
- **Travel cost method:** Value is inferred through the willingness to pay to travel. For example, a significant natural feature may have amenity value that is hard to assess. By surveying the distances traveled, time spent and other associated costs of visitors to the natural feature, it is possible to provide an estimate of the value that people attach to the amenity.
- **Contingent valuation:** Willingness to pay is inferred through survey techniques. For example, a natural environment resource such as a clean river can be valued by asking people directly how much they would be willing to pay for a change in the quality or quantity of the river water.
- **Benefit transfer:** This is where a non-market value established in a similar situation is used as a proxy for the cost or benefit under consideration. For example, the value of an endangered bird could be estimated with reference to studies of willingness to pay to visit a nature reserve where a different endangered bird was present.

As not all costs and benefits can be accurately captured through cost–benefit analysis, even when an attempt is made to monetize intangible factors (e.g., benefits from increased cultural integration), the final decision maker is required to exercise some judgement regarding the importance of the unquantifiable costs and benefits. These should be highlighted alongside the cost–benefit analysis along with distributional impacts.

Institutionalized stakeholder engagements can also be used to complement a cost–benefit analysis in order to ensure unquantifiable costs and benefits are considered. Such procedures help decision makers to better understand the stakeholders' specific needs and to avoid possible inappropriate investment design. Involving stakeholders in the design of infrastructure regulations also increases public trust in those projects and reduces the risk of disputes and legal challenges.

Sources:

- Harry F. Campbell and Richard P.C. Brown, *Benefit–Cost Analysis: Financial and Economic Appraisal Using Spreadsheets* (Cambridge: Cambridge University Press, 2003).
- HM Treasury, *The Green Book* (London: UK Government, 2018).
- New Zealand Treasury, *Guide to Social Cost Benefit Analysis* (Wellington: New Zealand Government, 2015).

2.2.1 Project pipelines

A systematic approach to the appraisal of competing projects in light of governments' investment objectives allows them to be ranked in order of social return or value for money; and enables a 'pipeline' of prospective projects that prioritizes government expenditure to be developed. This is particularly relevant at the local government level, which tends to have lower levels of administrative capacity while being in charge of more than 65 per cent of overall public investments in OECD economies.

Furthermore, a credible and transparent prioritization process applied to the set of prospective investments also reduces the risks from a private investor's perspective, as the private investor will be better able to predict future government behavior (in terms of projects that receive focus) and manage risks. For this reason, economies with credible project pipelines can be expected to attract more private investment at a lower cost.

How could structural policy support it?

Infrastructure governance models can support project prioritization in the following ways:

- Establishing formal processes that ensure investment and *ex-ante* risk assessments of infrastructure projects take place on a systematic and transparent basis (e.g., based on the standardized appraisal techniques discussed earlier). This ensures transparency in the economic, financial and social case for decision making.
- Ensuring investment assessments are conducted by a different organization from the agency implementing a project.⁵⁸ This avoids conflicts of interest and ensures independence in project appraisal. In several economies, this function is split between the implementing agency and the treasury or ministry of finance, who are well-placed to perform investment evaluations because of their role in fiscal stewardship. External stakeholder engagement, particularly with the potential affected communities, is also a good practice and can mitigate potential conflicts.
- Ensuring investment assessments are conducted separately from the determination of the mode of procurement (which might be via PPP, traditional procurement or another method). This ensures a project's economic value is established independently of the determination on the most effective delivery mechanism. The Australian New South Wales government has integrated this approach into their 'budget rule' (Box 2.4).
- In many economies, investment decisions are taken at the provincial or municipal level; however, the central government will have an interest in ensuring projects are prioritized across the economy as a whole. Achieving this requires infrastructure investment to be coordinated across different levels of government and priorities of central and local governments to be aligned. Robust coordination mechanisms for infrastructure policy are needed in order to ensure a balance between a whole-of-government perspective and sectoral and regional views. The OECD has developed a set of Principles on Effective Public Investment that are relevant here (Box 2.2).⁵⁹

⁵⁸ Ibid.

⁵⁹ OECD, "Recommendation of the OECD Council on Effective Public Investment across Levels of Government" (Paris: OECD, 2014).

Box 2.2: OECD Principles on Effective Public Investment

The OECD has developed a set of Principles on Effective Public Investment across Levels of Government. This instrument groups 12 principles under three pillars: coordination, capacities and framework conditions.

Pillar 1: Coordinate across governments and policy areas

- Invest using an integrated strategy tailored to different places
- Adopt effective coordination instruments across levels of government
- Coordinate across local governments to invest at the relevant scale

Pillar 2: Strengthen capacities and promote policy learning across levels of government

- Assess upfront long-term impacts and risks
- Encourage stakeholder involvement throughout the investment cycle
- Mobilize private actors and financing institutions
- Reinforce the expertise of public officials and institutions
- Focus on results and promote learning

Pillar 3: Ensure sound framework conditions at all levels of government

- Develop a fiscal framework adapted to the objectives pursued
- Require sound, transparent financial management
- Promote transparency and strategic use of procurement
- Strive for quality and consistency in regulatory systems across levels of government.

Source: “Effective Public Investment across Levels of Government Toolkit”, OECD, accessed April 2018, www.oecd.org/effective-public-investment-toolkit.

What does a good structural policy look like?

Systematic assessments of infrastructure projects

Several APEC economies have developed formal processes to set investment intentions and provide a systematic approach to prioritization, including:

- **Australia:** Infrastructure Australia is an independent statutory body with a mandate to independently assess projects and initiatives for inclusion on the Infrastructure Priority List, the authoritative list of domestically significant infrastructure investments Australia needs over the next 15 years.⁶⁰
- **Chile:** Chile’s National Public Investment System is a consolidated investment appraisal system that requires all public sector investment projects to be evaluated. The system standardizes the format to present projects and cost–benefit analyses, and there are explicit application and evaluation processes for public funds, with a General Methodology Manual as well as specific guidelines for particular project types or sectors. The National Public Investment System also sets key parameters for evaluation, including social prices such as labor supply and travel time, as well as the currency and social discount rate to use.⁶¹
- **New Zealand:** New Zealand has developed an investment management system to prioritize and deliver investments across the government, as discussed in Box 2.3.

⁶⁰ Australian Government, Infrastructure Australia, accessed April 2018, <http://infrastructureaustralia.gov.au>.

⁶¹ Ehtisham Ahmad and Hernan Viscarra, “Public Investment for Sustainable Development in Chile: Building on the National Investment System” (Washington, DC: Inter-American Development Bank, 2016), doi:10.18235/0000431.

Box 2.3: New Zealand's investment management system

New Zealand's investment management system sets processes and rules to ensure significant public sector investments are well-managed throughout their life-cycles.^a The system enables the government to invest more effectively to maximize public value and improve the wellbeing of New Zealanders. Conceptually the investment management system is organized into four investment life-cycle phases: think, plan, do and review. The system is led and coordinated by the Treasury's Investment Management and Asset Performance team in cooperation with other senior officials of the New Zealand government.

The complexity of the different agencies' decision-making processes requires a flexible, principles-based approach to investment management. Investment decision making is underpinned by 11 principles:

- Take considered and active stewardship of taxpayer and Crown resources over a long-term investment horizon
- Continually assess whether existing investments and assets align with the government's objectives and exit from assets, commitments or projects in development if it no longer makes sense to continue
- Balance investment across the government's interests and accountabilities when considering the make-up of the government investment portfolio
- Inform decision-making processes related to public services with information and evidence as well as analysis of the impacts of investing, not investing or divesting
- Consider the relative value of investment proposals against other proposals, to make decisions that make the best use of limited resources
- Give preference to initiatives aligned with the priorities of the government. Initiatives must be able to demonstrate long-term value and show they have strong stakeholder support and commitment
- Move resources to where they have the greatest overall effect, within the constraints of delegations and existing levers
- Accept a level of risk to obtain the benefits from investments, but the risks need to be clearly identified and managed
- Expect agencies to provide for current and future needs from within their existing baselines, and to understand: the costs of delivering their services, their medium- to long-term planning, the impact of moving resources, and the performance of investments under their responsibility
- Inform and constrain (e.g., timing and maximums) investment decision-making and management at an all-of-government level through the government's fiscal strategy and balance sheet targets
- Review, and periodically report on, the performance of the government's investment portfolio against the outcomes it wants to achieve to ensure transparency.

One of the processes that sits within the investment management system is the Better Business Case Model for significant infrastructure investments. The model is structured around the Five Case Model, which provides a disciplined approach to ensure that each of the key aspects of an investment proposal is explicitly and systematically addressed as part of the business case development process. The five cases are:

- **The Strategic Case:** This outlines the strategic fit, investment objectives and confirms the need to invest.
- **The Economic Case:** This reveals the preferred option that best meets the investment objectives.
- **The Financial Case:** This ascertains the affordability of the project.
- **The Commercial Case:** This confirms the commercial viability of project.
- **The Management Case:** This reveals the actions required to ensure the project can be successfully delivered.

Note:

^aIn New Zealand, the majority of transport investment is financed through a hypothecated fund overseen by a separate Crown entity, namely, the New Zealand Transport Authority (NZTA). The NZTA's approach to transport investment is however consistent with the broader investment management system.

Source: New Zealand Individual Economy Report.

Separating economic evaluation and procurement

The Australian New South Wales state government has formalized its approach to investment and procurement assessments, conducting them separately, through the state's budget rule. This is discussed in Box 2.4.

Aligning central and local government investment priorities

It can prove challenging to develop investment priorities for a region where multiple layers of government invest, and where coordination and a shared view of project prioritization become necessary. In New Zealand, central and local government approached this challenge when developing a transport strategy for the economy's biggest city – Auckland – by establishing the Auckland Transport Alignment Project (Box 2.5).

Box 2.4: New South Wales' budget rule

New South Wales implements a budget rule that separates the investment decision from the procurement decision on projects. This is to ensure the two decisions are being made independently and that the result of one analysis does not impact the other.

- **Investment Decision:** The purpose of this phase is to determine whether the project itself has merit. This phase comprises two stages:
 - *Cost–benefit analysis:* This stage checks if the economic benefits derived from the project outweigh the costs of the project.
 - *Prioritization:* This stage determines the ranking of the project compared to the other projects that are being contemplated, based on the results of the cost–benefit analysis.
- **Procurement Decision:** The purpose of this phase is to determine the procurement method that is optimal for the implementation of this project.
 - *Value for money:* This stage checks the financial viability of procuring the project through various methods. Procurement methods that are more financially viable are preferred.
 - *Public interest:* This checks the public interest implications of all procurement methods.

Following the decision to invest – but before the procurement decision – the project is budgeted for in an agency's forward capital budget. This ensures that:

- All potential projects compete for the same finite funds.
- The choice of procurement method is not influenced by the perceived budget impact.

If during the procurement decision, PPP procurement is found to deliver value for money, an agency's original forward capital budget for the project is converted into PPP capital payments.

Source: Compiled by Consultant (Castalia).

Box 2.5: Auckland Transport Alignment Project

Challenge

Rising levels of population growth and increased migration to Auckland have increased pressure on New Zealand's infrastructure and transport system. Expected future increases in population are likely to further intensify the need for investment in the transport system. Auckland's transport system is jointly funded by the central government and the Auckland Council. As joint transport investors, the government and council have a shared interest in ensuring value for money from their Auckland transport investments.

Reform

In 2015, the Auckland Council identified an NZD 300 million per year transport funding shortfall if its plans were to be implemented. Prior to agreeing to additional funding for Auckland transport, the central government wanted to be confident that further investment would address the region's transport challenges and provide value for money.

The Auckland Transport Alignment Project was established to align the priorities of the central government and Auckland Council in funding transport infrastructure. The project generated a report that set out a strategic approach, agreed between the central government and Auckland Council, for the development of Auckland's transport system over the next 30 years. The report aims to improve returns from transport investment over the medium and long term and has guided the development of statutory transport planning and funding documents.

Source: Summarized from the New Zealand case study in Annex 1.

2.2.2 Long-term planning

Long-term infrastructure planning is necessary to ensure that long-term costs and benefits are not overlooked in favor of upfront short-term costs. Long-term planning also better ensures that a coherent and strategic approach is taken across multiple sectors, institutions, policy areas, levels of government and community stakeholders over time.⁶² Planning should include determining and prioritizing the needs and trade-offs associated with the infrastructure as well as a strategy to address these issues. The planning process must be transparent and based on clear assumptions and must take into account the views of all stakeholders.

How could structural policy support it?

A plan should set out the long-term objectives across sectors, establish a shared strategy to achieve the objectives and provide a pipeline of projects that is aligned with the strategy. The strategic plan should be politically sanctioned, coordinated across levels of government, take stakeholder views into account and be based on clear assumptions. It should also be aligned with spatial and land-use planning policies.⁶³

Infrastructure planning should be linked to long-term fiscal projections and planning. A clearly articulated long-term plan will help to determine the size of required allocations in the fiscal

⁶² OECD, "Towards a Framework for the Governance of Infrastructure" (Paris: OECD, 2015).

⁶³ OECD, *Getting Infrastructure Right*.

plan and the trade-offs with other expenditure classes. Sound fiscal planning and clear funding provisions will also help to catalyze private investment in infrastructure.

Accounting standards and asset management practices can help to ensure that the long-term condition of assets is taken into account in the planning process. Accounting standards should stipulate that the state of public assets be reported and there should be a requirement to account for contingent liabilities and depreciation.⁶⁴

What does a good structural policy look like?

Examples of policy reform aimed at improving long-term planning include:

- **Creation of centralized infrastructure coordination teams:** Several economies have infrastructure coordination teams, either located within ministries where they can perform their functions effectively (such as finance ministries) or as standalone ministries. For instance, the Ministry of National Development in Singapore directs the formulation and implementation of policies related to land-use planning and infrastructure development. The infrastructure division sits within the ministry and is responsible for shaping the built environment in Singapore.
- **Economy-wide infrastructure plans:** The ‘Investing in Canada’ plan sets out a 12-year strategy to modernize Canadian infrastructure (Box 2.14). Alongside the previously mentioned Russian federal plan on transportation development, Russia is planning to develop by October 2018 a separate, focused long-term plan on the development of long-distance transport infrastructure up to 2024. Moreover, in March 2018, Russia endorsed a major strategic plan for structural reforms in infrastructure development that involves 16 aspects and instruments, including better PPP implementation, called the Roadmap on PPP Instruments Development.
- **Capital plans:** Since 2015, the New Zealand government has required long-term investment plans to be developed by agencies with intensive capital investment activity. The plans provide the strategic context and investment intentions over a 10-year horizon, including consideration of multiple scenarios to reveal the potential implications of fundamental changes in the policy, technology or social context. Additionally, New Zealand’s National Infrastructure Unit publishes a regular Capital Intentions Plan covering intended infrastructure investment.⁶⁵
- **Government accounting standards requiring whole-of-life project costing:** Korea uses life-cycle cost analysis to perform project selection. Life-cycle cost is a type of analysis that calculates all costs generated during the entire process, from planning to disposal of a facility, and finds an optimal combination. Its goal is to find the minimum investment point that constitutes a suitable balance between costs and functional aspects.

2.2.3 Procurement, operational and management standards

Standards, either domestic or international, can be used to drive the quality of infrastructure assets and service delivery. This section will focus on the role of policy and governance

⁶⁴ Ibid.

⁶⁵ New Zealand Treasury, “Infrastructure Evidence Base: Ten-Year Capital Intentions Plan 2016” (Wellington: New Zealand Treasury, 2016), <https://treasury.govt.nz/sites/default/files/2017-12/2016-capital-intentions-plan.pdf>.

standards in driving infrastructure quality. Section 2.4 discusses environmental and responsible business conduct standards.

International standards can allow benchmarking between economies and enable good practices to be shared and enhanced over time. Consistent standards also drive increased competition and service quality between public and private providers operating across boundaries. Infrastructure services provided by regional monopolies can be compared with one another with reference to standards.

The APEC forum provides a good opportunity for economies to consider cross-border standardization in key areas like environmental standards (discussed in Section 2.4), asset quality, procurement standards and data standards.

How could structural policy support it?

There are a number of forms of built standards that could improve infrastructure planning and management, hence improving overall quality. Management standards, such as ISO 55000, which is discussed next, can be used to establish or reinforce performance and capability expectations.

Data standards are useful when the economy wants to collect consistent sets of important data on infrastructure assets. For example, consistent information on infrastructure condition and utilization (such as data on built-asset level) helps infrastructure providers appraise performance against agreed targets, understand network interdependencies and the likely timing and cost of future investment and service needs, and make well-informed decisions. The OECD's Infrastructure Data Initiative is an example of a tool that can assist economies to collect the right data to prioritize projects and attract private investors.⁶⁶

Standardization in infrastructure procurement approaches can improve the quality of infrastructure by making more effective use of capability, lowering costs and reducing opportunities for corruption, for example, through the creation of transactional and contractual frameworks, templates for information, and finance structures that can facilitate investment through improved transparency, security, administration and due diligence. Standardized approaches to project-level financial data can also assist in attracting private finance by providing confidence in the information provided. The OECD public procurement standards (summarized below), the G20 principles for promoting integrity in public procurement and the World Trade Organization (WTO) Agreement on Government Procurement are examples of procurement standards.⁶⁷

What does a good structural policy look like?

Management Standards: ISO 55000 is an international standard covering the management of physical assets. It provides guidance and a 28-point requirements checklist of good practices in physical asset management. Typically, this is relevant to gas, electricity and water utilities; road, air and rail transport systems; public facilities; and process, manufacturing and natural resource industries. It is equally applicable to the public and private sector and regulated or non-regulated environments.

⁶⁶ "Workshop on Data Collection for Sustainable Infrastructure – Infrastructure Data Initiative ", OECD, 2017, <http://www.oecd.org/daf/fin/private-pensions/lti-workshop-sustainable-infra.htm>.

⁶⁷ G20, "G20 Principles for Promoting Integrity in Public Procurement" (2015), <https://www.gihub.org/resources/publications/g20-principles-for-promoting-integrity-in-public-procurement/>.

Data standards: The Infrastructure Asset Grading Guidelines of New Zealand have been compiled to provide practical methods for assessing the condition and performance of infrastructure assets. The guidelines help determine long-term investment needs for maintaining, enhancing and extending those assets to meet defined service standards in a consistent way. This facilitates consistent approaches to asset management, and allows like comparisons for owners, managers and investors. As mentioned in section 1.5, Canada launched the Core Public Infrastructure survey in 2017 to improve knowledge and understanding of Canada's core infrastructure assets.

Procurement standards: The OECD has detailed the standards required for modernizing procurement systems to ensure the proper allocation of public resources, improve efficiency in public spending and mitigate risks such as inefficiency and corruption. The OECD Recommendation on Public Procurement reflects the following 12 main principles:⁶⁸

- **Transparency:** Provide adequate and timely transparency to suppliers; allow free online access for all stakeholders to public procurement information, including tenders, award announcements, procurement forecasts, and laws and regulations; ensure visibility of the flow of public funds.
- **Integrity:** Apply frameworks or applicable codes of conduct (such as for conflict of interest or disclosure of information) to all stakeholders; implement general public sector integrity tools and training programs for the procurement workforce; develop requirements for internal controls, compliance measures and anti-corruption programs for suppliers.
- **Access:** Have coherent and stable institutional, legal and regulatory frameworks; deliver clear, and ideally, standardized tender documentation; use competitive tendering and limit the use of exceptions and single-source procurement.
- **Balance:** Strategically integrate secondary policy objectives (such as green growth and innovation) in procurement; employ appropriate impact assessment methodology to measure effectiveness.
- **Participation:** Develop and follow a standard process when changing the procurement system, which should include transparent and regular dialogues with suppliers and business groups; allow direct involvement of external stakeholders.
- **Efficiency:** Streamline systems, frameworks and technical processes; methods include centralized purchasing, framework agreements, dynamic purchasing, joint procurements and contracts with options.
- **E-procurement:** Use e-procurement tools (e-auctions, e-catalogues) that provide fair treatment and protect sensitive data.
- **Capacity:** Meet high professional standards by providing attractive, competitive and merit-based career options for procurement officials and promote collaborative approaches with universities and think tanks.
- **Evaluation:** Develop performance indicators and regularly assess the performance of the public procurement system.
- **Risk management:** Develop risk assessment tools and publicize strategies including red flags or whistleblower programs.

⁶⁸ "Public Procurement Toolbox", OECD, accessed April 2018, <http://www.oecd.org/governance/procurement/toolbox/>.

- **Accountability:** Establish clear lines of oversight and ensure internal and external controls such as audits are appropriately resourced; establish enforceable sanctions for misconduct among government and private sector participants.
- **Integration:** Combine procurement processes with public finance management, and harmonize the principles with public works, PPPs and concessions.

2.2.4 Funding models

A significant proportion of infrastructure is funded through general taxation due to its public-good nature. However, when it comes to charging for infrastructure-based services, there is a need to balance the objectives of incentivizing the efficient provision and use of assets through cost recovery-based pricing against considerations of equity of the cost burden and access across the community.

As a general principle, ensuring infrastructure costs are met by the beneficiaries, and those who most influence the costs or risks, will better ensure that the quality and cost of infrastructure provision are set at an efficient level. If the funding model sets prices below operating costs, there is a disincentive for expanding services and this may encourage overconsumption. Pricing that includes full life-cycle costs, including building, operations and decommissioning, is required to incentivize new provision and ensure consumption at levels that optimize limited resources. For some projects however, there is a tension between efficiency and considerations of equity and access.

How could structural policy support it?

For scenarios whereby a cost recovery model is used to support the efficient allocation of resources but does not meet social goals, the government can use social policies, such as subsidies or community service obligations, to meet distribution objectives (discussed further in section 2.4; Papua New Guinea's experience with community service obligations is described in Box 2.7).

There are many examples of infrastructure funding models where there are trade-offs between efficiency and distribution concerns. For example, infrastructure network regulators are often responsible for ensuring customers receive an affordable price while an efficient level of service is maintained. Box 2.6 describes these trade-offs in the electricity sector.

Box 2.6: Regulation challenges in electricity transmission networks

Efficient pricing of electricity transmission networks suggests the network should be funded by the beneficiaries, cost exacerbators, risk exacerbators or a combination of these. However, this can pose challenges when different consumers expect different quality standards because there is only one grid and all sections of society must accept whatever standard it is built to. Equally, efficient charging mechanisms can create challenges for inclusive infrastructure provision.

Different transmission pricing structures create different incentives

- Transmission pricing methodologies have variously based charges on regional peak injection and offtake (a cost exacerbator model), or connection (a beneficiary pays model), or a combination of these factors. Different incentives are created for investment in generation and transmission with different models, and different retail price structures result.

There is a trade-off between price and quality

- A higher quality standard (reliability, maximum power rating and resilience) will require higher prices to be paid. It is important for a regulator to decide what the correct balance is for society (the optimal price and quality trade-off). Since there can only be one grid and all sections of society must accept the same trade-off, some customers will pay for a grid that is unnecessarily well-built for their needs. Depending on their ability to pay, it may be justifiable to partially subsidize them.

There is also a trade-off between setting efficiency incentives and providing inclusive access

- Marginal cost pricing maximizes the efficiency incentive on the individual customer. It may also result in high connection costs for those who live further away from the grid. These customers can be in high need of access. Cross-subsidization within networks may be advantageous in certain situations to achieve social goals.

Source: Compiled by Consultant (Castalia).

What does a good structural policy look like?

Papua New Guinea has recently completed a series of state-owned enterprise reforms and seeks to implement a 'community service obligation' policy. Box 2.7 summarizes this experience.

Reforming the infrastructure funding base to reflect efficiency and fair cost allocation can be a significant task, requiring governments to undertake a thoughtful evaluation and policy reform process. Australia is undertaking significant changes to heavy vehicle road pricing through a four-phase policy process described in Box 2.8.

Box 2.7: State-owned enterprise reform in Papua New Guinea

Before the reform, nearly all of Papua New Guinea's commercial interests were managed by the Independent Public Business Corporation of Papua New Guinea, a state-owned corporation set up in 2002.

Pre-reform situation

The efficient management of its commercial investments in the state-owned enterprise sector was an area of concern for the government. The government requires effective and efficient management of the state-owned enterprises, as these enterprises are directly involved in the provision of essential

infrastructure services in sectors such as telecommunication, transport, electricity, water, finance and postal logistics.

The government had invested significantly in state-owned enterprises through direct capital funding. However, their performance (productivity level) over the years had remained relatively low. Most of them were natural monopolies in their own sectors; and outdated regulations, combined with little competition, resulted in poor performance.

Policy response

Under the ‘Kumul’ reform agenda, the government restructured its state-owned enterprises over the years to achieve optimal performance and generate sufficient returns on its investment.

The first attempt at reform was in 2002 with the establishment of the Independent Public Business Corporation Act and the second effort was in 2012 with minor amendments to the act. The most recent restructuring, the Kumul reform initiative, was carried out in 2015; the Independent Public Business Corporation Act was rescinded and replaced with the Kumul Consolidation Holdings Authorization Act. The new structure aims to apply corporate principles to the management of government investments, as well as improve synergy, coordination and efficiency in the government’s participation in commercial activities.

The new state-owned enterprises are guided by their own governing legislation that outlines their responsibilities and roles. They operate independently in managing government investments, delivering high-impact projects and providing support to the government through dividend payments.

The government also approved for implementation an on-lending policy allowing state-owned enterprises to access financing on favorable terms from the government, to deliver high-impact infrastructure projects throughout the economy. This is how the on-lending policy is envisaged to work:

- The government receives a loan (primary loan) from a financial institution and assumes the full loan repayment obligations – both the interest and the principal amount. It then passes on the primary loan proceeds to a state-owned enterprise or a government entity that will repay only the principal loan amount to the government.
- This process allows state-owned enterprises to receive funding at favorable terms. If they were to borrow on their own, such terms would not be possible due to their low ratings and weak balance sheet. The government has better ratings than individual state-owned enterprises. The government, however, must absorb the risk of default on its own debt obligations as well as those incurred by state-owned enterprises. This arrangement is only feasible when done in conjunction with other reforms that would improve the financial viability of state-owned enterprises. Otherwise, the loss-making state-owned enterprises would be unable to repay the government in the future, but the government must pay the financial institution that it borrowed from.

The government is preparing to implement the community service obligation policy that was developed and endorsed in 2013. State-owned enterprises will be allowed to provide services at a rate that remains financially sustainable while the government will be able to meet distributional objectives by externally subsidizing the services. Financially sustainable tariffs supported by a community service obligation arrangement will allow state-owned enterprises to expand service coverage while remaining incentivized to operate on an efficient, commercial basis.

Source: Summarized from Papua New Guinea’s case study in Annex 1.

Box 2.8: Heavy Vehicle Road Reform in Australia

Australia has an expansive and economically vital road network. However, it faces the challenge of rapidly rising demand and a revenue base that is unlikely to grow as fast as the expenditure needed to build and maintain the road network. Freight transport by heavy vehicles is an especially important source of demand, having more than doubled in 20 years. Australia began a long-term economic reform process in 2015. The goal is to link heavy vehicle user needs with the level of service they receive, the charges they pay and the investment of those charges back into heavy vehicle road services.

Pre-reform situation

Heavy vehicle operators contribute to road funding through a pay-as-you-go (PAYGO) system. This includes a fuel-based road user charge collected by the federal government and a registration fee for each heavy vehicle levied by state governments. The road-related revenue collected by the federal government is distributed through annual budget processes to state and local authorities who own and control highways and arterial roads (states) and smaller local roads (local governments). Total government road expenditure has been increasing at an average annual growth rate of 6 per cent per year.

Issues identified

- **The PAYGO system is a poor proxy for actual road use:** The amount a user pays for fuel use does not directly reflect the cost of providing and maintaining specific roads. Registration fees do not reflect the distance traveled by vehicles and the maintenance required on the roads.
- **There is no direct link between revenue and the road service provided:** Revenue and expenditures are controlled by different levels of government. These funding arrangements give road managers little long-term revenue certainty to plan for investments that road users might demand in the future. The lack of funding certainty also inhibits road managers from undertaking road maintenance at the optimal stage of a road's life-cycle.
- **There is no direct link between road user needs and charges paid:** Heavy vehicle users pay fees that are not directly linked to the services provided and the access they have to roads. There have been recent improvements to investment decision making, and infrastructure advisory bodies have been established in several jurisdictions. However, there is room to increase user focus, including incentivizing road providers to adjust expenditure to meet the needs of heavy vehicle users, for example, by improving heavy vehicle access to key freight routes.

Policy response

Heavy Vehicle Road Reform aims to improve efficiency by better linking heavy vehicle road use with the charges paid by heavy vehicle operators and aligning charges with investment in the road network to create the right incentives for the provision of heavy vehicle services. Governments are progressing the reform under a roadmap with four phases:

- **Phase 1:** Aims to improve the transparency of service delivery and expenditure, through expenditure plans, asset registers and improvements in the negotiating framework for users to pay for better services.
- **Phase 2:** Aims to establish a framework for economic regulation. This includes independent price regulation based on full life-cycle costs to ensure revenue can better match funding requirements into the future, and the development (in consultation with road users) of service level standards to determine the optimal level of investment in roads.
- **Phases 3 and 4:** Aim to implement funding reforms, so that charges levied will be reinvested in road building and maintenance to meet the service level standards. This also includes moving to more direct charges, comparable to those in the telecommunications, water and energy sectors. These charges would be set by the regulator based on road use.

Under phases 3 and 4, the introduction of community service obligations is being considered to support users of those roads that are unable to be provided on a commercial basis, for example, because of insufficient traffic volume.

Source: Summarized from Australia's case study in Annex 1.

2.3 IMPROVING THE EFFICIENCY OF OUTCOMES IN INFRASTRUCTURE AND RELATED MARKETS

Efficient markets are a theoretical economic optimum that, if achieved, ensures that customers receive the quality and amount of services they are willing to pay for, at prices that reflect the reasonable costs of providing the services. Competitive markets, where there are no significant externalities, will generally result in efficient markets.

However, many forms of infrastructure display public good or monopoly characteristics suggesting that the private sector will not deliver efficient outcomes without government intervention. Where infrastructure has public good characteristics (i.e., it is non-rivalrous and non-excludable), there are insufficient incentives for private provision and hence provision will need to be publicly funded. For example, members of the public cannot be excluded from the benefits of infrastructure that supports domestic defense, and this is therefore funded by governments. Additionally, infrastructure with high fixed costs and no diseconomies of scale, such as water sanitation facilities, electricity distribution and telecommunications networks, displays natural monopoly characteristics. A large supplier will be able to spread the upfront capital costs over a larger customer base than a small supplier. Unregulated monopolies result in higher prices and a lower quantity or quality of service delivery than is optimal for society. Structural policies to regulate monopolies can therefore improve societal welfare.

Technological change can be a disruptive influence in some natural monopoly infrastructure markets. Markets that have traditionally had natural monopoly characteristics can lose these due to technological changes. This section considers the implications of technological change for structural policy.

These characteristics of infrastructure provision signify that there are a number of structural policies that can improve the efficiency of the outcomes in infrastructure and related markets. This report focuses on three areas:

- Promoting competition and ease of entry
- Accessing private sector financing
- Implications from technology and innovation.

2.3.1 Promoting competition and ease of entry

Infrastructure sectors that do not deliver public goods or have monopoly characteristics are conducive to competitive private sector participation that can be either in the provision of assets or services. Structural policy can support the development of markets in such areas. Where markets have public good or monopoly characteristics, governments should identify areas where competition is possible and structural policy can delineate different services and support competition in those areas. For assets with strong monopoly aspects, governments will generally need to regulate price and quality to ensure consumers are charged prices reflecting costs and owners do not derive excessive profits.

Private sector provision of infrastructure or infrastructure services can lead to the following benefits:

- Improved affordability and a reduced need for regulation by reducing monopoly power⁶⁹
- Lower fiscal burden of infrastructure provision, or increased provision due to increased access to finance
- More efficient, timely and innovative delivery of projects.

Competition can be enhanced through regional economic integration (an APEC goal). For example, open and fair access for international firms and investors at the stage of infrastructure planning, construction and operation can improve competition and regional economic integration thus supporting sustainable growth across the region.

How could structural policy support it?

Structural policies that can support the ease of entry into, and competition in, markets for the provision of infrastructure, or services related to infrastructure, are described in the following:⁷⁰

- Procedures to start and operate businesses can be made simple and cheap, and regulatory barriers that favor incumbent firms reduced.⁷¹ This can include a tiered approach, with the lightest regulations for small new firms, for example, requiring them to meet only legal requirements for safety, environmental protection or public health.
- Services related to infrastructure assets or networks can be made more competitive through structural policy. For example, competitive parts of the service in the network infrastructure can be unbundled from the non-competitive parts (see Box 2.10 and Box 2.13 for examples). Examples include the separation of electricity distribution/transmission from retail/generation. Telecommunications fixed line networks and retail services have also been subjected to structural separation or unbundling.
- Aside from mandating unbundling, structural policies can support competition in these markets by seeking to eliminate anti-competitive practices. This may include requiring that retail competitors be given access to physical infrastructure owned by large incumbent firms at a fair regulated price and/or facilitating the conditions that support switching between retail competitors.⁷²
- Aspects of markets for the construction of infrastructure can be made competitive, even if the resulting asset is a monopoly asset. Facilitating competitive and transparent procurement processes provides greater certainty for the private sector parties that participate in construction tenders, hence enhancing competition. Ensuring equal access to markets by service providers and goods suppliers facilitates greater competition to

⁶⁹ Sergio A. Hinojosa, “New Issues in Natural Monopolies Regulation: The Financial Side in Infrastructure Projects through Public Private Partnership” (2001), https://ppiaf.org/sites/ppiaf.org/files/documents/toolkits/highwaystoolkit/6/bibliography/pdf/new_issues_in_natural_monopolies_regulation-the_financial_side.pdf.

⁷⁰ “Competition”, OECD, accessed April 2018, <http://www.oecd.org/daf/competition/>.

⁷¹ World Bank, *Doing Business 2016: Measuring Regulatory Quality and Efficiency* (Washington, DC: World Bank, 2016), <http://www.doingbusiness.org/~media/WBG/DoingBusiness/Documents/Annual-Reports/English/DB16-Full-Report.pdf>.

⁷² Penelope Brook and Warrick Smith, “Improving Access to Infrastructure Services by the Poor: Institutional and Policy Responses” (2001), <http://web.mit.edu/urbanupgrading/waterandsanitation/resources/pdf-files/Brook-ImprovingAccess.pdf>.

deliver the resulting infrastructure asset. OECD research provides both the benchmarks for APEC economies, and also the progress measures (where an APEC economy has been evaluated in the OECD work).⁷³

- PPPs can be used to facilitate greater private sector involvement in infrastructure provision (Box 2.9). The APEC Finance Ministers' Process has undertaken a considerable amount of work in this area.
- Creating the right legal and institutional environment can assist in attracting private participation in procurement processes. Box 2.9 summarizes the most common hindrances to private sector participation in public procurement processes according to the World Bank's Benchmarking Public Procurement report, which looks at public procurement laws and regulations across 180 economies.

The World Bank's 2017 report on Benchmarking Public Procurement also highlights reforms to procurement processes.⁷⁴ For example, it observes that Chile is reforming its procurement processes by operating through a single web portal. As a result, Chile's government is estimated to have increased its savings from USD 180 billion in 2010 to USD 280 billion in 2012. The Republic of Korea tripled the number of bidders in public procurement tenders following the introduction of KONEPS, an e-procurement system. The system reduced the opportunity for public officials to make arbitrary decisions and lowered the cost for suppliers participating in tenders. Chinese Taipei performs well in the benchmarking report for its bid security deposits and performance guarantees in public procurement. This economy requires a performance guarantee deposit yet is flexible in allowing suppliers many options, including providing a certified check, certificate of deposit, performance bond, insurance guarantee or letter of credit.

Box 2.9: Public-private partnerships and procurement policies

Opportunities to use public-private partnerships

PPPs are a mechanism that could be used to increase the competitive provision of services from infrastructure. PPPs are long-term contracts between a private party and a government entity for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance.

Under these arrangements, governments need to think about optimal risk allocation between the public and private sectors based on who is best able to manage or bear it. For example, when constructing a road, the construction-cost risks should be allocated to the private party managing the construction process, while any political risks are better allocated to the government.

Opportunities for PPP contracts arise when the following conditions are met:

- **Output can be clearly specified, measured and enforced:** The service needs to be defined on a standalone basis. If there is a lack of clarity around what constitutes the output of the contract, or there are significant measurement issues, or there is insufficient ability by the private party to adequately influence the outcome, PPP is not the optimal solution.

⁷³ Isabell Koske, Isabelle Wanner, Rosamaria Bitetti and Omar Barbiero, "The 2013 Update of the OECD's Database on Product Market Regulation: Policy Insights for OECD and non-OECD Countries" (OECD Economics Department Working Papers, no. 1200, Paris: OECD Publishing, 2015); Paul Conway and Giuseppe Nicoletti, "Product Market Regulation in the Non-Manufacturing Sectors of OECD Countries: Measurement and Highlights" (OECD Economics Department Working Papers, no. 530, Paris: OECD Publishing, 2006).

⁷⁴ World Bank, "Benchmarking Public Procurement 2017: Assessing Public Procurement Regulatory Systems in 180 Economies" (Washington, DC: World Bank, 2017).

- **Private sector incentives over the life-cycle of activity create value for money:** PPPs are more suited to the procurement of a service, rather than equipment, from the private sector. Involving the private sector may result in improved performance for the following reasons:
 - *Expertise:* Ongoing provision of expertise through the delivery of services.
 - *Innovation:* PPPs can allow the private sector to offer innovative solutions and delivery options. However, private parties will need to be incentivized for these benefits to materialize.
 - *Efficiency:* The private sector, if incentivized appropriately, can be more efficient than its public counterparts. Involving the private sector can lead to lower project costs.
- **Benefits outweigh the transaction costs:** While involving the private sector can add value, it is important to ensure that the benefits outweigh the costs of entering into a PPP transaction.

Major barriers to private participation in public procurement policies

The World Bank highlights five major themes that hinder public procurement:

- **Payment delays:** Delays in payment hinder participation by private firms in the public procurement process; this applies especially to MSMEs that struggle with limited cash flow. Delays are still common across all regions, and payments are timely in only one-third of the economies measured.
- **Bid security deposits and performance guarantees:** Bid security deposits ensure serious offers and guarantee that bidders will not withdraw their bids from the procurement process in an untimely manner. These deposits should not be set so high as to hinder participation nor so low as to allow frivolous offers. Most economies have bid security and performance guarantee requirements. Nevertheless, the World Bank finds that there is scope for improvement for APEC economies in this area in order to reduce investor uncertainty (such as in providing limits on the discretion of the procuring entity regarding the amount or improving rules for the oversight of decisions to withhold a performance guarantee).
- **Digitalization of the procurement process:** Economies in all regions are implementing reforms to conduct the procurement process online. However, a wide gap remains between economies that do not yet have an online portal dedicated to public procurement and other economies that have sophisticated e-procurement platforms that offer a range of services (and economies in between that offer limited information). The lack of such a portal means that suppliers may not have access to procurement opportunities and associated information.
- **Complaint mechanisms:** A fair, transparent and timely complaint mechanism increases confidence in the procurement process because it incentivizes procurement to be carried out in an impartial and open manner. In some economies, complaints processes are not comprehensive (e.g., complaints cannot be made before a contract is awarded), limiting the effectiveness of corrective measures that the review body can take. Further, the time needed for review bodies to issue decisions differs greatly, ranging from 2 to 450 days, suggesting efficiencies are possible in some economies.
- **Time needed to resolve complaints:** Ensuring complaints are resolved in a timely manner increases the confidence of private investors in the system and incentivizes participation in public tenders. This is likely to be further enhanced with the stipulation of legal time limits. Currently, it could take anywhere between 2 and 450 days for decisions to be issued. Delays in the process are seen among high-income OECD economies as well.

Source: World Bank, “Benchmarking Public Procurement 2017: Assessing Public Procurement Regulatory Systems in 180 Economies” (Washington, DC: World Bank, 2017).

Compiled by Consultant (Castalia).

What does a good structural policy look like?

Telecommunications has undergone significant reform in multiple economies in recent decades to allow for greater competition and private sector participation, resulting in more innovative services and lower costs for consumers. Viet Nam and Mexico have both implemented comprehensive regulatory reforms in their telecommunications sector to permit greater private sector participation and they have put in place regulatory frameworks that help enhance competition. Viet Nam's experience in telecommunications reform is outlined in Box 2.10, and Mexico's in Box 2.15. Mexico has also undertaken significant reform in the energy sector to improve private sector participation (Box 2.10).

Russia has reformed its PPP laws to attract greater private sector investment (Box 2.10). Additionally, the Russian National PPP Center, with the support of the Ministry of Economic Development, maintains the federal platform supporting PPP project development, registration, assessment and implementation. The platform provides investors and government with up-to-date information on recent PPP developments in Russia and supports the application and implementation of PPP infrastructure projects, as well as publishes relevant news and analytic reports.

Box 2.10: Reforms to improve private sector participation in infrastructure provision: Viet Nam; Mexico; and Russia

Viet Nam's reform of its telecommunications sector

Until 1990, state-owned enterprises provided all telecommunications services in Viet Nam and diversity of services was limited. Low levels of access to modern telecommunications services and equipment, limited innovation and low levels of competition were features of the system. By 1995, Viet Nam had an average of only 3.8 telephones per 100 people, which was much lower than other Southeast Asian economies.

Reforms in the Vietnamese telecommunication sector broadly fell into three categories:

- **Relaxation of entry for private providers, both domestic and foreign, in the telecommunications market:** In 2001, the government opened the ISP business to the private sector and foreign investors. Viet Nam's WTO accession in 2007 was accompanied by commitments to offer market access to all WTO members on a most-favored nation basis.
- **Equitization of government-owned telecommunications providers:** In 1995, Saigon Postel, a joint stock company, was established, marking the end of government monopoly in the sector.
- **Enhancement of competition in the telecommunications market via regulatory changes and enforcement of competition law:** The Law on Telecommunications (2009) established a framework for telecommunications regulation in Viet Nam. The law incorporated the WTO membership commitments, and further provided for a regulatory authority to be established to investigate competition issues and perform dispute resolution. Meanwhile, the Competition Law (2004) classified certain telecommunications providers as wielding significant market power, making them subject to tariff regulation.

The reforms led to significant growth in the telecommunications sector. The effects of the regulatory changes were far-reaching. The reforms contributed to improved efficiency of various enterprises in Viet Nam by lowering the costs of doing business and enhancing the competitiveness of Vietnamese firms in global trade.

Mexico's reform of the energy sector

Prior to 2013, Mexico's energy sector was dominated by state-owned monopolies. Insufficient investment in energy infrastructure was creating economic costs. For example, a lack of capacity in natural gas transport infrastructure led to demand surpassing capacity at times, leading to

interruptions in natural gas supply with severe economic consequences for industrial consumers. Further, energy output was in decline even though energy demand was increasing.

In 2013, Mexico undertook a reform of the energy sector with the objectives of ensuring energy security and sustainability and building open, efficient and competitive markets. The reform sought to open up the long-closed oil, gas and electricity sectors to competition. Major parts of the reform were:

- **Electricity Law Reform:** Reforms were undertaken to help develop a competitive electricity market – including unbundling the operations of the monopoly supplier of electricity services into a number of subsidiaries in order to open the way for new players in the energy market and empowering government agencies with regulatory and market control capacities.
- **Hydrocarbons Law:** This law allowed for the private sector to participate in upstream activities in the hydrocarbons sector through a licensing system and also allowed private sector participation in activities in the oil and gas industry that were previously delivered exclusively by PEMEX.
- **PEMEX and CFE Law:** The state-owned monopolies, PEMEX and CFE (Federal Electricity Commission), were turned into ‘state productive enterprises’, which are expected to follow a business-driven strategy and are now required to pay dividends to the government.

As a result of these reforms, the sector is undergoing a deep transformation. There has been a significant increase in private sector participation across the entire hydrocarbons value chain representing a potential investment of USD 180 billion.

Russia’s experience with reforms to incentivize PPPs

Until recently, federal-level PPP legislation in Russia did not allow for ownership of an infrastructure facility to pass from a public authority to private investors. The inability of private sector investors to own infrastructure projects limited the potential PPP arrangements that were achievable. Hence, over the past 15 years, most Russian regions adopted their own regional PPP laws to provide options for implementing PPP projects that were based on private ownership of the relevant infrastructure.

On 1 January 2016, the federal law ‘On Public–Private Partnership, Municipal–Private Partnership in the Russian Federation and Amending Certain Legislative Acts of the Russian Federation’ (PPP Law) entered into force. The PPP Law creates the legal framework for the use of PPP models that allow the transfer of ownership of a facility to a private investor. This gives investors the option of choosing the most beneficial form for the implementation of a PPP project and potentially increases the number of such projects that are viable.

The adoption of the new law has become a significant milestone in the development of the legal regulation of the Russian PPP sector. In 2016, when the law entered into force, the number of PPP projects in Russia surged from 873 (2015) to 2,183. Private investments in PPP projects also increased from RUB 408 billion (about USD 6.5 billion) in 2015 to RUB 1,300 billion (about USD 20.6 billion) in 2016.

Source: Summarized from the case studies on Viet Nam; Mexico; and Russia in Annex 1.

2.3.2 Accessing private sector financing

As discussed in Part 1, the gap in infrastructure provision for the APEC region between what is needed and what is provided amounts to many billions of dollars each year. The Global Infrastructure Outlook developed by the Global Infrastructure Hub (a G20 initiative) with Oxford Economics forecasts infrastructure needs across 50 economies to 2040 (including 17 of the 21 APEC economies). The 2017 report estimates that the gap between infrastructure needs and what will be spent by 2040 is USD 15 trillion.⁷⁵

Financing constraints contribute to this gap. For example:

- Governments may be debt-constrained.
- Economies may face significant sovereign or political risk premiums.
- Private sector involvement may face barriers.
- In many developing economies, infrastructure has not developed as a viable asset class for financial institutions to invest in due to:⁷⁶
 - Shortage of long-term domestic currency finance
 - Local banking market capacity and appetite
 - Lack of adequately developed capital and inter-bank markets
 - Unavailability of government support mechanisms (such as guarantee facilities and viability gap mechanisms)
 - Unsuitable regulatory frameworks to protect the interests of institutional investors
 - Lack of a viable project pipeline

This section focuses on the third element of the financing constraints listed above, namely, how to overcome barriers to better facilitate private sector involvement in infrastructure investment.

An important precondition for private sector participation in infrastructure investment is project bankability. Bankability refers to the willingness of capital market lenders to provide debt or equity financing to the private sector project parties. Farquharson et al. indicate that investors will undertake detailed analysis of the allocation of risks in a project and the available returns to ensure that the project company can meet its financing obligations.⁷⁷ Although the social benefits of a project may be higher than the social costs, the bankability of the project may not be assured. The financial returns from the project must be adequate to cover the private costs at a given risk level.

⁷⁵ Global Infrastructure Hub and Oxford Economics, *Global Infrastructure Outlook*, accessed 6 June 2018, <https://www.outlook.gihub.org/>. Data was extracted for infrastructure needs in 50 economies and 7 sectors to 2040.

⁷⁶ Edward Farquharson, Clemencia Torres De Mastle, Edward Raymond Yescombe and Javier Encinas, *How to Engage with the Private Sector in Public-Private Partnerships in Emerging Markets* (English) (Washington, DC: World Bank, 2011), <http://documents.worldbank.org/curated/en/995241468337913618/How-to-engage-with-the-private-sector-in-public-private-partnerships-in-emerging-markets>.

⁷⁷ Ibid.

How could structural policy support it?

Governments must fulfil certain core functions to prepare and develop the infrastructure projects that the government is promoting so that they are attractive to the private sector and bankable. These include the following four functions:

- **Adequate project preparation:** This refers to the steps taken by a government (with advisors) to ensure the technical, legal, economic, financial, social and environmental viability of a project. A feasibility study is a common way for government agencies to ensure that a project is viable. A feasibility study can also determine the fiscal or budgetary implications of a project, including implications of project risks materializing.
- **Independent project evaluation:** Following initial project preparation, an entity independent of the government agency implementing the project should evaluate the merit in funding and implementing the proposed project. This should include a value for money assessment (discussed in Section 2.2) and the likelihood of the viability criteria from the preparation phase being met.
- **Provision of fiscal support if necessary:** Where projects provide net social benefits and meet policy objectives, but may not be financially viable, the government can consider fiscal support. Section 2.4 discusses some funding models.
- **Transaction management:** To ensure an effective transaction, the government needs to manage risk allocation and infrastructure project structuring; ensure bankability; and undertake preparation of draft contracts and management of a competitive procurement process. The transaction management function is focused toward understanding market requirements, identifying potential participants, promoting transactions and managing effective procurement.

Project implementation does not end with the above four functions. Infrastructure projects are generally long-term commitments and should be accompanied by the following three functions over the project's lifespan:

- **Ongoing monitoring and evaluation after the procurement process is finalized:** Monitoring and evaluation will help governments recognize lessons learned. These lessons can help governments improve institutional frameworks, processes and procedures for implementing infrastructure projects. The lessons could also inform project structuring to improve the likelihood of achieving value for money in the future.
- **Oversight and management to ensure value for money is delivered:** Governments have a value for money stake in infrastructure projects. Proper contract management is needed to protect the anticipated project benefits. The government agencies that contract for infrastructure projects need to enforce the contract terms, take preemptive or remedial action where performance starts to deviate from expected outcomes, and handle disputes.
- **Management of fiscal commitments to ensure fiscal sustainability:** Governments need to monitor projects to ensure that both direct and contingent fiscal liabilities are managed. Direct fiscal impacts can arise from means such as subsidy payments. Contingent fiscal liabilities could arise where risks retained by the government in a project materialize during the operation phase. Management of fiscal risks is further discussed in Section 2.4.

Well-prepared projects are a minimum; but for a project to be bankable, it must provide an appropriate financial return for the risk the investors will bear. In many situations, the total return that the private investor can receive from delivering an infrastructure service is relatively inflexible due to political and social considerations limiting the private sector's ability to charge higher than a certain rate for delivering certain services. Consideration should be given to risk allocation and mitigation.⁷⁸ For example, bankability can be improved by inducing the private party to take risks that it can mitigate or bear, but not risks that are out of its control, through means such as blended finance.⁷⁹ Requiring the private party to accept the right risks incentivizes it to perform. Allocating project financing risk to the private sector provides incentives for the private sector to minimize whole-of-life project costs and maximize project benefits, because the private sector is more invested in the project over the long term. At the same time, allowing it to avoid risks that are outside of its control enables it to accept a lower return.

Policies that deepen/broaden capital markets and reduce barriers to foreign investment; create policy stability and enforce the rule of law; and promote sound procurement practices (see section 2.2) can also assist bankability as they can reduce risk and expand the available sources of long-term finance for infrastructure projects.

What does a good structural policy look like?

Chile provides an example of a legislative approach for reducing regulatory and financial risk for foreign companies. Decree Law 600 (1974) – now repealed – protected firms from legal changes after contracts were signed and automatically compensated for exchange rate risk through an optional regime of:⁸⁰

- Invariable income taxation at a higher than normal rate of 42 per cent for 20 years
- Invariable value-added tax and customs duties on the import of capital goods
- No variation in the mining tax for 15 years
- An alternative mechanism for calculating tax costs in a foreign currency.

Decree Law 600 was replaced by the Direct Foreign Investment Framework Act (2015). This change reflected the confidence of international investors in Chile as a stable regime. Laws applying to investments made before the act was passed were not changed retroactively, and the impact on planned investments was managed by allowing contracts under the old rules to continue to be available for a further four years. Important provisions of the foreign investment regime include the ability to freely transfer income offshore, protection from discrimination (favoring of domestic firms) and no limitations on foreign ownership of assets.

Chile also implemented reforms in 2010 to its PPP regulatory framework under Law no. 20410. This law both increases transparency and improves evaluation processes for the compensation

⁷⁸ G20 and OECD, “G20/OECD Guidance Note on Diversification of Financial Instruments for Infrastructure and SMEs” (2016), <https://www.oecd.org/g20/topics/financing-for-investment/G20-OECD-Guidance-Note-Diversification-Financial-Instruments.pdf>.

⁷⁹ See for example: OECD, “OECD DAC Blended Finance Principles for Unlocking Commercial Finance for the Sustainable Development Goals” (Paris: OECD, 2018), <https://www.oecd.org/dac/financing-sustainable-development/development-finance-topics/OECD-Blended-Finance-Principles.pdf>.

⁸⁰ Government of Chile – Foreign Investment Committee, *Foreign Investment Statute: Decree Law 600* (Santiago: Government of Chile, 2010), http://files.chinagoabroad.com/Public/uploads/v2/v1_attachments/2012/04/dl600-english.pdf.

given to the private sector should the government make legal changes that affect the investment. Compensation for private sector parties is provided for actions by persons with public power if certain requirements are met.⁸¹ The implementation of this reform has improved the investment environment in Chile by reducing the risks borne by private investors and has led to the implementation of several projects.⁸²

China and Indonesia provided examples of reforms that facilitated private sector financing in their case studies. With respect of transport infrastructure, China has clarified the role of government funding, worked to improve the PPP model and developed alternative financing platforms. Similarly, Indonesia has carried out reforms in its PPP governance and provided financing support for the provision of infrastructure (Box 2.11).

**Box 2.11: Reform of the investment and financing system and PPP governance:
China and Indonesia**

China: Reform of the investment and financing system facilitates transport infrastructure construction

Background and challenges

China has viewed transport infrastructure as a key driver of social and economic development. Through preferential systems and policies, China's transport infrastructure construction has seen active investment by the public sector and the private sector, including foreign investment. Before the reforms were undertaken, issues identified during the construction and development of its transport infrastructure included: poor coordination between departments, complicated approval procedures and a lack of active participation by private enterprises due to unsound exit mechanisms and poor returns. The PPP model's implementation has been impeded by an incomplete policy framework.

Reforms

China has issued 'Guidance on Deepening the Reform of Transport Infrastructure Investment and Financing' and 'Guidance on Deepening the Reform of the Investment and Financing System' in succession between 2015 and 2016, outlining the following key tasks:

- **Delineating the boundary between government and enterprise investments:** It was established that government funds should only be provided to non-operating projects while financing of operating projects should be the primary responsibility of enterprises. Government support should only be given after a series of steps have been carried out, such as scientific argumentation, approval, and budget management and information publicity.
- **Clarifying the role of investment management by the government:** This led to improved government investment management capabilities in budget management, appraisal and approval, information publicity, and process and after-event supervision. This was implemented through establishing a collaboration mechanism across the departments of transport, finance, development and reform, and domestic land resources.
- **Vigorously improving the PPP model:** A PPP policy framework was established with an operational guideline to facilitate the development of a PPP model.

⁸¹ Government of Chile, *Public Works Concession Law and Regulations*, translation (Ministry of Public Works of Chile, 2010), http://www.concesiones.cl/quienes_somos/funcionamientodelsistema/Documents/Law_Regulations.pdf

⁸² The Economist Intelligence Unit (EIU), *Evaluating the Environment for Public-Private Partnerships in Latin America and the Caribbean: The 2017 Infrascope* (New York: EIU, 2017).

- **Promoting the transformation of the transport financing vehicle:** The vehicle is no longer responsible for fundraising for the government but is to be transformed into a viable commercial entity involved in the construction and operation of infrastructure.

Impact

Between 1992 and 2008, fixed asset investment in the transport sector surged almost 30 times and a number of world-class transport infrastructure projects were successively built, including the Beijing–Shanghai high-speed railway, the Qinghai–Tibet Railway, the Beijing–Tianjin Intercity Railway and the Hangzhou Bay Bridge.

Indonesia: PPP governance structural reform and financing support for infrastructure provision

Background

Indonesia has utilized PPPs in infrastructure provision since the 1980s for a limited range of sectors. In 2005, the range of sectors that can utilize the PPP structure was expanded and complemented with other supporting policies; however, up until 2014, only one PPP project agreement signed had achieved financial close.

PPP reform

Significant structural reforms have been implemented to improve PPP governance since 2014. Some of the major reforms are as follows:

- **Better PPP governance and planning through a stronger mandate, increased capacities and robust coordination between stakeholders:** The government established the Priority Infrastructure Provision Acceleration Committee (KPPIP) in 2014 to lead and coordinate the acceleration of infrastructure development by reducing bottlenecks in the process. In addition, a PPP unit was developed within the Ministry of Finance in 2015 to manage the project development facility involved in structuring the Final Business Case and ensuring proper transaction processes. The PPP unit also manages government fiscal support and facilities for PPP projects, with the exception of land acquisition financing support.
- **Fiscal support and facilities for PPP projects:** The government has provided a robust guarantee scheme and improved financing facilities for PPP projects through various schemes:
 - Land acquisition financing support from the National Asset Management Agency
 - A project development facility to support the preparation phase and provide transaction support
 - A viability gap fund to support the creditworthiness of a PPP project and to improve affordable service provision
 - Availability payment for the provision of service, with payment directly from the government that includes capital expenditure, operational expenditure and the rate of return on investment, thus mitigating demand risks for the private sector
 - A guarantee of support to increase PPP project creditworthiness, appeal to investors and as part of risk management in PPP projects.

Source: Summarized from the case studies of China and Indonesia in Annex 1.

Accelerating infrastructure development and financing has been a key focus of the APEC Finance Ministers' Process in recent years. It represents pillar 4 of the Cebu Action Plan and, with the assistance of a range of international organizations, ABAC and other partners, the Finance Ministers' Process has advanced a number of initiatives to support member economies to take steps to develop, finance and deliver quality infrastructure. As outlined in Box 2.12, this includes working with the OECD on ways member economies can diversify the sources of finance for infrastructure and facilitate private sector investment, drawing from work undertaken in other international fora. The importance of facilitating private sector financing for infrastructure was highlighted in the October 2017 APEC Joint Ministerial Statement.⁸³

Box 2.12: The OECD's recommendations to the APEC Finance Ministers' Meeting on access to finance for infrastructure

For the past few years, and with renewed focus since the global financial crisis, infrastructure investment has been a key policy objective of governments. The resulting long and slow recovery gave way to policy dialogue aimed at increasing investment as a way to build a stronger economic footing – and infrastructure development and investment has been a key element of this policy focus. In that context, the OECD has been a strong partner to its member economies, the G20 and APEC, in providing evidence-based policy recommendations and sharing best practices in infrastructure financing.

The OECD's contributions to the APEC agenda on infrastructure financing over the past few years have focused on the diversification of financial instruments for infrastructure, risk allocation and mitigation, quality infrastructure as well as good governance for infrastructure investment and development.

Private financing for infrastructure

In 2013, the OECD elaborated the G20/OECD High-level Principles on Long-term Investment by Institutional Investors. These were welcomed by APEC Finance Ministers at their 2013 meeting in Bali, Indonesia. APEC economies thereby acknowledged the importance of enhancing private sector participation in infrastructure financing and improving access to private financing for economic infrastructure. As outlined in the preconditions to the High-level Principles, mobilizing private financing also has to go hand in hand with implementing structural reforms and guaranteeing a stable macroeconomic framework. These aspects were also reflected in the APEC Multi-Year Plan for Infrastructure Development and Investment which was developed in the same year.

Continuing their determination to mobilize private investors for infrastructure development, in 2014, APEC Finance Ministers welcomed the G20/OECD report on Effective Approaches to Support the Implementation of the High-level Principles on Long-term Investment by Institutional Investors as well as the G20/OECD Checklist on Long-term Investment Financing Strategies and Institutional Investors. They further called upon the OECD, among other international organizations, to identify relevant good infrastructure practices in the APEC region.

Cebu Action Plan

In 2015, the OECD contributed to developing the Cebu Action Plan, a voluntary and non-binding roadmap aimed at (1) promoting financial integration; (2) advancing fiscal reforms and transparency; (3) enhancing financial resilience; and (4) accelerating infrastructure development and financing in APEC economies. Under the Cebu Action Plan, the OECD was further mandated to conduct a study of risk mitigation instruments available in the APEC region and to develop a set of policy

⁸³ “Annex A. Diversifying Financing Sources and Fostering Private Sector Involvement in Infrastructure Investment in APEC Economies” (Joint Ministerial Statement, APEC Finance Ministers' Meeting, Hoi An, Viet Nam, 21 October 2017), APEC, 2017, https://www.apec.org/Meeting-Papers/Sectoral-Ministerial-Meetings/Finance/2017_finance/AnnexA.

recommendations to improve their availability. The OECD was also mandated to extend its survey and report on the self-assessment of interested APEC economies against the G20/OECD Checklist on Long-term Investment Financing Strategies and Institutional Investors (Annex A and B of the 2015 APEC Finance Ministers' Statement).

Risk allocation and mitigation

The OECD delivered in 2017 a report on Selected Good Practices for Risk Allocation and Mitigation in Infrastructure in APEC Economies, developed in collaboration with the Global Infrastructure Hub and the Asian Development Bank, which was welcomed by APEC Finance Ministers at their meeting in Hoi An, Viet Nam. Consistent with the objective to mobilize further investment, this report provides an overview of the type of risks in infrastructure and the tools available to policymakers and regulators to help effectively manage and allocate risks among the various stakeholders. This serves the objective of facilitating the engagement of investors in infrastructure projects through the judicious use of risk mitigation instruments and techniques. Data in the report are based on survey responses from three APEC economies: Chile; Mexico; and Peru.

Diversifying financing sources

Also in 2017, the OECD assisted in the drafting of the policy statement on Diversifying Financing Sources and Fostering Private Sector Investment in Infrastructure Investment in APEC Economies, which was endorsed as Annex A to the 2017 APEC Finance Ministers' Statement. The recommendations included are consistent with those in the G20/OECD Guidance Note on Diversification of Financial Instruments for Infrastructure and SMEs, which was endorsed by G20 leaders under the Chinese G20 2016 presidency. Recommendations in Annex A cover the following areas of infrastructure financing:

- Diversified sources and instruments for the finance of infrastructure
- Institutional investors and promoting infrastructure as an asset class
- PPPs, effective transaction design and risk allocation
- Risk mitigation instruments and techniques
- Infrastructure project pipelines.

Capacity-building package

Most recently, in 2018, at the APEC Finance and Central Bank Deputies' Meeting (15–16 March) and the Senior Finance Officials' Meeting (7–8 June), it was agreed to develop a capacity-building package of tools to help APEC economies adopt measures to accelerate infrastructure development and financing. This package will comprise a selected set of effective approaches to financing infrastructure in APEC economies, including blended finance, drawing from responses to an APEC/OECD survey of policies that facilitate the implementation of the non-binding recommendations contained in Annex A. This work is currently being developed by the OECD in collaboration with Papua New Guinea's APEC chairmanship. The survey builds on a survey of effective approaches to the implementation of the G20/OECD Guidance Note on Diversification of Financial Instruments for Infrastructure and SMEs, which was launched in late 2016.

Ultimately, as called upon by APEC Finance Ministers in 2017, the OECD, in collaboration with other international organizations, is continuing to work with APEC economies on studying best practices and providing capacity building on quality infrastructure investment. This work is also well aligned with the OECD's mandate to develop guidelines and good practices on quality infrastructure, the elaboration of which is a current priority for both APEC and the G20.

Source: Compiled by the OECD.

2.3.3 Implications from technology and innovation

Technological change can enable significant improvements to the delivery of infrastructure services. Industries must be agile in searching for, or responding to, the possibilities of new technologies, to ensure the best services are delivered to infrastructure users. This is not usually a problem in competitive markets, where private companies strive for continual innovation to enable competitive advantage.

In non-competitive markets, however, incentives for firms to invest in innovation or new technology uptake are weakened through the high returns earned on existing technology and infrastructure. This can include firms with market power discouraging new technology that may benefit competitors in order to maintain their monopoly positions. Structural policies can support the uptake of technology and innovation in non-competitive infrastructure markets.

Conversely, technology is altering how competitive an infrastructure sector is. Technological change can be a disruptive influence in some natural monopoly infrastructure markets. Markets that have traditionally had natural monopoly characteristics can lose these characteristics due to technological changes. Technology can sometimes allow provision without the same high fixed costs that created the market power. The telecommunications sector provides a compelling example. Historically, the copper network was regulated as a natural monopoly with the high fixed costs of provision limiting competition in this sector. The transition to next-generation broadband technologies, however, is making the copper network increasingly obsolete. There are examples of electricity market disruption also, including the use of mini grids as an alternative to transmission, and solar photovoltaic (PV) as an alternative to transmission and distribution. Competition and other policies must therefore keep pace with changing realities: structural policy must reflect how new technologies alter the competitive structure of the market.

How could structural policy support it?

Structural policies that support competition such as those discussed earlier in this section are important contributors to technological uptake as technology is a key aspect through which firms compete. However, private firms will not always capture all the benefits from technological development and hence there may be a case for government fiscal support at times. Uptake of new technology is however hard to predict, and hence governments will need to be cognizant of future trends and not just fund current technology.⁸⁴

Intellectual property protections, such as patents, trademarks, designs and copyright, are important to ensure the returns from technological development are captured. The World Intellectual Property Organization standards can be a useful guide.⁸⁵

⁸⁴ World Economic Forum, “Infrastructure Investment Policy Blueprint” (Geneva: World Economic Forum, 2014), http://www3.weforum.org/docs/WEF_II_InfrastructureInvestmentPolicyBlueprint_Report_2014.pdf.

⁸⁵ APEC, “Promoting Innovation for Start-ups: Summary Report” (Singapore: APEC, 2018), <https://www.apec.org/Publications/2018/04/Promoting-Innovation-for-Start-ups>.

Governments should regularly review regulatory systems and legislation, including competition policy, to accommodate new technology. Further, the regulatory system must remain flexible and ready to accommodate new technology. An example of this exists in the emergence of autonomous cars. New Zealand has an action plan to promote emerging transport technologies, including scanning all transport legislation to identify unnecessary barriers to deployment.⁸⁶ Several US states have reformed their regulatory systems to promote innovation in autonomous vehicle testing – for instance, California has expanded its testing rules to allow for remote monitoring instead of a safety driver inside the vehicle.⁸⁷

What does a good structural policy look like?

New Zealand is updating its competition policy for the telecommunications sector and has funded the rollout of Ultra-Fast Broadband in light of new technologies. This is discussed in Box 2.13.

Box 2.13: Telecommunications reform in New Zealand

The goal of successive governments in New Zealand has been to improve access to broadband services. This culminated in the rollout of the Ultra-Fast Broadband program, a government-sponsored project to achieve over 86 per cent fiber-to-the-home coverage by the end of 2022. The program is currently at 68 per cent completion.

Pre-reform situation

Prior to launching the Ultra-Fast Broadband program, New Zealand had already conducted significant market reform in the telecommunications sector. The Telecommunications Act 2001 signaled a move from generic competition legislation to sector-specific regulation. In 2006, the government mandated local loop unbundling and the operational separation of the retail, wholesale and network arms of the incumbent monopoly (Telecom), with third parties able to access Telecom's wholesale services on the same terms as Telecom's retail arm. Despite this change, there was continued debate about whether broadband infrastructure was being upgraded at the appropriate rate, particularly around whether Telecom had sufficient incentives to invest.

Policy response to incentivize investment in broadband infrastructure

In 2009, the government launched the Ultra-Fast Broadband program, committing a total of NZD 1.8 billion to subsidize the rollout of a fiber-to-the-home network to a majority of the population.

Build–own–operate contracts were offered on a regional basis. A condition of participation in the Ultra-Fast Broadband initiative was that any company partnering with the government to provide wholesale Ultra-Fast Broadband was not allowed to also provide retail telecommunications services.

The government entered into contracts with four companies to deliver Ultra-Fast Broadband: three regional electricity lines companies and Telecom. As a condition of participating in the program, Telecom agreed to split into two companies: Chorus, a wholesaler covering copper networks and local loops; and Spark, a fixed-line retailer and mobile network operator.

⁸⁶ Ministry of Transport, New Zealand, “Intelligent Transport Systems Technology Action Plan 2014–18: Transport in the Digital Age” (Wellington: Ministry of Transport, New Zealand, 2014), <https://www.transport.govt.nz/assets/Uploads/Our-Work/Documents/Intelligent-Transport-Systems-Technology-Action-Plan-June-2014.pdf>.

⁸⁷ Jack Karsten and Darrell West, “The State of Self-driving Car Laws across the U.S.,” blog, Brookings, 1 May 2018, <https://www.brookings.edu/blog/techtank/2018/05/01/the-state-of-self-driving-car-laws-across-the-u-s/>.

Rural areas have been provided broadband access through a separate initiative, the Rural Broadband Initiative, which gives grants for broadband infrastructure in rural areas where Ultra-Fast Broadband is not commercially viable.

Regulatory response following the rollout of the Ultra-Fast Broadband program

The rollout of the Ultra-Fast Broadband network has meant that New Zealand faces a new set of issues to those faced when the Telecommunications Act was designed in 2001. This act was introduced with a focus on competition problems in the sector at that time, such as interconnection of competing networks with Telecom, discrimination in favor of Telecom's retail services, and low levels of competition and investment.

Today, improvements in wireless technologies have led to competition to traditional broadband through mobile networks. Further, the Ultra-Fast Broadband rollout is providing additional competition to the copper networks. This has significant regulatory implications, which are currently being addressed through an update to the Telecommunications Act 2001.

Source: Summarized from the New Zealand case study in Annex 1.

2.4 PROMOTING INCLUSIVE GROWTH, ENVIRONMENTAL SUSTAINABILITY AND RESILIENCY

Under the G7 Ise-Shima Principles for Promoting Quality Infrastructure Investment, delivering quality infrastructure includes ensuring job creation, capacity building and the transfer of expertise and know-how to local communities, as well as addressing potential and actual social and environmental impacts of infrastructure projects.⁸⁸ Further, policies that ensure access to infrastructure can serve a redistributive role in society, which can be supportive of (or a substitute for) tax and transfer schemes. The UN Sustainable Development Goals can be advanced through infrastructure investment, and infrastructure planning processes need to take account of resiliency, including to climate change impacts, over the longer term.

Inclusive growth considerations need to be balanced against value for money considerations for infrastructure projects. For example, investments in remote regions can be costly relative to investment in urban areas, but they may be necessary for social inclusion and continued development of the economy.

This section discusses considerations for infrastructure development with respect to:

- Attaining social development objectives
- Poverty reduction and job creation
- Environmental and social due diligence
- Promoting resilience.

⁸⁸ The Ise-Shima Principles are explained in Section 2.1. See also: G7, "G7 Ise-Shima Principles for Promoting Quality Infrastructure Investment" (Tokyo: Ministry of Foreign Affairs, Japan, 2016), <https://www.mofa.go.jp/files/000196472.pdf>.

2.4.1 Attaining social development objectives

Projects that provide net social benefits may not always be financially viable (i.e., bankable) as it may not be possible to charge for all the benefits flowing from a project. Further, at times, cost-recovery pricing may limit the access of certain groups to essential services creating a trade-off between social and economic objectives.

How could structural policy support it?

Governments can consider support arrangements (through certain funding models) to infrastructure projects offering the greatest net social benefits to society. Examples include:

- **Community service obligations:** These are non-commercial requirements for achieving identified social purposes that a business may elect not to provide on a commercial basis, or that it would only provide commercially at higher prices. An example is a government-owned electricity transmission provider required to provide transmission services to remote communities, which might not be commercially viable. This ensures access is not limited only to areas with high density or income. Universal service obligations are a type of community service obligation where the intention is to have universal provision. Public service obligations and non-commercial service obligations are similar terms (Papua New Guinea's reform, which involved implementing community service obligations, is discussed in Box 2.7).
- **Government financial support for private providers:** There are multiple ways governments can provide support to private providers where social benefits exceed profits. Governments have access to cheaper financing than the private sector. In PPPs, governments can on-lend funds to private participants to address the limitations of financial markets and to make financing cheaper. Governments may also provide guarantees to PPPs to improve their bankability by covering foreign exchange and political risks. Papua New Guinea is an example of an economy that has implemented an on-lending policy for state-owned enterprises (Box 2.7).
- **Government subsidies:** Subsidies targeting poor users will make it possible to increase access to essential infrastructure. This can be effective where privately provided infrastructure is not affordable for groups of consumers but is nonetheless considered essential. One possible solution is to provide favorable financing terms for upfront costs of connection. This can also be achieved through cross-subsidization across a network.

What does a good structural policy look like?

The 'Investing in Canada' plan and the 'Connect to Innovate' program are examples of government interventions to provide infrastructure to rural and remote communities and promote social inclusion (Box 2.14).

Box 2.14: Access to social and digital infrastructure in Canada

In Canada, infrastructure is largely developed, owned and managed by provincial, territorial and municipal governments. In recent years, all orders of government in Canada have increased their investments in infrastructure. Despite this, infrastructure demand has outpaced investments for several decades resulting in congestion in urban centers, too many Canadians struggling to meet their housing needs, insufficient and aging water and wastewater systems and a lack of basic infrastructure in many indigenous communities. Furthermore, Canada's rural and remote regions lag behind urban areas in terms of broadband coverage. Low population density and challenging terrain mean that it can be difficult for the private sector to generate adequate returns and invest in new or upgraded broadband networks in rural or remote regions.

Policy response: 'Investing in Canada' plan

The 'Investing in Canada' plan is built upon extensive research and public engagement that made it clear that Canada faces a broad-based infrastructure gap which is limiting its economic growth and Canadians' quality of life. With historic investments in social infrastructure, public transit, green infrastructure, trade and transportation infrastructure, and rural and northern communities, new federal investments will take advantage of historically low interest rates to renew Canada's infrastructure and improve the quality of life for all Canadians. Over the 12 years of the plan, starting in 2016, the government will invest over CAD 180 billion in infrastructure to achieve three objectives:

- Generate long-term economic growth
- Improve the resilience of communities and transition to a clean growth economy
- Improve social inclusion and socioeconomic outcomes for all Canadians.

Provinces, territories, municipalities and indigenous communities are key partners in developing and implementing the plan. Through the plan, the federal government's increased investment in infrastructure will be further leveraged by all orders of government to more than double the reach of the plan's funding.

The plan includes a Community Employment Benefits program. This gives additional priority to projects that increase employment for apprentices, indigenous peoples, women, persons with disabilities, veterans, youth, and newcomers to Canada, and that boost procurement opportunities for small and medium-sized social enterprises.

The Canadian government sees infrastructure investments as a means for addressing inequalities. Given this, the government will track and report regularly on the following program outcomes:

- The rate of economic growth is increased in an inclusive and sustainable way.
- Environmental quality is improved, GHG emissions are reduced and resilience of communities is increased.
- Urban mobility in Canadian communities is improved.
- Housing is affordable and in good condition and homelessness is reduced year over year.
- Early learning and child care are of high quality, affordable, flexible and inclusive.
- Canadian communities are more inclusive and accessible.
- Infrastructure is managed in a more sustainable way.

Policy response: 'Connect to Innovate' program

Successive Canadian governments have established targeted programs aimed at ensuring inclusive access to broadband infrastructure – particularly in rural and remote areas. In December 2016, the government of Canada launched the CAD 500 million 'Connect to Innovate' program. 'Connect to Innovate' is focused on expanding high-capacity backhaul to underserved rural and remote communities and also on connecting anchor institutions such as schools, hospitals and indigenous government buildings. More broadly, access to community backhaul will support fixed and mobile services to local homes and businesses at faster speeds. The goal is to provide a transformative level of service to rural and remote communities that can both support current needs and scale for long-term growth.

The 'Connect to Innovate' program has been highly successful. The program received close to 900 applications, requesting over CAD 4.4 billion in funding. To date, the government of Canada has announced funding for 139 projects in seven provinces and territories across the economy. These projects will improve connectivity in 740 rural and remote communities.

Source: Summarized from the Canada case studies in Annex 1.

2.4.2 Poverty reduction and job creation

Infrastructure contributes toward poverty reduction over the long term by supporting economic growth, including in remote areas. This is because, aside from the jobs created from

constructing infrastructure, quality infrastructure boosts productivity by improving connectivity, reducing the costs of doing business and connecting remote populations. For example, infrastructure can improve access to job markets through transport and communications infrastructure and can reduce the frictions or transaction costs that may lead to unemployment and deprivation. Agglomeration benefits can arise from this improved connectivity.

Infrastructure can also increase trade and create better commercial opportunities by increasing access to domestic and international goods and services markets. Firms that can transport goods to markets more efficiently or provide services more easily through improved connections will be more profitable. This increases income and incentivizes increased production, which supports economic growth.

In addition, better infrastructure links have the related benefit of lowering the cost of goods and services that the poor consume. For instance, the Asian Development Bank estimates that the annual investment in transport, communications and energy infrastructure in developing Asia is USD 800 billion per annum during the period 2010–2020. The estimated welfare gains from this are USD 1,616.3 billion (in 2008 prices) in 2020, or 10 per cent of projected aggregate GDP that year.⁸⁹

How could structural policy support it?

A well-executed cost–benefit analysis (discussed in Box 2.1) should include all costs (including social and environmental costs) and benefits of an infrastructure project, including the extent to which the investment gives rise to spillover benefits that support growth in the broader economy and therefore assists in poverty reduction and job creation (including employment generation through second-order economic activity). However, the benefits of poverty reduction will not always be able to be fully quantified and hence qualitative judgement is also important.

Structural policy can distribute projects across regions and in this way impact on the distribution of benefits (see Part 1). Infrastructure can bring development with it, such as roads and communication services that improve rural–urban linkages and directly employ locals. Local content policies can ensure the local labor force benefits from job creation and capacity building.

General infrastructure funds can be established to benefit specific regions or populations that may be deprived. These can be viewed as domestic versions of international development banks such as the World Bank or Asian Development Bank, with a smaller scale and scope. These can help with institutional capability – supporting regional organizations to develop plans or feasibility studies. They can also invest in specific sectors identified as economy-wide priorities. Finally, they can act as a bank for infrastructure projects pitched to them by public and private entities – directly addressing the funding gap.

⁸⁹ Biswa Nath Bhattacharyay, Masahiro Kawai and Rajat M. Nag, eds, *Infrastructure for Asian Connectivity* (Cheltenham: Edward Elgar Publishing, 2012), <https://www.adb.org/sites/default/files/publication/159325/abdi-infra-asian-connectivity.pdf>.

What does a good structural policy look like?

APEC has identified many infrastructure policies that can improve urban–rural linkages and hence inclusive growth in a 2016 report.⁹⁰ Policies especially relevant to infrastructure include:

- Building a database of rural and remote geographical territories to assess and overcome development and infrastructure gaps
- Developing an environment to attract private investments and to create a virtuous cycle of savings–investment–growth–employment–income
- Promoting investment for rural–urban connectivity and access to services such as cold storage and retail markets in rural and secondary cities
- Promoting rural–urban business communication networks.

Mexico has undertaken reform in telecommunications, which has contributed to job creation and poverty reduction (Box 2.15).

Box 2.15: Constitutional reform of telecommunications in Mexico

Mexico underwent large-scale reform of the telecommunications sector at the political constitutional level to improve operations. This formed part of a wider political pact for Mexico that provided political stability to enact the contentious reforms.

Pre-reform situation

Mexico’s telecommunications markets were found to perform poorly compared to their OECD peers. The telecommunications sector was characterized by a lack of competition, high prices and weak or inconsistently applied regulations. This resulted in a low rate of penetration of services and poor development of the infrastructure needed to provide them. For example, in 2012, a single company controlled 80 per cent of the landline phone market in Mexico and 70 per cent of the wireless market, while over three quarters of households lacked access to the Internet.

Policy response

In 2013, an initiative was begun to add various provisions to the Political Constitution of the United Mexican States. The provisions and subsequent regulatory and legislative changes in the telecommunications sector included:

- Creation of an autonomous regulatory body acting independently in its decisions and operation: the Federal Telecommunications Institute (IFT by its acronym in Spanish). The IFT is responsible for the regulation, promotion and oversight of the use, development and operation of the radio spectrum and broadcasting, and for access to essential inputs for telecommunications services. It is also the competition authority in the telecommunications and broadcasting sectors – with ample powers to enforce independent regulation based on evidence-driven decision making.
- Introduction of rules for bidding for new concessions for broadcasting television frequencies, including grouping at least two new television channels with economy-wide coverage.
- Elimination of FDI restrictions.
- Release of sufficient spectrum and promotion of infrastructure sharing in order to meet the growing demand for mobile broadband services.

⁹⁰ APEC, “Strategic Framework: Rural–Urban Development to Strengthen Food Security and Quality Growth” (Singapore: APEC, 2016), <http://www.apec.org/-/media/Files/Groups/PPFS/4-Framework-for-RualUrban-Development-for-Food-Security.pdf>.

- Determination of ‘preponderant economic agents’ (monopolistic entities) in the telecommunications and broadcasting sectors to allow the regulation of these.
- Establishment of measures that allow the effective disaggregation of local telecommunications networks owned by incumbents.
- Review of the current concession titles, to verify compliance with their terms, conditions and modalities.
- Establishment of Telecomunicaciones de México to have the authority and resources to promote access to broadband services, and to plan, design and execute the construction and growth of a robust telecommunications backbone infrastructure.
- Installation of a wholesale wireless service network using 90 MHz (released with the transition to digital television) in the 700 MHz band, with a target to cover 92.2 per cent of the population by 2024 guaranteed by the federal branch.

Impact

New players were able to access the mobile market, increasing competition. FDI in the sector increased from 1 per cent of total FDI before the reform to 8 per cent in 2015. Quality of service has improved, particularly broadband speeds and data volumes. Between 2012 and 2016, prices for telecommunication services significantly decreased, leading to an important increase in subscriptions, especially in mobile markets (over 50 million new mobile subscriptions to the Internet).

These reforms decreased effective poverty in Mexico by allowing the poor to access telecommunication services more cheaply, thereby leaving more income available for other purchases. The increased access also increased penetration of mobile services, which increased utility directly but also increased connectivity among the poor to the wider jobs and goods markets. From a small base, the number of people in Mexico using the Internet for online transactions has multiplied by a factor of four from 2012 to 2016.

Source: Summarized from the Mexico case study in Annex 1.

2.4.3 Environmental and social due diligence

Infrastructure can improve living standards, but there can also be negative social and environmental impacts such as displaced communities, pollution, habitat loss, inequitable outcomes, and economic or social impacts for communities. Structural policies can mitigate such negative impacts, ensure development is within environmental limits or provide adequate compensation arrangements to affected groups. Mitigation of, or compensation for, negative impacts can assist in reducing opposition to future projects that may have high benefit-to-cost ratios. Beyond that, government policies and infrastructure investment can also be aimed toward addressing social and environmental impacts that arise outside of infrastructure, such as through considering the role of infrastructure in smart city development.

How could structural policy support it?

Key structural policies aimed at ensuring that environmental and social impacts are appropriately managed are:

- Environmental regulatory standards (or safeguards) and assessments

- Requirement to assess and manage the negative impacts of infrastructure development on communities (one example is the OECD’s responsible business conduct standards discussed in Box 2.16)⁹¹
- Cost–benefit analysis, which should include all costs, including social and environmental impacts, in order to ensure a comprehensive analysis and transparency as to impacts (discussed in Box 2.1).

Environmental regulation encompasses a wide range of measures. Minimum environmental standards and protected species legislation that infrastructure projects must abide by are important in reducing the environmental impacts of infrastructure. Examples include minimum river flow requirements for hydropower plants; or protections for endangered species that require construction to proceed in ways that guarantee habitat availability for minimum populations to continue to thrive.

Requiring an environmental impact assessment for projects affecting the natural environment in the planning stage can help ensure these standards are met. Open and free access to environmental data can help developers to plan mitigation measures and reduce the cost of environmental impact assessments. Such assessments should not be viewed in isolation; social issues should also be taken into account. For example, the loss of an adequate standard of living and livelihoods experienced by communities impacted by infrastructure development should be considered. Environmental regulation needs to be matched with sufficient institutional capacity to implement, monitor and enforce requirements.

Responsible business conduct standards are comprehensive standards aimed at helping businesses ensure that expectations on labor, environmental and human rights issues are adequately addressed. For example, a recent UN study looked at the potential human rights consequences of infrastructure projects and plans, and found that these are not addressed at a systemic level.⁹² Tools exist for businesses and governments alike to address these gaps. For example, the OECD has developed guidance on social and environmental due diligence that sets out expectations for responsible business conduct (Box 2.16).

Stakeholder engagement with communities is an integral component of the identification and mitigation of negative impacts on communities and building support for projects. A structural policy should ensure meaningful stakeholder engagement at both the planning and building stages of an infrastructure project. These interactions should be based on international best practice and standards, and there should be recognition that a change in processes and plans may be needed for the continued success of the project.

Displaced communities can also benefit from effective structural policies. The European Bank for Reconstruction and Development has a comprehensive Resettlement Guidance and Good Practice document.⁹³ One key policy is setting up a legal framework for land acquisition. A census and socioeconomic survey should be carried out before a project begins in order to establish the existing conditions. This should include a list and map of affected plots and assets.

⁹¹ “Policy Framework for Investment: Responsible Business Conduct”, OECD, accessed 2 July 2018, <https://www.oecd.org/investment/toolkit/policyareas/responsiblebusinessconduct/>.

⁹² Office of the UN High Commissioner for Human Rights (OHCHR), “Baseline Study on the Human Rights Impacts and Implications of Mega-infrastructure Investment” (Geneva: OHCHR, 2017), https://www.ohchr.org/Documents/Issues/Development/DFI/MappingStudyontheHRRiskImplications_MegaInfrastructureInvestment.pdf.

⁹³ European Bank for Reconstruction and Development (EBRD), *Resettlement Guidance and Good Practice* (London: EBRD, 2017), www.ebrd.com/documents/environment/pdf-resettlement-guidance-and-good-practice.

This can be updated over time, but a clear cut-off date should be established for the census and survey to be completed.

Where communities do experience negative impacts, compensation arrangements can be used to ensure that affected communities are at least as well off as they were prior to the project commencing. A survey can help in designing the most appropriate compensation entitlements – monetary compensation for land or assets; lost income support; or resettlement and assistance for livelihood restoration. It also determines who is eligible for compensation – those present in the area or having legal rights to the land. Individuals should be given a choice where possible as to what kind of compensation they wish to receive, while communal assets should be replaced in kind where possible. A displacement policy should ensure this process has independent oversight, separate from the developer.

What does a good structural policy look like?

The OECD has developed a guidance on social and environmental due diligence (Box 2.16).

Box 2.16: OECD guidance on social and environmental due diligence

The OECD Due Diligence Guidance for Responsible Business Conduct provides practical support to enterprises on the implementation of the OECD Guidelines for Multinational Enterprises by providing plain language explanations of its due diligence recommendations and associated provisions. Implementing these recommendations can help enterprises avoid and address adverse impacts related to workers, human rights, the environment, bribery, consumers and corporate governance that may be associated with their operations, supply chains and other business relationships. The guidance includes additional explanations, tips and illustrative examples of due diligence.

The guidance also seeks to promote a common understanding among governments and stakeholders on due diligence for responsible business conduct. To do so, it was developed in close consultation with the Office of the United Nations High Commissioner for Human Rights (OHCHR), the International Labour Organization (ILO) and the UN Working Group on Business and Human Rights. It aligns with the UN Guiding Principles on Business and Human Rights and the ILO Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy. As such it represents a tool for business to respond to the due diligence expectations of all leading international instruments on responsible business conduct. The Due Diligence Guidance for Responsible Business Conduct was adopted by the OECD Ministerial Council Meeting on 30–31 May 2018.

The Guidance responds to the G7 Leaders' Declaration adopted on 7–8 June 2015 in Schloss Elmau, which recognized the importance of establishing a common understanding on due diligence, particularly for small and medium-sized enterprises, and encouraged headquartered and active enterprises in their economies to implement due diligence in their supply chains around the world. G20 leaders committed, in the Declaration adopted on 8 July 2017 in Hamburg, to fostering the implementation of labor, social and environmental standards and human rights protection in line with internationally recognized frameworks in order to achieve sustainable and inclusive supply chains, and underlined the responsibility of businesses to exercise due diligence in this regard.

Source: Compiled by the OECD.

ABAC has provided Box 2.17 on the role of digital technologies in developing smart cities.

Box 2.17: Digital technologies to improve sustainability in smart cities

In many APEC economies, there are cities that are on their way to becoming ‘smarter’. Every smart city project has a plethora of initiatives that have either immediate or medium-term prospects of achievement, from the Internet of Things using sensors and smart meters, to electric vehicles and autonomous vehicles. The ABAC report on structural reform and digital infrastructure suggests there are another set of challenges, such as aging populations, environmental pollution and the long-run impact of climate change, that urgently need attention. While governments cannot do it all, they are in the best position to lead, and involve the private sector and local communities. For example, although China suffers from some of the worst effects of pollution and GHGs, it is also among the global leaders in green technologies and policies such as clean energy and carbon certificate trading which is designed to incentivize the use of ICT to reduce GHGs.

In Singapore, various green technologies are being used as the economy makes the transition to a ‘smart nation’, experimenting with everything from smart homes to self-driving automated vehicles. In Hong Kong, China, a high-level internal committee chaired by the Chief Executive, the Steering Committee on Innovation and Technology, has been set up to steer development of I&T and smart city initiatives. Also, the Smart City Blueprint for Hong Kong, China was published in December 2017 with a chapter dedicated to ‘Smart Environment’. In Latin America, Chile lists 11 cities as becoming smarter;^a and in Mexico, both Guadalajara and Mexico City have entered the lists of smart cities.^b In 2014, Peru initiated a feasibility study on smart city development in the San Borja district of its capital, Lima.^c More recently, Lima has sought investment from Spanish companies with expertise in smart city development.^d In one index, over the last decade, Lima has jumped from 26th to 8th for the ease of doing business in Latin America.^e No city can become ‘smart’ overnight, but every city can become smarter, and APEC economies should be well placed to create the right mix of technologies, policies and regulations, and markets, especially if APEC encourages the openness to foreign participation demonstrated by Lima.

Notes:

^a Yessica Cartajena, “Smart Cities in Latin America” (presentation, United Nations Commission on Science and Technology for Development, 2016), http://unctad.org/meetings/en/Presentation/CSTD_2015_ppt05_Cartajena_en.pdf.

^b Victor M. Larios, “Smart City, Smart Future: Guadalajara, Mexico”, IEEE.org, 2018, <https://iot.ieee.org/articles-publications/smart-city-smart-future-guadalajara-mexico.html>; “Mexico City in the 2016 Smart Cities List!”, *Mxcity*, 2016, <http://en.mxcity.mx/2016/12/2016-smart-cities-list/>.

^c Asia Pacific Energy Research Centre (APEREC), *A Study on Smart Communities in the APEC Region* (Tokyo: APEREC, 2015), https://aperc.ieej.or.jp/file/2016/1/12/A_Study_on_Smart_Communities_in_the_APEC_Region.pdf.

^d Mike Dreckschmidt, “Peru Looks to Bring Smart City Companies from Spain”, *Living in Peru*, 18 July 2017, <http://www.livinginperu.com/peru-looks-bring-smart-city-projects-spain/>.

^e Augusto Rey, “Lima: The Impetus of the Peruvian Capital” *UNO*, no. 29, 2017, <http://www.uno-magazine.com/uno-29/lima-the-impetus-of-the-peruvian-capital/>.

Source: ABAC Report on Structural Reform and Digital Infrastructure.

2.4.4 Promoting resilience

The United Nations definition for resilience is: ‘The ability of a system, community or society exposed to hazards to resist, absorb, accommodate and recover from the effects of a hazard in

a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions'.⁹⁴

Infrastructure resilience is broader than just preparing for and managing specific events such as earthquakes, or the technical failure of a piece of infrastructure. Consideration should be given to all potential threats to a system including the slow-onset impacts of climate change, and to thinking about interdependencies within and between systems and the impact of events on the level of service. In the circumstances of rapid digital economy development, where all infrastructural objects are becoming interconnected by ICT, special attention should be given to security in the use of ICT. In the face of these issues and challenges, the concept of resilience puts the focus squarely on the need to develop capacity to anticipate, absorb, adapt to and rapidly recover from a potentially disruptive event.

Figure 2.1: Resilience attributes



Source: New Zealand Individual Economy Report.

Increasing resilience is therefore not just about building stronger infrastructure. The role of operational changes and community preparedness and planning in mitigating the costs of hazards is vital. The attributes of infrastructure resilience are summarized in Figure 2.1 and elaborated below.⁹⁵

- **Service delivery:** The robustness of a system in providing access to infrastructure services in adverse conditions.
- **Adaptation:** The capacity to withstand disruption, absorb disturbance and act effectively in a crisis, responding appropriately to the changing circumstances in the hazards facing society.
- **Community preparedness:** Communities' readiness to respond to a crisis in a way that minimizes disruption and danger. This could include warning systems, planning and public education.

⁹⁴ United Nations International Strategy for Disaster Reduction (UNISDR), *2009 UNISDR Terminology on Disaster Risk Reduction* (Geneva: UNISDR, 2009), 24, <https://www.unisdr.org/we/inform/publications/7817>.

⁹⁵ For more discussion of resilience and these attributes, see: National Infrastructure Unit, New Zealand, "Infrastructure Evidence Base: Resilience" (Wellington: New Zealand Treasury, 2014), <https://treasury.govt.nz/sites/default/files/2017-12/nip-evidence-resilience.pdf>.

- **Responsibility:** Making obligations clear between different groups: owners, operators, users, policymakers and regulators.
- **Interdependencies:** The recognition that resilience in one system may rely on the functioning of another, which includes acknowledging supply chain and weakest link vulnerabilities.
- **Financial strength:** The ability of infrastructure providers (including governments) to withstand the financial losses and requirements for new investment that can emerge because of shocks.
- **Continuous:** The fact that resilience efforts need to be ongoing, recognizing that infrastructure resilience will always be a work in progress. For example, risk management plans should be revisited at scheduled dates – controlling for a changing environment and economy.
- **Organizational performance:** Leadership and institutional culture that are conducive to constantly improving resilience.

How could structural policy support it?

Disruptions to infrastructure services due to emergent and shock events reduce the benefits that infrastructure assets can provide over their life-cycle. The period after shock events may also be the time infrastructure is most valuable or necessary. For example, transportation systems that fail in extreme weather events such as hurricanes will slow down recovery after the event. Infrastructure that this applies to is called ‘critical infrastructure’, defined as:

*The primary physical structures, technical facilities and systems which are socially, economically or operationally essential to the functioning of a society or community, both in routine circumstances and in the extreme circumstances of an emergency.*⁹⁶

Critical infrastructure includes transport and telecommunication systems, electricity, water and communications systems, hospitals and health clinics, and centers for fire, police and public administration services. Access to critical infrastructure improves quality of life and saves lives. Even where these critical infrastructure services are determined to be best provided on a commercial basis in normal circumstances, the ability for them to function effectively during and following a disaster should be assured as this produces a large positive externality for society.

The benefit of building and preparing for resilience should be incorporated into business cases. However, resilience can be undervalued or not considered when undertaking an economic evaluation of new infrastructure as the risk of a hazard materializing can be hard to measure; some risks emerge slowly, and the consequences of not building for resilience might not be felt for a long time.⁹⁷ Consideration should be given, for example, to the benefit of building stronger infrastructure, or implementing mitigation policies such as those discussed next, versus the expected costs that would arise if an adverse event occurred. For example, some studies show that building disaster resilience is cost-effective compared to late humanitarian

⁹⁶ Italics added. “Critical facilities”, in UNISDR, *2009 UNISDR Terminology on Disaster Risk Reduction*, 8–9.

⁹⁷ C. Gallego-Lopez and J. Essex, *Designing for Infrastructure Resilience* (London: Department for International Development, UK, 2016), https://assets.publishing.service.gov.uk/media/57d6bc5be5274a34fb00002e/Designing_for_Infrastructure_Resilience_July_2016_external.pdf

response.⁹⁸ Emergent risks, such as risks from climate change, need to be actively managed; making infrastructure resilient to climate change risks will assist economies in adapting to climate change and can mitigate any climate-related shock event (like flooding).

Structural policies can encourage providers to improve the resilience of infrastructure systems on several levels:⁹⁹

- **Robustness:** This refers to the inherent resistance or strength in a system to withstand external demands without degradation or loss of functionality. For example, in electricity, this would include the extent to which the physical infrastructure for generation and transmission of electricity can withstand hazards and continue providing electricity normally to consumers. Regulation can help build robustness; for example, minimum building standards can be used to ensure the infrastructure remains functional under a certain level of physical stress.
- **Redundancy:** This refers to system properties that allow for alternate options, choices and substitutions under stress. For example, in electricity infrastructure, this would be having sufficient backup generation and a grid that is able to withstand a line being broken. Standards and regulations are important here. So are policies that aid coordination between groups in a sector and between sectors to provide redundancy, recognizing the interdependence of different sectors.
- **Resourcefulness:** This refers to the capacity to mobilize needed resources and services in emergencies. There are limits to how robust or redundant infrastructure can be made at a reasonable cost. For electricity, this is having the necessary expertise and parts where they are needed to respond to disruption. A slow-onset hazard may require the provision of alternative electrical service delivery rather than repeated rebuilding of current standard infrastructure. Structural policies can establish the clear responsibility, adaptation and community preparedness to help achieve this.
- **Rapidity:** This refers to the speed at which a disruption can be overcome, and safety, services and financial stability restored. This requires financial strength for providers. Financial tools can support resilient infrastructure and include project-specific tools, such as insurance arrangements, and system-wide tools, such as contingent liability planning by the central ministry of finance or treasury, and fiscal buffers or funds (e.g., the Earthquake Commission in New Zealand). Adequate contingency planning by the government ensures that, following shock events, funds can be made available to rebuild infrastructure quickly.

While resilience provides many benefits, there are also costs. If the costs are too high, then investments cease to be economically justified. Therefore, it is important to provide resilience efficiently, in the most cost-effective way. In relation to infrastructure, the cost-effectiveness of prevention will be enhanced where governments provide adequate infrastructure and

⁹⁸ Courtenay Cabot Venton, Catherine Fitzgibbon, Tenna Shitarek, Lorraine Coulter and Olivia Dooley, “The Economics of Early Response and Disaster Resilience: Lessons from Kenya and Ethiopia” (2012).

⁹⁹ M. Bruneau, S. Chang, R. Eguchi, G. Lee, T. O’Rourke, A. Reinhorn, M. Shinozuka, K. Tierney, W. Wallace and D. von Winterfelt, “A Framework to Quantitatively Assess and Enhance the Seismic Resilience of Communities”, *Earthquake Spectra* 19, no. 4 (2003): 733–52, cited in T.D. O’Rourke, “Critical Infrastructure, Interdependencies and Resilience”, *The Bridge* 37, no. 1 (Spring 2007): 25, <http://www.nae.edu/File.aspx?id=7405>

services by not deferring high-return spending like maintenance and by applying higher margins of safety to critical infrastructure.¹⁰⁰

¹⁰⁰ World Bank and United Nations, *Natural Hazards, UnNatural Disasters: The Economics of Effective Prevention* (World Bank, 2010).

What does a good structural policy look like?

Climate change resilience

The G20 climate and sustainability working group supported by the OECD has undertaken substantial work on resilience to climate change. Box 2.18 presents a summary of the work.

Box 2.18: Climate-resilient infrastructure

New and existing infrastructure needs to be (re-)designed, built and operated to take into consideration the impacts of climate change. Rising temperatures, increased flood risk and other climate impacts will affect infrastructure. These may result in decreased service reliability and increased maintenance costs, and may reduce the lifetime of infrastructure assets. Climate change may also influence the demand for infrastructure services, such as energy for heating and cooling buildings.

Given that infrastructure underpins economic development, increasing the resilience of infrastructure is an essential part of the challenge of adapting to a changing climate. Climate-resilient infrastructure can improve the reliability of service provision, increase asset life and protect asset returns. Best practices of governments that are taking action tend to focus on creating conducive framework conditions and mobilizing finance for climate-resilient infrastructure. Among these practices are:

Strengthening the enabling environment for the development of resilient infrastructure

- Invest in the provision of climate data and projections, combined with efforts to make that information easily accessible to end users
- Mainstream climate resilience into key policy areas, including in:
 - The design and implementation of spatial planning frameworks (to improve disaster risk management, reduce vulnerability and prevent the construction of new infrastructure in exposed areas)
 - Infrastructure project and policy appraisals, including strategic environmental assessments and environmental impact assessments
 - Regulatory, engineering and economic standards (including building codes)
- Encourage the disclosure of climate-related risks by infrastructure owners and operators.

Mobilizing public and private investment in climate-resilient infrastructure

- Examine the potential for nature-based, flexible or innovative approaches to climate-resilient infrastructure to prepare for the impacts of uncertain climate change.
- Develop infrastructure plans to provide a strategic view of how climate change will affect infrastructure needs in the coming decades, and design sequenced packages of investment ('pathways') that address interconnections and increase resilience in a way that cannot be achieved by looking at projects in isolation.
- Ensure that public procurement policies account for costs over the asset lifetime. For PPP contracts, it is important to clarify the allocation of responsibilities regarding climate-related risk planning, management and response.
- Undertake proportionate screening of public sector infrastructure investment to ensure that it is consistent with climate resilience.
- Use public finance to build capacity for project preparation to address capacity constraints relating to climate resilience. Blended finance may be used to improve the risk–return profile of investments where appropriate.

Source: Compiled by the OECD.

Institutional arrangements

Community preparedness and institutional capability are important in achieving resilient communities. Box 2.19 provides some examples.

Box 2.19: Resilience in Canada and New Zealand

Canada

Climate change is affecting the frequency and severity of extreme weather such as heatwaves and major precipitation events, as well as the occurrence of natural hazards such as floods, wildfires and droughts. These effects threaten safety and security, economic wellbeing, and access to essential services Canadians depend on.

In 2018, the government of Canada launched the CAD 2 billion Disaster Mitigation and Adaptation Fund under its 'Investing in Canada' plan.

- The Disaster Mitigation and Adaptation Fund will fund large-scale infrastructure projects over 10 years (2018–2028).
- The program will strengthen the resilience of Canadian communities to natural hazards and extreme weather through investments in large-scale infrastructure, including natural infrastructure.
- Investments will reduce the impacts of events such as floods, wildfires and seismic events, and slow-onset hazards such as the northern permafrost thaw and coastal sea-level rise; and protect Canadian communities from potentially devastating social and economic losses.

The Disaster Mitigation and Adaptation Fund is a key element of the government of Canada's commitments outlined in the Pan-Canadian Framework on Clean Growth and Climate Change. Specifically, these commitments include building climate resilience through infrastructure, and reducing climate-related hazards and disaster risks. Canadian provinces, territories, municipalities, public sector bodies, and indigenous communities are all eligible to apply to the program.

New Zealand

Transport infrastructure

The New Zealand government recognizes the transport system as critical infrastructure. The Ministry of Transport therefore identified transport system resilience as a priority and plays a key role in providing cross-sector leadership on resilience with the goals of:

- Planning, preparing and responding to events impacting on the transport system
- Building a longer-term resiliency strategy
- Encouraging engagement and collaboration across the transport sector
- Providing clear advice on government policy.

A government policy statement on land transport is issued by the Minister of Transport and guides the strategy on how land transport funds are invested over the next decade. The 2018 statement includes an explicit objective for investments to consider resilience, with a focus on the impacts of climate change.

Institutional preparedness

The creation of the New Zealand Lifelines Council in 1999 is an example of an approach toward building institutional capability with regard to resilience. The council aims to 'enhance the connectivity of lifeline utility organizations across agency and sector boundaries in order to improve infrastructure resilience'. The council is a community of critical infrastructure providers that share interdependencies, including telecommunications, electricity and gas, water and road providers, and government agencies.

The council undertakes several functions, including:

- Advising on best practices for resilience across a range of activities
- Providing a link between resilience work across government agencies
- Promoting and promulgating resilience-related research
- Organizing an annual National Lifelines Forum.

Source: (1) Innovation, Science and Economic Development Canada (ISED) (2) New Zealand Individual Economy Report.

Fiscal and financial resiliency

Financial resiliency of governments and entities exposed to infrastructure risks is important to ensuring the system can recover from damage. Governments can make reforms to fiscal and accounting policy to provide greater financial resiliency. The World Bank Group and the OECD developed a working paper titled ‘Managing disaster risk related contingent liabilities in public finance frameworks’ that discusses policies governments can adopt to manage fiscal risks and especially disaster-related contingent liabilities.¹⁰¹ Key policies identified are:

- Clearly establishing institutional arrangements and responsibilities for disaster-related fiscal risk management, whether through a centralized model where the treasury has responsibility, or a decentralized model as in Australia where agencies produce their own annual reports, contributing to a fiscal risk statement published in the budget.
- Effective identification, quantifying and disclosure of contingent liabilities. For example:
 - The Philippines explicitly calculated a debt sustainability analysis under natural disasters in their 2013 Fiscal Risk Statement.¹⁰²
 - In Australia, the annual Statement of Risks publication within the budget contains a specific category for ‘significant but remote’ contingent liabilities;¹⁰³ and New Zealand follows a similar approach with a chapter in its budget on specific fiscal risks.¹⁰⁴
 - For Chile, the Fiscal Responsibility Law mandates that the government provide information on contingent liabilities (Box 2.20).
- Effective disaster risk management. For example:
 - Japan has the Disaster Relief Act (1947), which establishes central government support for disaster relief and welfare support, including the repair of private housing and cash transfers. The Disaster Countermeasures Act (1961) allocates the central and local governments’ responsibilities for disaster risk management, and defines fiscal mechanisms for disaster response, including subsidies, taxes and debt measures. The Natural Disaster Victims Relief Law (1998) extended the scope of the government’s financial responsibility and established the central government’s responsibility for disaster relief at 80 per cent.
 - A series of laws in Japan also provide government support for insurance (earthquake, agricultural, fisheries, fishing boat and forest) and establish a contingent liability for the central government with respect to a portion of the payouts. For example, the Japanese government is responsible for a specific share of the losses covered by Japan Earthquake Reinsurance, which increases with the amount of overall losses and is revisited on a periodic basis based on the capacity of the insurance sector to

¹⁰¹ Catherine Gamper, Benedikt Signer, Luis Alton and Murray Petrie, “Managing Disaster-related Contingent Liabilities in Public Finance Frameworks” (OECD Working Papers on Public Governance, no. 27, Paris: OECD Publishing, 2017), <http://dx.doi.org/10.1787/a6e0265a-en>.

¹⁰² Bureau of the Treasury, Philippines, *Fiscal Risks Report 2013* (2013), <http://www.treasury.gov.ph/wp-content/uploads/2018/01/FRS-2013.pdf>. The statement is updated annually, with the series available at http://www.treasury.gov.ph/?page_id=7376.

¹⁰³ Department of the Treasury, Australia, “Australia Budget 2018 –Statement 9: Statement of Risks” (2017), https://www.budget.gov.au/2017-18/content/bp1/download/bp1_bs9.pdf.

¹⁰⁴ New Zealand Treasury, “Budget Economic and Fiscal Update 2018”, The Treasury, 17 May 2018, <https://treasury.govt.nz/publications/efu/budget-economic-and-fiscal-update-2018-html#section-7>.

cover earthquake losses. This provides financial resilience in an economy with concentrated seismic risk.

- Management of fiscal risks with *ex-ante* mitigation tools such as dedicated reserve funds, reinsurance, contingent credit facilities and catastrophe bonds. For example, in New Zealand, the Earthquake Commission covers a fixed amount of losses for dwellings and property contents in the event of a natural disaster. Losses beyond the cap are covered by private insurance. The commission is funded via a levy which is applied to private insurance premiums and accumulates in a fund that is used to pay claims.

Box 2.20: Measuring and valuing contingent liabilities in Chile

The Fiscal Responsibility Law mandates that the Chilean government provide information on contingent liabilities. The Budget Directorate in the Ministry of Finance must reveal the total amount and characteristics of government guarantees on an annual basis. These contingent liabilities, given the size, are taken into account when calculating the structural balance target.

Since 2007, the Budget Directorate has published a report on contingent liabilities yearly. This report presents sensitivity analysis on the minimum income guarantee for concessions; government guarantees on debts of government-owned enterprises; guarantees for higher education loans; government deposit guarantees; the Chilean Economic Development Agency's hedge fund risk and small business guarantee fund; and guarantees for the pension system.

In the particular case of PPPs, it should be noted that Chile started estimating the fiscal effect of revenue guarantees and revenue sharing for PPP in the late 1990s. This work led to the development of a spreadsheet model that could estimate the expected cost of revenue and exchange rate guarantees (and the expected revenue from revenue- and gain-sharing arrangements) for each year of each concession. The model also generated an estimate of the probability distribution of future spending and revenue each year, which allowed estimates of cash flow at risk and similar measures. The Ministry of Finance took over the model and developed it further, extending its scope to include airports as well as roads. The ministry now uses the model to estimate the cost of possible guarantees, to set guarantee fees and to report information on the costs and risks of guarantees.

Sources:

- Camila Vammalle and Ana Maria Ruiz Rivadeneira, "Budgeting in Chile", *OECD Journal on Budgeting* 16, no. 3 (2017), <https://doi.org/10.1787/budget-16-5jfw22b3c0r3>.
- Timothy Irwin and Tanya Mokdad, "Managing Contingent Liabilities in Public-Private Partnerships: Practice in Australia, Chile, and South Africa" (Washington, DC: World Bank, 2010), <http://documents.worldbank.org/curated/en/998191467987871769/pdf/101491-WP-PUBLIC-Box394815B-WB-ManagingContingentLiabilitiesAustraliaChileSoAfrica.pdf>.
- Compiled by the OECD.

2.5 POLICY CONCLUSIONS AND WAY FORWARD

Over the coming decades, demand for infrastructure in the APEC region will increase with its growing populations and rising incomes. As such, there is an urgent need to develop efficient long-term infrastructure planning processes. If such processes are not developed, economies risk stifling economic development, lowering competitiveness and worsening living standards for their people.

However, developing quality infrastructure that supports inclusive and sustainable growth requires a mix of structural policies and an integrated approach across many policy areas. Infrastructure not only needs to be productive and financially attractive (where private funds are sought), governments should also have regard for social development goals, sustainability, environmental impacts and the desired level of resiliency and the need to adapt to climate change.

Further, it is imperative that structural policies and reform be done in sync with the development priorities of individual economies. Economies are at different stages of development with different social challenges and will therefore prioritize structural reform differently. Well-crafted and forward-looking policies focusing on the needs of the member economy can ensure that the interventions have the most beneficial outcomes for that economy and utilize resources most efficiently.

Examples of reforms in APEC as well as best practices from existing literature highlighted in this report point to the following menu of structural policies that are important to achieving the nine outcomes set out at the start of Part 2, and thereby supporting quality infrastructure:

1. **Developing a credible pipeline of bankable projects will support prioritization of public expenditure and attract private investment.** A pipeline must have broad political backing to provide longer-term certainty to external investors and stakeholders. More specifically, to improve prioritization, APEC economies could consider:
 - Establishing/developing formal processes that ensure investment and risk assessments of infrastructure projects take place on a systematic basis. These processes should evaluate project costs and benefits through analytical methods such as cost–benefit analysis and further develop institutional structures to formalize this process. One example is the Chilean National Public Investment System.
 - Establishing processes to ensure that the assessments of infrastructure investment are unbiased and consistent – including through requiring that a different organization to the agency implementing a project conduct or review the evaluation (as in the case of Infrastructure Australia); and conducting investment assessments separately to determining the mode of procurement, such as with the budget rule of the New South Wales state government.
 - Seeking coordination and alignment of priorities across the different levels of governments to establish rigorous project prioritization. An example can be found in New Zealand where the Auckland Transport Alignment Project coordinates across both central and local governments.
2. **Creating long-term plans will ensure current investment decisions are consistent with longer-term drivers of infrastructure needs and fiscal constraints.** Long-term drivers of needs and objectives across sectors and a shared strategy to achieve the

objectives should be established. Future spending should be considered through sound fiscal planning and clear funding arrangements developed for the private sector to catalyze private infrastructure investments. This may need the development of accounting standards that require regular reporting on the state of public assets to ensure that the long-term condition of assets is considered in the planning process. One example is the ‘Investing in Canada’ plan which forecasts future infrastructure spending for the next 12 years and anticipates investing CAD 180 billion to modernize infrastructure in Canada.

3. **Standardization in infrastructure procurement and management approaches can improve the quality of infrastructure by enhancing capability and reducing opportunities for corruption and can lower the costs of infrastructure provision.** For example, the creation of transactional and contractual frameworks, templates for information, and finance structures can facilitate investment and can lower costs through improved transparency, security, administration and due diligence. Standardized approaches to project-level financial data can also assist in attracting private finance by providing confidence in the information provided. The OECD public procurement standards, the G20 principles for promoting integrity in public procurement and the WTO Agreement on Government Procurement are examples of procurement standards while ISO 55000 is an example of a management standard.
4. **Promoting private sector involvement in the provision of infrastructure, or the services from infrastructure, can improve efficiency, innovation and affordability.** Structural policies that support competition and the ease of entry into markets for the provision of infrastructure include:
 - Considering the ideas discussed at the APEC Conferences on Good Regulatory Practice, such as single online locations for regulatory information.
 - Reducing barriers to international entry for the provision or construction of infrastructure assets. An example can be seen in Viet Nam, where in 2001, the government opened the ISP business to the private sector; and its WTO accession led to it making commitments to offer market access to WTO members.
 - Reducing the complexity of establishing a business and ensuring regulations do not favor incumbent firms.
 - Allowing open tenders for projects and operating with transparency in procurement through stated, robust processes. For example, Korea has adopted an e-procurement system, KONEPS.
 - Increasing competition through unbundling the competitive parts of infrastructure services; and implementing policies that support competition in these markets such as facilitating consumers to switch between providers. Vertical unbundling may be necessary to ensure potential competitors have fair access to the specific links in infrastructure provision with natural monopoly characteristics. An example of such reforms is those carried out within Mexico’s electricity market to unbundle the operation of electricity services.
5. **Modifying institutional arrangements to support private sector financing of infrastructure will help meet future infrastructure needs and lower fiscal burdens.** Infrastructure financing needs exceed the ability of governments to provide funding and hence private sector financing is critical to improving living standards through sound infrastructure investment. Governments must fulfil certain core functions to prepare

and develop infrastructure projects attractive to the private sector and must undertake certain *ex-post* monitoring roles. These include:

- Adequate project preparation to ensure technical, legal, economic, financial, social and environmental viability
- Independent project evaluation, which should include value for money assessments
- Provision of fiscal support (if necessary) for projects of high net social benefit but that may not be financially viable
- Ongoing monitoring and evaluation after the procurement process is finalized
- Oversight and management to ensure value for money is delivered
- Management of fiscal commitments to ensure fiscal sustainability
- Managing the risk–return characteristics of a project through the use of legislation and best practice procurement guidelines.

Additionally, deepening or broadening capital markets, reducing barriers to foreign investment, creating a stable policy environment and enabling a diversity of financing sources can also support private sector investment.

6. **Ensuring regulatory systems are adaptive and incentivize technology uptake and innovation.** Governments should regularly review, and consider the adaptability of, regulatory systems and legislation to accommodate new infrastructure technology and to adapt to the impacts of new technologies on market dynamics. Where there are positive net benefits (that exceed financial benefits), government investment in new technology may support economic growth and wellbeing. An example of such investment is New Zealand’s Ultra-Fast Broadband program which subsidized the rollout of the fiber-to-the-home network.
7. **Aligning investment decisions with development strategies will help to ensure that infrastructure investment decisions also assist in meeting social objectives.** Quality infrastructure will ensure job creation, capacity building and the transfer of expertise and know-how to local communities. The location of infrastructure has implications for the distribution of returns from the infrastructure. Where there is a tension between commercial and social objectives, governments can consider the following structural policies to assist in meeting distribution or social objectives:
 - **Community service obligations:** These require business enterprises to achieve identified social purposes that they would not have chosen to provide on a commercial basis, or that they would only provide commercially at higher prices.
 - **Government financial support to private providers:** This may be justified where the social benefits of a project are greater than the financial benefits.
 - **Government subsidies to those on low incomes:** Subsidies to users make it possible to increase access to essential infrastructure.
8. **Social and environmental impacts must be taken into account through structural policy for infrastructure aimed at mitigating effects.** Infrastructure has impacts on the environment and can also negatively affect certain communities, including in remote areas. Implementation of responsible business conduct standards can help ensure that consideration of social and environmental impacts is well integrated across all stages of the infrastructure life-cycle processes. Additionally, these impacts can be mitigated by: (1) establishing environmental, safety, habitat protection and other relevant standards or safeguards; (2) mandating stakeholder engagement with

communities throughout the entire project life-cycle; (3) supporting compensation arrangements to guarantee that affected communities are at least as well off as they were prior to the project commencing; and (4) promoting the use of digital technologies to assist in the development of smart cities.

9. **Ensuring sufficient resiliency of infrastructure, fiscal balances and entities to potential disruptive events can minimize costs and disruption over time.** Structural policies that ensure increased resilience include:

- Ensuring business cases consider the costs and benefits of enhanced resilience
- Ensuring critical infrastructure is identified and can operate if there is a disaster
- Ensuring infrastructure meets adequate robustness standards
- Ensuring the financial resiliency of entities, and fiscal resiliency of governments, that are exposed to the costs that arise from disasters and other events. This includes building adequate fiscal buffers at the government level (including considering building reserves, reinsurance and catastrophe bonds) and ensuring the adequacy of accounting policy (e.g., the recognition of disaster-related contingent liabilities). For instance, Japan has implemented such policies through the Disaster Relief Act (1947) and Disaster Countermeasures Act (1961); the Philippines implemented them through debt sustainability analysis; and Chile has laws that mandate disclosure of contingent liabilities. Reforms to fiscal and accounting policy to provide greater financial resiliency can also be helpful.

10. **Adequate digital infrastructure is important for participation in the digital economy.** The ABAC report highlights the need for economies to have adequate fixed line broadband infrastructure and recommends that APEC economies that lack good broadband infrastructure should assign a high priority to fixed line broadband.

2.5.1 Moving forward

While APEC has undertaken several initiatives to advance the infrastructure development capacity of economies, there is still much room for improvement. Some areas that could further strengthen its capabilities are highlighted below.

Expansion or deepening of APEC's role

APEC economies in their IER submissions highlighted that APEC should deepen its role as a platform to share knowledge and best practices, accommodate the interests of the private sector and promote homogenization of standards. In general, APEC economies have identified that there are efficiencies to be gained through better coordination and collaboration.

ABAC is of the view that APEC has an opportunity to add its voice to encouraging its members to develop green digital economies, probably the most important challenge for the planet.

Strengthening capacity-building initiatives

There is a need for greater capacity-building initiatives to strengthen institutional capacity in the region, particularly in areas such as PPP process, project cycle, PPP modalities, and financial contract structuring and project funding strategies. The development of capacity-building initiatives will enhance the ability of member economies to identify and prepare good infrastructure projects that are attractive and bankable.

APEC may expand its support to individual economies, focusing on the least developed and developing member economies. One area for possible APEC assistance would be the development of a compendium of structural reforms in infrastructure among the economies, which could provide a platform for sharing/exchange of views, experiences and knowledge in addressing common infrastructure challenges.

Promoting greater cross-fora and international collaboration

While the different fora within APEC have different objectives and focus areas, there tends to be a degree of overlap in some priorities, particularly in infrastructure-related areas. Given this overlap, the different initiatives carried out by individual groups may at times address the same problem, leading to both wastage of resources and reduced efficiencies. For example, the Peer Review and Capacity Building on APEC Infrastructure Development and Investment is an initiative under the Committee on Trade and Investment that is focused on supporting the development of quality infrastructure through facilitating PPPs. At the same time, under the APEC Finance Ministers' Process, a PPP experts advisory panel was established (now disbanded) and there is a pilot PPP center. Also, the Asia-Pacific Infrastructure Partnership was proposed in 2010 by ABAC.

Promoting greater cross-fora collaboration allows resources and expertise to be pooled together and infrastructure priorities to be better met in a collaborative manner. Related fora with similar interests should continue discussions on further advancing the collaboration.

APEC should also continue to expand and deepen collaboration with international organizations. For example, the OECD has a longstanding partnership with APEC on promoting the development and sustainable financing of infrastructure in the Asia-Pacific region, primarily under the 2015 Cebu Action Plan in the APEC Finance Ministers' Process. This includes the OECD's 2018 deliverables to APEC Finance Ministers: a capacity-building package providing illustrative examples of good practices in APEC economies related to effective approaches to financing infrastructure.

APPENDIX TO THE MAIN REPORT

Table 3.1: Relationship between growth and productivity with infrastructure (public capital)

$$\frac{\text{Log of GDP per Capita (2014)}}{\text{Log of GDP per Capita (1970)}} = a_1 \text{Log of 1970 real GDP Per capita} + b_1 \text{Log of Private Capital} + c_1 \text{Log of Human Capital} + d_1 \text{Log of Public Capital} + \text{Constant}$$

Dependent variable	
Log of real 1970 GDP	-0.35 (0.044)
Log of Private Capital	0.26 (0.1140148)
Output Elasticity	0.15
Log of Human Capital	0.90 (0.1620557)
Output Elasticity	0.53
Log of Public Capital	0.18 (0.0896682)
Output Elasticity	0.11
Constant	-1.80 (0.481248)
Observations	124
Adjusted R-Squared	0.48

GDP = Gross domestic product.

Notes: Robust standard errors in parentheses

Source: Penn World Table 9.0 Data; IMF Investment and Capital Stock Dataset, 1960–2015; APEC Policy Support Unit staff estimates.

Table 3.2: Elasticity of poverty with respect to infrastructure investment

Poverty Headcount or Log of Extreme Poverty Headcount = a_1 Log of Real GDP + b_1 Log of Real GFCF + c_1 Log of Population + d_1 Gini Coefficient + Constant


Dependent variable	(1)	(2)
	Log of poverty headcount	Log of extreme poverty headcount
Log of real GDP	-0.875* (0.473)	-1.912*** (0.633)
Log of real GFCF	-0.448** (0.207)	-0.0131 (0.238)
Log of population	3.186*** (1.069)	4.478*** (1.395)
Gini index	0.0663*** (0.0188)	0.0602** (0.0234)
Constant	-9.568 (21.10)	-14.79 (24.27)
Observations	702	1,579
R-squared	0.467	0.379
Number of economies	99	124

GDP = gross domestic product; GFCF = gross fixed capital formation; PPP=purchasing power parity; OLS=ordinary least squares

Notes:

- poverty headcount = number of people living on less than USD 2.00 PPP per person per day; extreme poverty headcount = number of people living on less than USD 1.25 PPP per person per day; real data for GDP and GFCF are in constant 2005 USD.
- Regressions used economy fixed effects panel OLS. Year dummy variables are suppressed for brevity. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses.

Source: World Bank Data; APEC Policy Support Unit staff estimates.



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