

Understanding infrastructure opportunities in ASEAN

Infrastructure Series Report 1







Contents

Foreword	3
Methodology	4
Chapter 1: State of play in ASEAN	5
Current infrastructure spending in ASEAN	5
Future infrastructure spending outlook	7
What is an infrastructure gap?	16
Chapter 2: Challenges in addressing the infrastructure gap	18
Understanding the infrastructure project lifecycle	18
Key challenges across the infrastructure project lifecycle	20
Strategy	20
Design and execution	21
Recycling capital	24
Chapter 3: Measures to address the infrastructure gap	25
Presence of an entire ecosystem	25
Governments	26
Financial institutions and investors	36
Advisors	37
Infrastructure companies	40
Multilateral development banks	41
Chapter 4: An infrastructure hub: a one-stop shop	43
Conclusion	46
Sources	47



Foreword

We all know there is a huge need for infrastructure spending in ASEAN and other emerging markets, while spending remains constrained and lags behind the demand for new infrastructure stock. Emerging markets tend to focus on core infrastructure like transport networks and utility infrastructure, but other aspects like healthcare, education and housing, which tend to be significantly under provided, are becoming increasingly important. This failure results in a widening infrastructure gap which has a negative effect on the growth of economies in the region. It limits the access of citizens to work and prosperity and increases the vulnerability of cities to climate change, natural disasters and changing demographics.

This report is the first in a three-part Infrastructure Series. For starters, we focus on the current state of play of infrastructure spending in ASEAN and what is needed in the future. The shortfall between the actual and required infrastructure spending points towards an infrastructure gap that needs to be filled if growth in ASEAN is to be maintained or accelerated. This report also delves into the key factors that are responsible for the infrastructure investment gap, including external factors such as the role of government in formulating plans, availability of finance and facilitating a conducive business environment, as well as project-related factors such as design and implementation.

Governments in ASEAN have been undertaking reform and measures to address the external factors in order to attract domestic private and foreign investment into their economies but project-related factors still need more attention.

To understand these better, this report explores the lifecycle of infrastructure projects and the challenges at each stage of any project. In order to address these challenges, projects require the presence of an entire support system comprising key stakeholders – the government, financial institutions, infrastructure companies, financial, legal, tax and technical advisors, as well as multilateral institutions. We call this support system an infrastructure ecosystem. This report notes that not every country in ASEAN houses a complete ecosystem and countries rely on each other for support, be it in terms of funding, expertise or others. This cross harmony gives rise to the concept of an infrastructure hub – a geographic location within a region that comprises all ingredients necessary for project success, including but not limited to the entire ecosystem, a talented pool of experts, strategic location, language advantage, and a robust financial system.

The subsequent reports within this Infrastructure Series, will cover the future project pipeline, investment outlook for infrastructure in the region and how and why infrastructure needs to be considered as a separate asset class to attract private sector investment and alternative financing sources such as pension funds and institutional investors.

We hope that you find this Infrastructure Series a useful resource that addresses some of the key issues that we as infrastructure practitioners grapple with. If you would like to discuss any of the issues raised here, please get in touch with us.



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Methodology

Our comments and analyses are based on data obtained from industry recognised sources. We also built on PwC's significant research and findings drawn from previous publications, which include *Repaving the ancient Silk Routes* (2017), *A Summary of South East Asian Infrastructure Spending: Outlook*

to 2025 (2014), *Capital Project and Infrastructure Spending: Outlook to 2025* (2014). We supplemented these findings with independent research to provide a holistic view of the topic. Furthermore, we have also included case studies and examples, where relevant, to illustrate the trends observed.



Chapter 1: State of play in ASEAN

In this first chapter, we provide an overview of the current status and future needs of infrastructure spending in ASEAN, and the infrastructure gap that exists based on the mismatch between the required and actual expenditure.

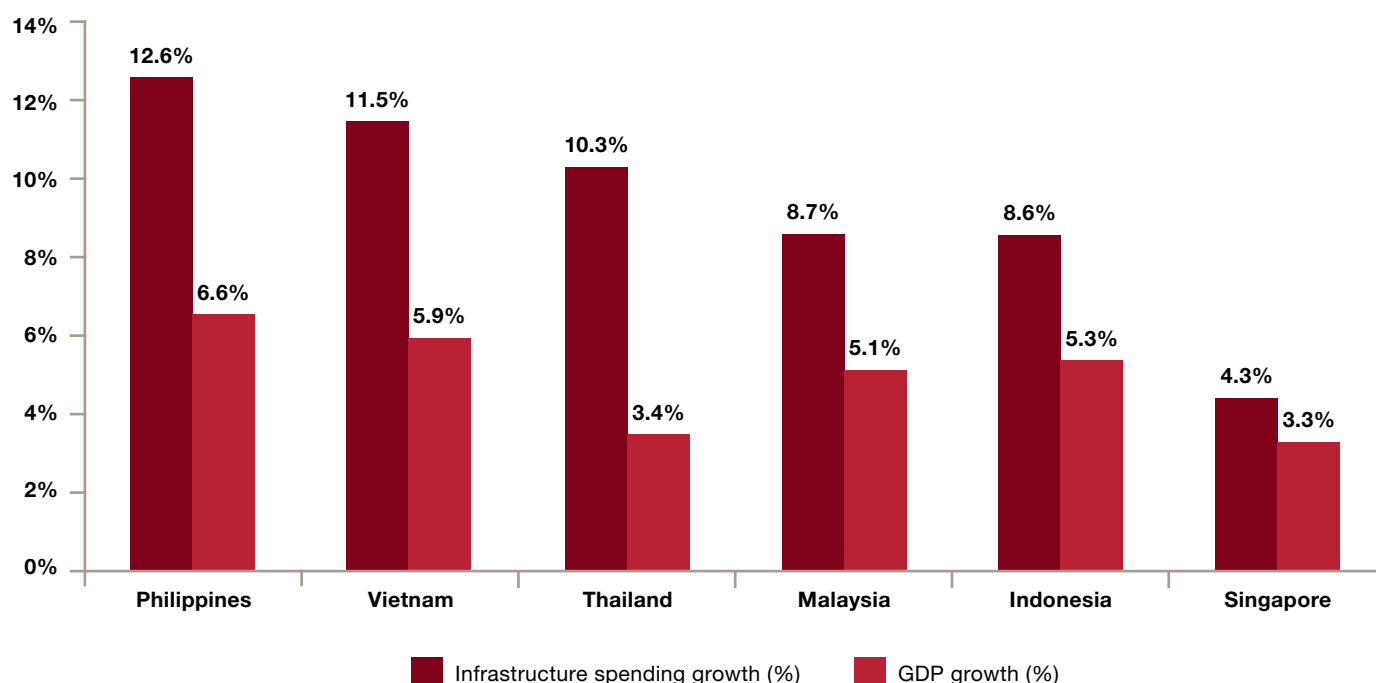
Current infrastructure spending in ASEAN

The Association of Southeast Asian Nations (ASEAN) was founded in 1967 by Indonesia, Malaysia, Philippines, Singapore and Thailand. Today, ASEAN consists of 10 member states: the five founding member states and Brunei Darussalam, Cambodia, Lao People's Democratic Republic (PDR), Myanmar, and Vietnam.

The ASEAN region is developing at a rapid rate. Its combined Gross Domestic Product (GDP) of US\$2.4 trillion grew by 4.7% in 2015¹, and annual average projected growth from 2016 to 2020 is 5.2%². The bloc is currently the seventh-largest economy in the world, and is projected to become the fourth-largest by 2050³.

Figure 1: Infrastructure spending and GDP growth

Average growth rates from 2012-2016



Source: Oxford Economics; World Bank data

¹ ASEAN Economic Community Chartbook 2016, ASEAN Statistics, 2016

² Outlook 2017: ASEAN still beckons, IE Singapore, 2017

³ 7 surprising things you probably don't know about ASEAN, World Economic Forum, 2016

A large part of the economic growth in ASEAN is attributable to the rise of the manufacturing industry, among other factors. Manufacturers are shifting operations from China to Southeast Asia due to lower overall costs, increases in domestic consumption and improving physical infrastructure. This has called for a further rise in demand for infrastructure development. Recently, foreign investors have capitalised on this growing demand. Foreign Direct Investment (FDI) in infrastructure accounted for about 12-15% of total FDI inflows into the ASEAN region between 2012 and 2014⁴. According to the World Bank, the majority of private sector participation in infrastructure projects in ASEAN has been in the transport, energy, information and communications technology (ICT) and real estate sectors. Infrastructure spending is broadly acknowledged as a key driver of economic growth.

In our analysis, we have used data sets from our previous report, *Capital Project and Infrastructure Spending: Outlook to 2025*, which was supported by research from Oxford Economics. We have also used publicly available data sources from the Asian Development Bank (ADB) and the World Bank. In the data sets, Oxford Economics defines infrastructure as social, transport, communications, manufacturing, utility, power and extraction industries. ADB defines infrastructure as transport, telecommunication, power, water supply and sanitation.

In the last five years, there has been a large disparity between the growth rates of infrastructure spending in the six largest economies of ASEAN, which has ranged from 4% to 13%. The country with the largest infrastructure spending growth, Philippines, recorded the highest GDP growth of the six countries. On the other hand, infrastructure spending in

Singapore increased the least. These trends highlight the following:

- Developed economies such as Singapore that are reaching or have reached a steady state observe lower rates of growth of GDP and infrastructure spending. In contrast, developing economies such as Philippines and Vietnam need to grow faster to catch up with their developed counterparts and hence need higher infrastructure spending.
- Infrastructure spending growth has a direct positive correlation with GDP growth. A higher investment in infrastructure enables a country to increase its output, which then leads to a higher GDP growth rate.
- For all of these six selected countries, infrastructure spending is growing faster than the overall economy.

However, an exception to the observed trend is Thailand. The country has an infrastructure spending growth of 10.3%, whereas its GDP growth only stands at 3.4%. The large growth in infrastructure spending has been primarily a result of its government's increased focus on infrastructure spending to enable and drive growth in other sectors of the economy. Thailand has implemented a number of government initiatives to realise this objective, including the development of the Eastern Economic Corridor, Thailand 4.0 (its Digital Economy Strategy) and a new fast-track scheme for high priority Public Private Partnerships. These are all huge initiatives. For example, within the next five years, an expected US\$43 billion will be invested in the Eastern Economic Corridor alone⁵. However, as these are recent policies, the benefits of the high growth rate of infrastructure spending on the wider economy will only be felt in the medium- to long-term future.



⁴ ASEAN Investment Report 2015, ASEAN, November 2015

⁵ Thailand's Eastern Economic Corridor – What You Need to Know, ASEAN Briefing, April 2017

The role of infrastructure is critical to promoting sustainable growth and improving connectivity among the ASEAN economies. Increased connectivity and quality of infrastructure will facilitate business and trade growth. Countries with higher

infrastructure spending per capita tend to have better quality infrastructure and are more competitive. This reinforces our point that infrastructure spending is essential for overall economic development.

Table 1: Infrastructure spending, quality and global competitiveness

Selected ASEAN Country	Infrastructure spending per capita (US\$)	Infrastructure Score (1 to 7)	Global Competitiveness Index (1 to 7)
Singapore	2,049	6.5	5.7
Malaysia	705	5.4	5.2
Thailand	522	4.4	4.6
Indonesia	314	4.2	4.5
Vietnam	284	3.9	4.3
Philippines	115	3.4	4.4

Source: Oxford Economics; The Global Competitiveness Report 2016-2017, World Economic Forum, 2016

Future infrastructure spending outlook

ADB estimates that Developing Asia⁶ will need to invest US\$26 trillion over the 15-year period from 2016 to 2030, or US\$1.7 trillion per year, on infrastructure to maintain current growth rates, including the cost of climate mitigation and adaptation⁷. The total infrastructure investment needs in ASEAN from 2016 to 2030, according to the same report, will be US\$2.8 trillion (baseline estimate) and US\$3.1 trillion (climate-adjusted estimate⁸). This works out to an annual investment need of US\$184 billion and US\$210 billion respectively.

Drivers of infrastructure spending

There is a huge demand for infrastructure spending going forward and in ASEAN. This demand will be driven by:

Population change

- Urbanisation
- Demographic and social change (including an ageing population)
- Increase in mobility, increased demand for transportation

Geopolitical and environmental factors

- Trade competitiveness
- Climate change and resource scarcity: The need for sustainable infrastructure
- Shifts in global economic power

Disruption

- Technological breakthroughs
- Communication needs

⁶ Developing Asia refers to the 45 Developing Member Countries (DMCs) in the 2017 report by ADB, Meeting Asia's Infrastructure Needs

⁷ Meeting Asia's Infrastructure Needs, ADB, February 2017

⁸ These estimates include climate mitigation and adaptation costs

Table 2: ADB estimates on future infrastructure investment needs

Estimated infrastructure investment needs by region, 45 DMCs, 2016–2030 (US\$ billion in 2015 prices)						
	Baseline estimates			Climate-adjusted estimates		
	Investment needs	Annual average	Investment needs as % of GDP	Investment needs	Annual average	Investment needs as % of GDP
Southeast Asia	2,759	184	5.0	3,147	210	5.7
East Asia	13,781	919	4.5	16,062	1,071	5.2
South Asia	5,477	365	7.6	6,347	423	8.8
Central Asia	492	33	6.8	565	38	7.8
The Pacific	42	3	8.2	46	3	9.1
Total	22,551	1,504	5.1	26,166	1,745	5.9

Source: Meeting Asia's Infrastructure Needs, ADB, 2017

Urbanisation — There is a very high rate of urbanisation in ASEAN's emerging economies. Over the course of the last decade, we have seen huge growth in urban centres as people move from the countryside into cities to live and work. This trend is forecast to continue and, in many cases, accelerate. Countries in the region are growing fast, with the United Nations (UN) estimating urban rates for Southeast Asia to reach 64% in 2050, from 47% in 2014⁹. This growth is primarily driven by countries such as Indonesia and Myanmar. In the same report, UN estimated Indonesia's and Myanmar's 2050 urban rates to reach 71% and 55% respectively, up from 53% and 34% in 2014¹⁰. With urbanisation and increased population density within city centres, and as congestion and pollution become problematic, the demand for efficient transport networks, utilities and waste management will increase substantially while the need for housing, healthcare and education will grow in tandem. City planners, mayors and their teams need solutions to encourage effective urban planning that provides for the future. As cities grow, more investment needs to be made in transport networks to reduce reliance on private vehicles; increased housing stock needs to be built to accommodate growing populations, and utilities

and public services need investment to satisfy the growing number of urban residents.

Demographic and social change (including an ageing population) — Rising wealth and demographic trends in ASEAN will fuel demand for more spending on social infrastructure. Capital will need to be allocated to education and healthcare to ensure populations are able to contribute to their growing economies on a sustainable basis. In emerging Asia, social investment contributes to a much lower share of total infrastructure spending as governments prioritise spending on economic infrastructure that will boost economic growth. There is room for increased investment in this sector and this will become more acute as wealth increases.

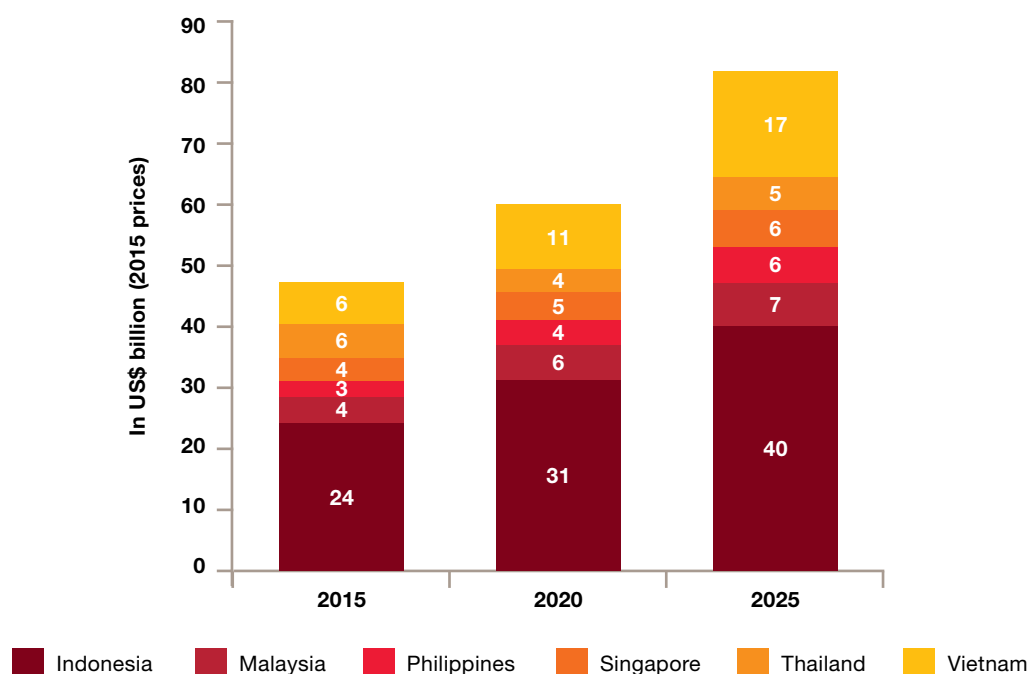
⁹ World Urbanization Prospects: The 2014 Revision, UN, 2014

¹⁰ Ibid

Increase in mobility, increased demand for transportation — Spending on transport infrastructure is expected to continue to see an increase, particularly in emerging ASEAN economies. Increased prosperity leads to, among other things, a demand in car ownership. It has been found that each US\$1,000 increase in GDP per capita results in 15 more cars per 1,000 residents¹¹. Clearly, this leads to congestion and economic inefficiencies if road networks are not upgraded or improved.

Coupled with increased spend on road infrastructure, economies also need to invest heavily in other forms of transport infrastructure — heavy rail, high speed rail, and urban rail are necessary to allow for the effective movement of goods, raw materials, and people. Ports and airports remain a key part of transport networks in a geographically fractured region. The figure below shows the expected increase in spending on transport infrastructure in selected ASEAN countries.

Figure 2: Spending on transport infrastructure (road, rail, sea and air ports)



Source: Oxford Economics

¹¹ Sizing the Global Infrastructure Market, Oxford Economics, November 2013

Case study

Jakarta, Indonesia

This is a city where a huge and growing population is served by a limited public transport network, which results in heavy congestion and long and delayed journeys. This costs the economy an estimated US\$2.62 billion¹² a year in wasted fuel, productivity losses and negative health impact on its residents. In addition to a lacking public transport network, Jakarta is spread over a large geographical area and sits close to the water table. As a result, whenever there is sustained rainfall and high tide, parts of the city will flood, causing substantial loss to business and damage to infrastructure.

Jakarta is in the process of addressing some fundamental problems that affect its ability to become a first-world capital city. A new mass rapid transit (MRT) system is under construction; a light rail system is in development; new toll

roads are being planned to alleviate traffic congestion; the port is being partially relocated, while efforts are being made to clear water drainage, reclaim land and create flood barriers in the bay north of the city. These are substantial and very costly projects but necessary for Jakarta to reach its full economic potential.

Many of these projects are not necessarily economically viable. Therefore, it will be important for the government to judiciously plan for investment and possibly seek funding from multilateral institutions or through Official Development Assistance (ODA) support. Commercially viable projects should be procured through commercial or private sector sources to free up limited capital within government.



¹² Chronic congestion costs big cities Rp 35t a year, The Jakarta Post, March 2016

Trade competitiveness — As countries become more engaged in global production networks, investing in infrastructure upgrades to facilitate trade bears greater significance. The quality of infrastructure within a country plays a major role in the trade costs incurred when engaging in trade, thus affecting the trade competitiveness of countries. ASEAN economies also share important trade links with one another. For instance, in ASEAN between 2010 and 2015, the increase in exports and imports amounted to US\$111 billion and US\$113 billion respectively¹³.

With increased demand for goods from consumers both within and outside of ASEAN, there would be a corresponding development of regional supply chains, leading to a need for

infrastructure to improve connectivity within and between countries in the region. In addition to transport networks, infrastructure supporting access to, and transmission of, power would also be critical in facilitating trade. China's Belt and Road (B&R) Initiative (BRI) is one example of infrastructure development arising from a need to improve connectivity and the overall ecosystem to foster trade and other ties among countries.

As lower-value manufacturing shifts out of China due to increases in wages and cost base, ASEAN has an exceptional opportunity to take on this capacity. With a lower cost base and improved connectivity, competitiveness of the region will increase.



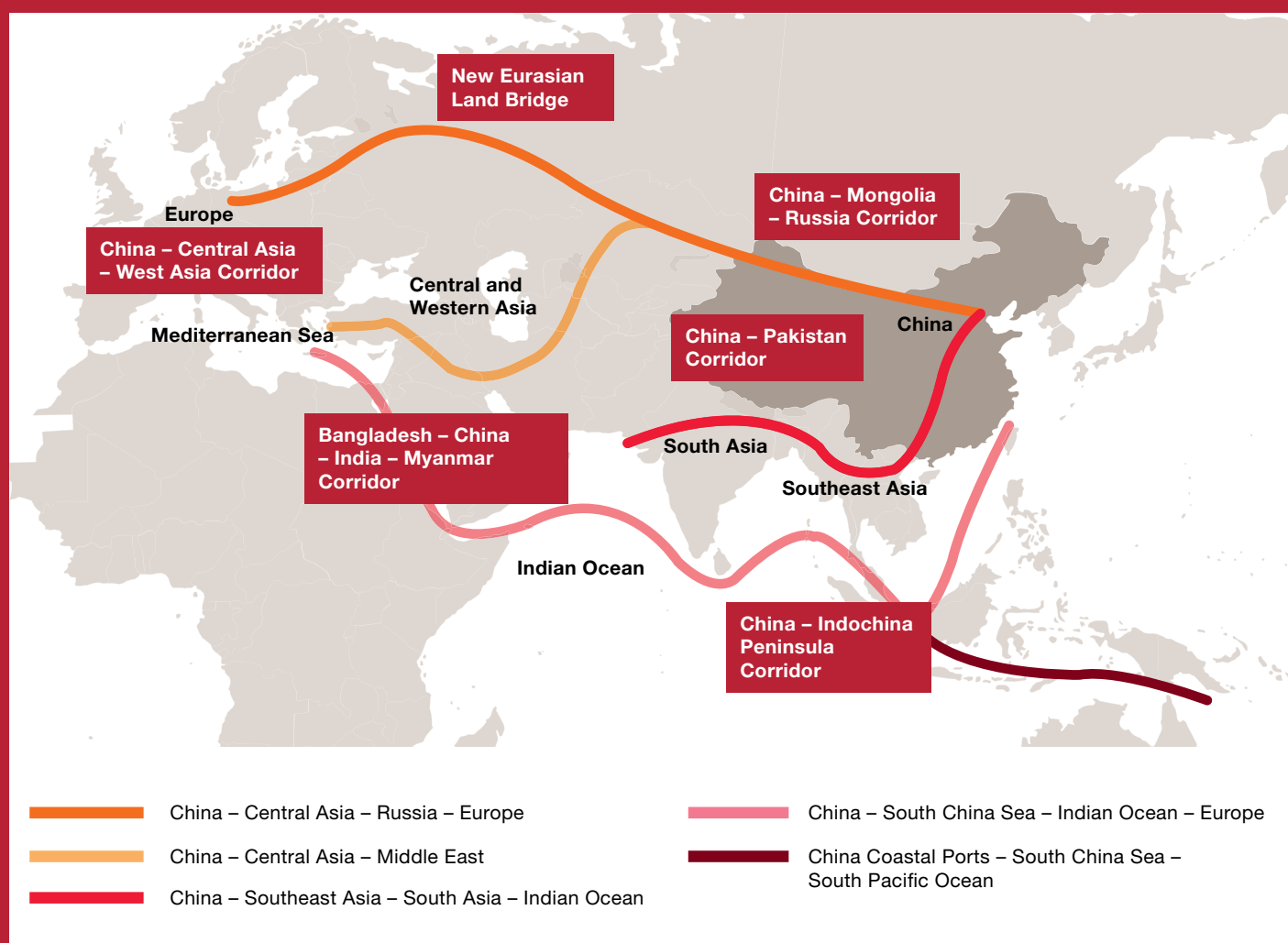
¹³ Intra- and extra-ASEAN trade, ASEAN Secretariat, 2010 and 2015

China's Belt and Road Initiative

The BRI was first proposed by Chinese President Xi Jinping in 2013, with the aim of creating a transport network that connects Asia, Europe and Africa — recreating the ancient Silk Routes. The network consists of 65 countries, equating

to 65% of the world population, contributing to one-third of the world's GDP and 40% of global trade. The BRI serves as a blueprint for how China wants to further connect itself with the global economy and strengthen its influence in the region.

Figure 3: B&R covers three key land routes and two main ocean routes



Source: Map from 'Vision and actions on jointly building the Silk Road Economic Belt and 21st Century Maritime Silk Road' document (March 28, 2015). Actual routes may differ and may also extend to encompass other territories as the project develops; Repaving the ancient Silk Routes, PwC, 2017

The Chinese government is increasing its emphasis on global connectivity in an effort to bolster trade, as proved by the implementation of BRI. Given the growing importance of Southeast Asia in the global arena and its close proximity to China, much of Chinese investment funds have been focused on this region.

China has begun a US\$23 billion¹⁴ investment in a network of railways including the Singapore-Kunming Rail Link (SKRL). The initial investment extends the existing High Speed Rail network within China through Lao PDR to Vientiane. This would then link up with the Bangkok-Nong Khai line, which is separately being progressed at a government-to-government level between Thailand and China.

In November 2016, the Malaysian government signed an agreement with China Communications Construction Company (CCCC) for the delivery of the East Coast Rail Link (ECRL). Under this agreement, CCCC would fund and construct the rail project at a cost of US\$13.1 billion¹⁵. Malaysia's Land Public Transport Commission (SPAD) approved Phase One of the ECRL railway, which covers 688km of the track and comprises 22 stations¹⁶, in June 2017.

In parallel, the Singapore and Malaysian governments have commenced the procurement process for the Kuala Lumpur-Singapore High Speed Rail. This megaproject will not only enhance connectivity between ASEAN and China, it will also fuel economic growth, train skilled workers and create jobs. With interest in the Southeast Asian region growing, new opportunities will arise for ASEAN. Countries in ASEAN have also announced initiatives to leverage potential opportunities presented through the BRI. One such example is the BRI Connect Platform launched by the Singapore Business Federation (SBF) and Chinese Enterprises Association in August 2017. This platform aims to facilitate connectivity between companies in Singapore looking to provide expertise and professional services, and companies taking on B&R projects.

Figure 4: Indochina Peninsular Corridor



Source: Hong Kong Trade Development Council (HKTDG); Repaving the ancient Silk Routes, PwC, 2017

¹⁴ Repaving the ancient Silk Routes, PwC, 2017

¹⁵ China set to build, finance Malaysia's East Coast Rail Line project, Channel News Asia, October 2016

¹⁶ East Coast Rail Link: Malaysia touts rail trade route as rival to Singapore, The Straits Times, August 2017

Climate change and resource scarcity: The need for sustainable infrastructure — With rapid economic growth and its overarching impact on climate, there has been a corresponding global emphasis on sustainable development and this has contributed to the demand for sustainable infrastructure in the region. For instance, of the 17 Sustainable Development Goals (SDGs) adopted by world leaders during the September 2015 UN Sustainable

Development Summit, Goal 7 speaks of ensuring “access to affordable, reliable, sustainable and modern energy for all”¹⁷. This has in turn created a demand for the generation of clean energy through solar farms, wind farms and hydropower plants. Some examples of such projects include the Lopburi solar plant in Thailand and the Nam Ngiep hydropower project in Lao PDR.

ADB supporting the development of clean energy projects	
Lopburi solar plant, Thailand	Nam Ngiep hydropower project, Lao PDR
A 55-megawatt solar plant was built in Lopburi Province, Thailand by a joint venture company, Natural Energy Development, with support from ADB through its Asia Solar Energy Initiative (ASEI). This was the first project of ASEI. The solar plant is able to generate clean electricity to power up to 70,000 households and avoid the release of over 1.3 million tons of greenhouse gases over the next 25 years ¹⁸ .	A 290-megawatt hydropower generation facility was constructed at the Nam Ngiep River in the Bolikhamxay and Xaysomboun Provinces, Lao PDR, with support from ADB. The electricity generated will be sold to Thailand and supplied to Lao PDR and the reduction in greenhouse gas emissions is expected to reach 500,000 tons ¹⁹ per annum.

Shifts in global economic power — It is widely acknowledged that global economic power is shifting fast. One part of this is the shift of the world’s biggest e-commerce market to Asia (and to China in particular), leading to potential growth in the reach of mobile and broadband connectivity. The e-commerce boom is driving expectations for faster and cheaper access to broadband networks for shoppers and businesses. At the same time, it is putting pressure on policy makers to agree to share data across borders as well as to safeguard transactions, privacy and intellectual property. These are the types of ‘soft’ infrastructure that help expand business and trade and that are becoming more prominent as connectivity evolves in this region and around the globe.

Technological breakthroughs — Technology breakthroughs impact every industry. In the infrastructure sector, it transforms the way infrastructure is procured, built and operated, and has major implications on enablers throughout the lifecycle of infrastructure projects. One of the major trends identified by PwC that will impact infrastructure in ASEAN is the rise of smart cities and grids.

Smart Nation, Singapore
<p>Singapore’s Smart Nation drive aims to utilise networks, data and ICT to improve living and create economic opportunities in five main areas²⁰:</p> <ul style="list-style-type: none"> • Transport • Home and environment • Business productivity • Health and enabled ageing • Public sector services <p>One example of an opportunity created in the infrastructure sector would be the recent tender issued for the development of energy-efficient Smart Lighting systems for deployment on public road networks in Singapore²¹. As potential grants, tenders and requests for proposals are also announced on the Smart Nation website, it also serves as a platform for companies to identify opportunities relating to this initiative.</p>

¹⁷ Sustainable Development Goals, UN, January 2016
¹⁸ Sun, Partnerships Power Thailand Solar Project, ADB, June 2016
¹⁹ Report and recommendation of the President to the Board of Directors, ADB, July 2014
²⁰ About Smart Nation | Enablers, Smart Nation Singapore, 2017
²¹ Opportunities, Smart Nation Singapore, 2017

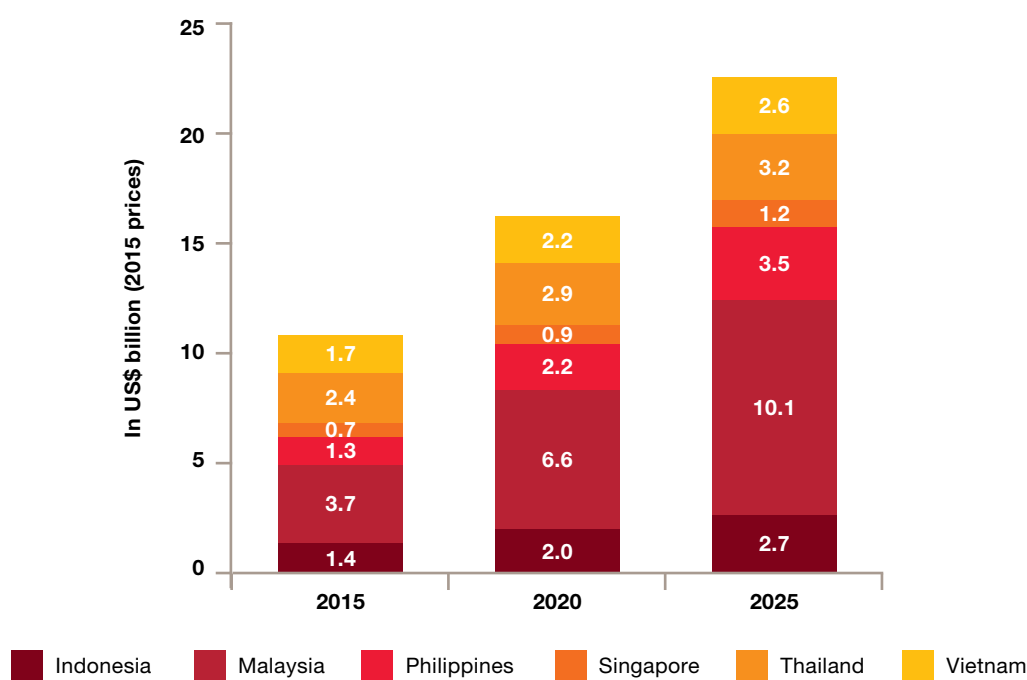
Autonomous vehicles, 3D printing, augmented reality, the Internet of Things (IoT) and drones are all changing the way that people plan for the future; how we analyse data and improve efficiency; how we redefine our approach to project definition and delivery; and how we improve the efficiency of businesses through the use of technology and artificial intelligence.

Communication needs — Telecommunication capability is becoming increasingly important as businesses rely on their employees' ability to talk to colleagues, customers and suppliers both globally and in a timely manner. An increasing amount of communication is made through email, while businesses look to the Internet as a valuable sales channel. Cities and countries that can implement fast and reliable wired and wireless communication networks can gain

a competitive advantage over their geographical neighbours. This has the dual benefit of increasing workforce productivity and attracting new companies to establish operations in a city or country. The figure below shows the expected spending on telecommunications in selected ASEAN countries.

In the earlier sections, we have seen that, in ASEAN, infrastructure need is growing at a faster pace than infrastructure spending. If the ASEAN countries wish to maintain their growth trajectory and/or grow faster, they need to ensure that the rate of growth of infrastructure spending meets the expected increase in demand. However, given current growth levels and trends, this is not the case in most ASEAN economies.

Figure 5: Spending on telecommunication infrastructure



Source: Oxford Economics

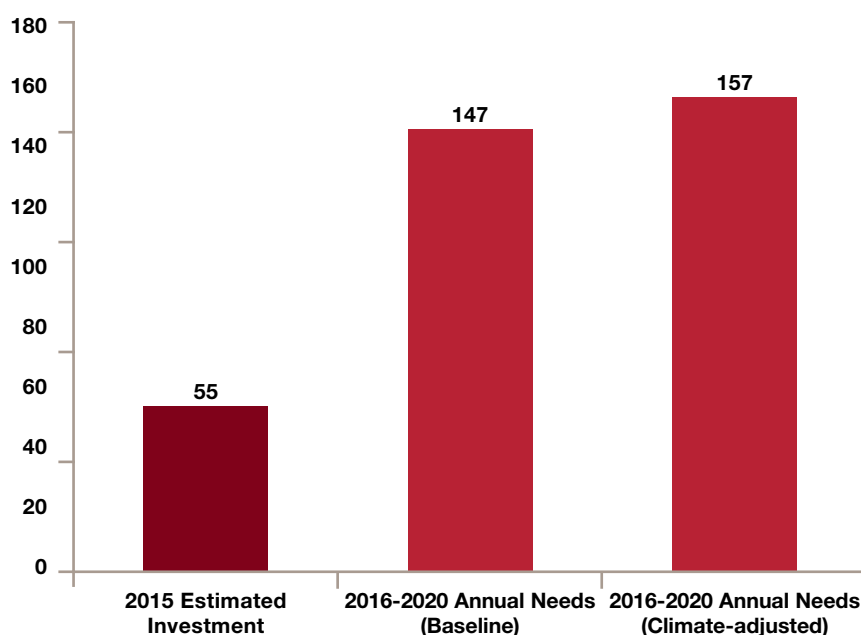
What is an infrastructure gap?

An infrastructure gap is the difference between the required infrastructure investment and actual infrastructure spending.

Infrastructure spending in 2015 and needs from 2016 to 2020: According to ADB's recent estimates, the total infrastructure spending in 2015 in Southeast Asia (excluding Singapore, Brunei Darussalam and Lao PDR) was

US\$55 billion²². The same report estimated the required annual spending need for Southeast Asia (excluding Singapore, Brunei Darussalam and Lao PDR) to be US\$147 billion (baseline) and US\$157 billion (climate-adjusted), so an annual gap of US\$92 billion (baseline) and US\$102 billion (climate-adjusted) is expected²³. This is illustrated in Figure 6 below.

Figure 6: Annual investments in Southeast Asia (current and projected need), excluding Singapore, Brunei Darussalam and Lao PDR



Source: Meeting Asia's Infrastructure Needs, ADB, 2017

Infrastructure investment needs, 2016 to 2030:

According to ADB estimates, the total investment need in Southeast Asia (including Singapore, Brunei Darussalam and Lao PDR) is US\$2.8 trillion (baseline estimate) and US\$3.1 trillion (climate-adjusted estimate), placing the annual investment need at US\$184 billion and US\$210 billion respectively²⁴.

Expected infrastructure spending growth up to 2025:

In our report, *A Summary of South East Asian Infrastructure Spending: Outlook to 2025*, PwC estimated the increase in expected annual spending on infrastructure in ASEAN countries until 2025, as set out in Table 3 below.

Table 3: Expected growth in infrastructure spending per year till 2025

Country	Expected infrastructure spending growth per year till 2025
Philippines	10%
Malaysia	9%
Vietnam	9%
Indonesia	7%
Thailand	7%
Singapore	5%

Source: A Summary of South East Asian Infrastructure Spending: Outlook to 2025, PwC, 2014; Oxford Economics

²² Meeting Asia's Infrastructure Needs, ADB, 2017

²³ Ibid

²⁴ Ibid

Infrastructure gap: Comparing the expected infrastructure spending growth (Table 3) with the 2015 estimated actual spending (Figure 6), there will likely be a large disparity with ADB's 2016-2020 estimates. This highlights the problem: if measures are not taken to increase infrastructure spending further, the expected demand for infrastructure will not be met, the infrastructure gap will remain, and economic growth will slow or stagnate.

Further, the figure below shows that infrastructure spending as a percentage of GDP in ASEAN counties is relatively low when compared to other developing countries (such as China and India) and developed countries (such as Canada and Australia).

These facts combined clearly illustrate that a huge infrastructure gap in ASEAN exists and it needs to be addressed. Most countries worldwide do not have sufficient available public sector capital to invest in much-needed new infrastructure or indeed for refreshing or maintaining old infrastructure. Emerging economies have even less available public budget to spend on infrastructure, and must learn to

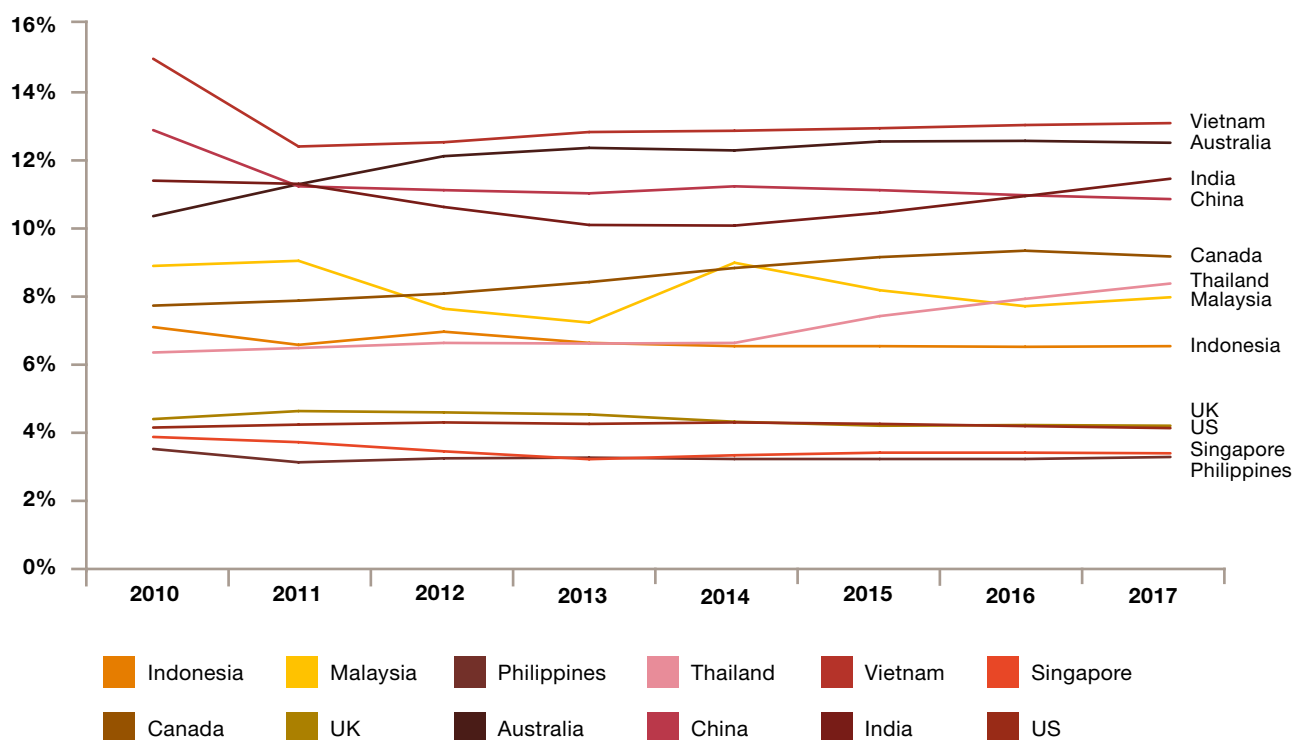
prioritise projects effectively and clearly identify those that require government support, those that may attract ODA funding, and those that are sufficiently economically viable to attract private sector funding.

Government spending will not be enough to meet the demand and to fill the gap. Therefore, significant private sector participation and financing is required to supplement it.

Indonesia

It is estimated that Indonesia's annual infrastructure spend will increase from US\$82 billion in 2016 to US\$165 billion in 2025²⁵. The Indonesian government is targeting spend of US\$465.7 billion between 2015 and 2019²⁶. It is expected that approximately half of this will come from the government, one-fifth from State-Owned Enterprises (SOEs) and the remainder from private sector sources²⁷.

Figure 7: Infrastructure spending as a percentage of GDP in selected countries



Source: Oxford Economics

²⁵ Oxford Economics

²⁶ Indonesian Infrastructure: Stable foundations for growth, PwC, 2016

²⁷ Ibid

Chapter 2: Challenges in addressing the infrastructure gap

In Chapter 1, we provided an outlook of the infrastructure spending in ASEAN and shed some light on the existing and expected infrastructure gap in ASEAN.

The infrastructure deficit across ASEAN is a very well established fact — the ability of ASEAN countries to continue growing at their current rates will depend largely on how much infrastructure can be delivered in the coming years. Power generation, clean water, effective utility networks and much-needed improvements in transportation networks are essential in ensuring that Asia is able to fulfil its potential. In this chapter, we discuss the challenges that need to be addressed to tackle the infrastructure gap.

According to *The Economist*, there is sufficient capital within the Asia Pacific region to fund the projects that are

currently being procured across the region. Globally, banks and institutional investors hold approximately US\$120 trillion of assets under management²⁸ and this is an obvious source of capital for infrastructure projects²⁹. However, the projects currently being procured are a small fraction of the infrastructure pipeline that is actually required over the next 10 to 20 years — there is a bottleneck that is markedly slowing down the rate at which well-structured and well-conceived projects are coming to market. These are the “investment barriers” that inhibit the bankability of projects and stop the supply of capital from meeting the demand for infrastructure.

The lack of infrastructure investment is a result of many factors, such as a policy decisions, lack of bankable projects, weak governance and a lack of transparency. In this chapter, we discuss some of these factors.

Understanding the infrastructure project lifecycle

The next diagram represents the stages of any infrastructure project — the infrastructure project lifecycle (Figure 8) — as well as the work or activities involved in each stage (Table 4).

We have segmented the infrastructure project lifecycle into three phases: (1) strategy, (2) design and execution, and (3) recycling of capital.



²⁸ Bridging Global Infrastructure Gaps, McKinsey & Company, June 2016

²⁹ Ibid

Figure 8: Infrastructure project lifecycle

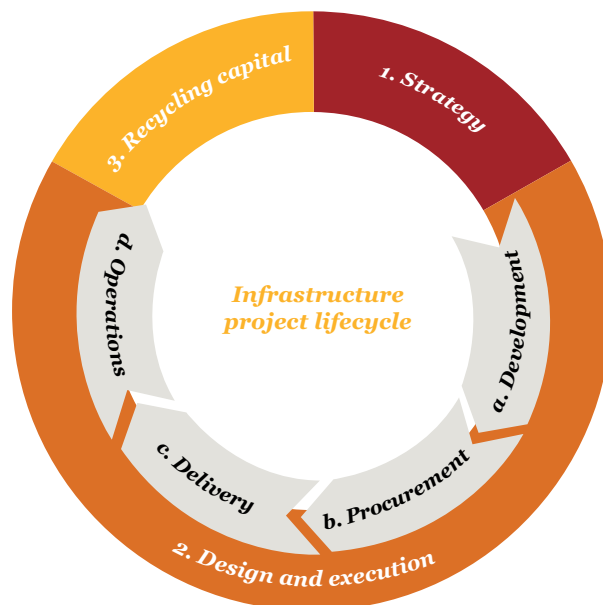


Table 4: Scope of work in each stage of the infrastructure project lifecycle

Scope of work	
1. Strategy	<ul style="list-style-type: none"> Identifying a need for infrastructure Understanding local and/or regional requirements (such as regulations) Prioritising projects effectively to ensure capacity is utilised most effectively Conducting studies to identify market opportunities and assess the financial, commercial and technical feasibility of a project
2a. Development	<ul style="list-style-type: none"> Understanding and mitigating potential risks Finding a viable contract, financing and legal project structure that best balances the interests of all stakeholders Designing the technical specifications of the project Obtaining funding and understanding delivery partners (architects, advisors, construction companies, operators)
2b. Procurement	<ul style="list-style-type: none"> Planning of procurement strategies Preparation of tenders and running the tender process Identifying potential bidders and finalising commercial and financial terms Obtaining financing
2c. Delivery	<ul style="list-style-type: none"> Physical construction of assets Managing the project over its construction phase
2d. Operations	<ul style="list-style-type: none"> Operating and maintaining the asset over its lifetime
3. Recycling capital	<ul style="list-style-type: none"> Divesting the asset partially or fully Re-investing capital into new projects

Key challenges across the infrastructure project lifecycle

We now discuss some of the key challenges that may be faced across the project lifecycle.

Strategy

This stage involves identifying a need for the project, understanding local and/or regional requirements (such as regulations) and conducting studies to identify market opportunities while assessing the financial, commercial and technical feasibility of a project.

The key challenges to be addressed at this stage are weak legal and regulatory frameworks and poor project planning and preparation.

Weak legal and regulatory frameworks

It is important to understand the legal and regulatory framework that exists within a country early in any infrastructure planning cycle. This is a critical factor determining the success of any infrastructure market. A weak legal or regulatory framework will block private sector capital and expertise from participation in infrastructure projects that are inherently governmental (power, water, transport) as legal certainty is a key ingredient to providing comfort to investors that their capital is secure and that they will be treated fairly. One common challenge in emerging markets is when there are difficulties in the acquisition of land for an infrastructure project. This may arise from a lack of regulation that supports acquisitions or delays in the implementation of regulations, slowing down the ability of emerging markets in developing infrastructure stock.

Batang power plant, Indonesia

A 2,000-megawatt coal-powered power plant in Batang, Central Java, Indonesia was ready to commence construction in 2011 by PT Bhimasena Power Indonesia, a joint venture of PT Adaro Energy Tbk, Itochu Corp and J-Power Electric Power Development Co. Ltd. But as the planned plant was sited in an agricultural area, local residents opposed the project on the basis of the potential impact to the environment and their livelihoods. This resulted in delays in the acquisition of land³⁰.

Although Indonesia passed the Land Acquisition Law in 2012 with the intention of speeding up land acquisitions for infrastructure projects, there were delays in the implementation of the law to facilitate land procurement. It was only in 2016, when the Supreme Court ruled against the local landowners³¹, that the government was able to acquire the land on the basis of public interest and target the commencement of construction.

An additional factor to consider is the nature of the procurement process within any jurisdiction. A transparent, clearly defined process that treats bidders fairly and allows for the award of contracts based on clearly defined criteria is critically important. Weak procurement processes lead to a lack of transparency and corruption, which in turn creates a deep lack of confidence in the market. This reduces the investment capital available to the market, and will push investors, contractors and operators to other markets – ones that administer procurement fairly and transparently.

Poor project planning and preparation

Sufficient time and money is needed to prepare a project for market to ensure it is bankable and deliverable. Feasibility studies are required to establish the economic and technical viability of a large infrastructure transaction; the project owners need to identify the most appropriate commercial structure that can be achieved within a governing regulatory framework; risks need to be identified and allocated through contractual documentation in a way that makes the project bankable; and a tender process that is fair, transparent and understood by the market needs to be adhered to.

³⁰ Indonesia's Controversial Batang Power Plant: Human Rights & Environment, Indonesia Investments, June 2016

³¹ Supreme Court ruling paves way for Batang megaproject, The Jakarta Post, March 2016

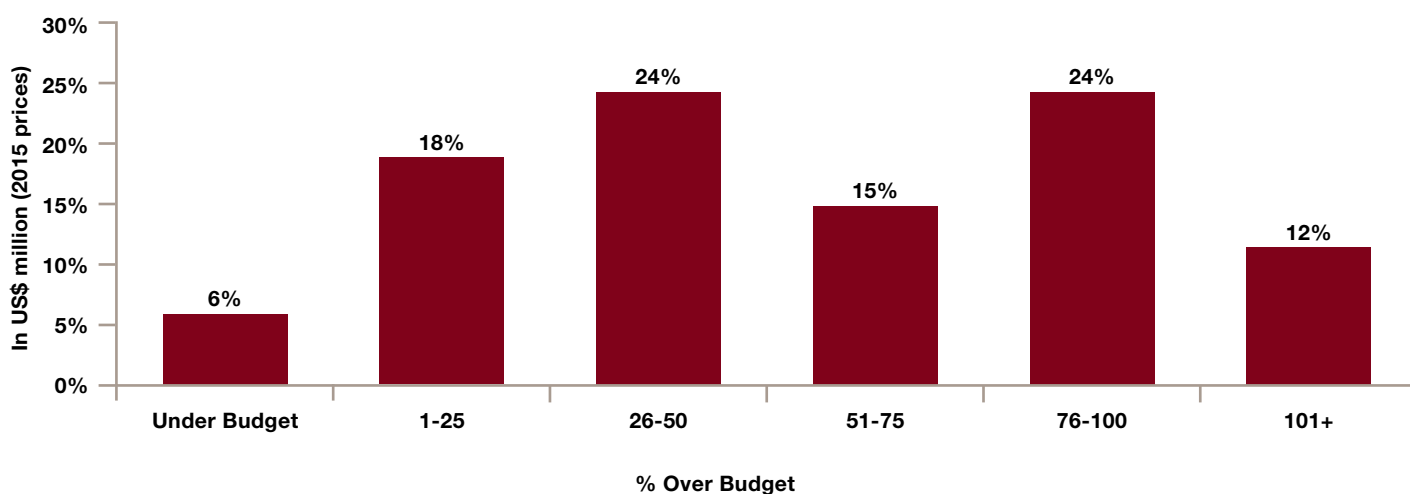
Design and execution

This stage includes **development** (understanding and mitigating potential risks, finding a viable contract, determining a financing and legal project structure that best balances the interests of all stakeholders, and designing the technical specifications of the project); **procurement** (planning of procurement strategies, preparation of tenders and running the tender process, obtaining financing, identifying potential bidders and finalising commercial and financial terms); **delivery** (physical construction of assets, and managing the project over its construction phase); and **operations** (operating and maintaining the asset over its lifetime).

In most cases, the primary cause of project failure is weak project preparation — well before projects commence

construction. A poorly designed project could lead to alterations in project scope later on; poor understanding of project risk and the subsequent inability to mitigate these risks; poor logistical planning; weak governance and control; poor project delivery due to selection of weak or unqualified contractors; corruption and more. These will all cause project delays and cost overruns and are largely a result of poor project preparation. The results in the figure below indicate that cost overruns are more common than not. Furthermore, delays to project delivery, cost overruns and inefficiencies in the procurement process often have political consequences – they reflect poorly on a government’s ability to manage its economy effectively.

Figure 9: Percentage of projects with cost overruns



Source: Correcting the course of capital projects, PwC, 2013; PwC analysis, based on industry research

The key challenges faced during this phase may include the following:

Poorly structured projects and complicated procurement processes

Once a project is prepared, the market needs to be made aware of the opportunity – the project owners need to ‘sell’ the project to the market to attract interest. This is often done through procurement publications and other media, market awareness

presentations (e.g., ‘Open Days’), or one-on-one meetings with potential investors. In emerging markets, such campaigns become very important as the private sector evaluates where to deploy its limited capital. Regional governments must recognise that investors, lenders and those operating within the market (advisors, constructors and operators) will place their time and money in jurisdictions and projects offering the best return for the risks assumed.

Prior to commencing formal procurement, tender documentation that clearly articulates the project requirements, the commercial structure and the obligations of all parties need to be drafted and approved by the government. These tender documents need to be comprehensive. Poorly conceived tender documentation will result in a sub-optimal or failed procurement process as potential bidders do not want to spend valuable time and money bidding on projects where procuring authorities fail to deliver adequate documentation to the market.

Imbalance between risks and rewards that makes obtaining financing difficult

Equity and debt financiers will invest their capital in markets that offer fair and equitable returns for the risks taken. In simple terms, most foreign investors and financiers will assess projects in jurisdictions in which they have operations or are contemplating operations to understand the risks they will be exposed to and whether they will be able to compete with the

local market (or be treated equitably). If the returns offered by a specific project do not fairly compensate advisors, investors and lenders, builders or operators, they will invest their money in competing projects and jurisdictions that do.

This is further exacerbated by the varying preferences of financiers or investors (which include governments, banks, funds and insurance companies). For example, investment funds might prefer higher returns in a shorter term, whereas sovereign wealth funds might have opposing preferences (lower returns over a longer period)³². Even within private equity funds, there may be different risk profiles and investment strategies. For instance, in PwC's 2017 Survey for the Asia-Pacific Economic Cooperation on Infrastructure Investor Risk Profiles and Appetite conducted with various private equity funds that have infrastructure investments in the region, the investment holding period can range from three years to maturity. Table 5 below also details the typical return requirements and some investment preferences of different types of investors.

Table 5: Return requirements and investment preferences of investors

Investor	Typical return requirement	Description
Infrastructure / PE funds	10-30%	<ul style="list-style-type: none"> Highest return requirements among investors Look to exit investments within a desired timeframe
Strategics	11-15%	<ul style="list-style-type: none"> Corporations with industry expertise and operational know-how Stable and long time horizon – view assets as businesses they hold
Sovereign Wealth Funds (SWFs)	7-15%	<ul style="list-style-type: none"> Created to manage national/state wealth Tend to acquire equity stakes alongside proven partners, however, there is a trend toward direct investments
Pension funds	7-12%	<ul style="list-style-type: none"> Long-term liabilities require looking for long-life assets and cash flows to match Tend to co-invest alongside experienced partners although players such as Canadian pension funds are leading the way in direct investment and active involvement in project implementation and operation
Development Finance Institutions (DFIs)	While project has to be economically viable, DFIs also evaluate development and social impact	<ul style="list-style-type: none"> Fill a gap in the financial market by investing in areas where commercial investors typically do not Intended to act as a catalyst to bring in private sector investors While development focused, can be profitable due to first-mover advantage

³² Closing the financing gap: Infrastructure project bankability in Asia, Marsh & McLennan Companies, 2017

It is important to understand the risk appetites of the potential financiers and structure feasible projects that are able to balance the interests of all stakeholders involved. The Singapore-Kunming Rail Link (SKRL) project, part of which

runs through Thailand, is an example that demonstrates a mismatch in interests of the potential investor (China) and the government of Thailand.

Singapore-Kunming Rail Link project

The SKRL is a US\$23 billion³³ rail network that would connect Singapore to Kunming in China through Cambodia, Lao PDR, Malaysia, Myanmar, Thailand and Vietnam. This was one of 15 priority projects in the Master Plan on ASEAN Connectivity 2010 (MPAC 2010) but had not progressed according to the original timeline and was reallocated to one of the strategic areas laid out in MPAC 2025³⁴.

Thailand-China rail link

There were difficulties in reaching an agreement on the financing structure and terms of the Thailand-China rail link, which is a section of the SKRL project. Initially, both countries intended to split the cost of the project but failed to reach an agreement on this as Thailand did not accept the interest rates on loans offered by China³⁵. Eventually, Thailand approved a US\$5.2 billion³⁶ infrastructure budget to finance the construction of the project on its own balance sheet.

Inequitable risk allocation

Governments can view private sector involvement in projects as a way to transfer risks to another party. However, governments will always retain some risk: a project and resultant risks will transfer back to the government in the event of a project failure. Thus, governments should not seek to transfer as much risk as possible but instead seek to allocate the risks to the parties that are best able to manage them. This means considering the levers over specific risks, which party controls those levers and so be able to manage the risks. Further, governments should consider the price of transferring risk. Risk should be transferred so as to maximise value for money for the government.

Lack of capacity

Infrastructure projects are large and complex, and similarly, procuring them is not an easy process. This is especially true when there is a lack of experience in procuring such projects. Public sector officials require technical, legal and financial skills, which must be supported by rigorous procurement processes that allow for decisions to be made and conclusions as well as recommendations to be challenged. Governments and officials should complement their in-house skills with external advice as and when required, to benefit from specialist knowledge and insight. This naturally comes at a cost, but when compared to the overall cost of the project, a little investment upfront can reap huge dividends for public finances.

³³ Repaving the ancient Silk Routes, PwC, 2017

³⁴ Master Plan on ASEAN Connectivity 2025, ASEAN, 2016

³⁵ Thailand throttles back on rail project with China, Nikkei Asian Review, March 2016

³⁶ Thailand, China agree on \$5 billion cost for rail project's first phase, Reuters, September 2016

Recycling capital

This phase includes divesting the asset partially or fully and re-investing capital into new projects. The key challenge in this phase may be the availability of exit options.

Availability of exit options

The availability of exit options is one factor that can influence potential investors of an infrastructure project. After the completion of an infrastructure project, initial investors, whether they hail from the public or private sectors, would look into exit strategies to free up capital for reinvestment into new projects or new markets. For a government, this would be through a divestment of their interests to the private sector or a monetisation of future cash flows. For a private sector investor, this would be through a refinancing or sale of their interests to an investor with a different risk or return profile that better matches the risk profile of the project.

The availability of a regional secondary market for infrastructure investments is essential. Such a platform facilitates the recycling of capital as it allows various investors to find transactions that match their risk profiles, and investment and exit preferences. A well-developed secondary market in ASEAN is necessary but the accessibility of the market to a broader group of investors, both local and foreign, can be a significant limiting factor. Governments' foreign investment policies often act as this limiting factor, especially in the infrastructure sector as it is often seen as a sector of national interest that should not permit total or majority foreign ownership.

There are clearly a host of factors that can contribute to limiting investments in infrastructure. In the next chapter, we look at measures to address these challenges.

Negative Investment List of 2016, Indonesia

The Negative Investment List of Indonesia restricts foreign ownership in a number of business lines, with the most recent revision made in 2016. While there have been notable improvements in a bid to increase investments, there are still restrictions on the level of foreign ownership allowed in various infrastructure sectors. For example, foreign ownership in the fixed and mobile telecommunications networks sector is capped at 67%, whereas in the passenger land transportation sector, this is capped at 49%³⁷.



³⁷ Indonesia 2016 Negative List

Chapter 3: Measures to address the infrastructure gap

In Chapter 2, we explored the key factors that prevent countries from addressing the infrastructure gap. In this chapter, we discuss the key measures that need to be undertaken to address the infrastructure gap.

Some of the key measures include having a national model for evaluating and making decisions on the types of projects to be undertaken; stable legal and regulatory frameworks; access to financing; risk mitigation instruments; public-sector capacity to create and manage projects; social responsibility practices; and strong environmental regulations.

In addition, there needs to be a strong talent pool of enablers at each stage of the project lifecycle to ensure that each stage of the project is carried out efficiently. These enablers include:

- Governments
- Financial institutions and investors (such as banks, funds and insurance companies)

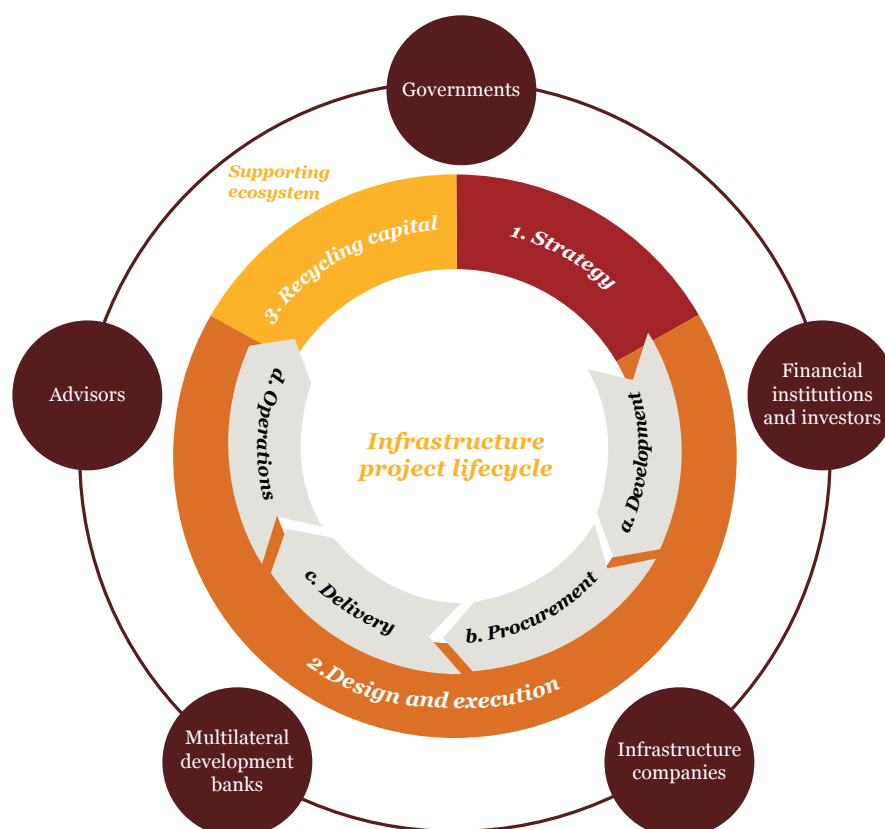
- Advisors (including financial, tax, legal and technical advisory firms)
- Infrastructure companies (such as engineering companies, construction companies and design companies)
- Multilateral development banks (MDBs such as the World Bank, ADB and Asian Infrastructure Investment Bank (AIIB))

These enablers serve as a strong support system which can help to address the key challenges and provide support across the entire project lifecycle. We call this the ‘ecosystem’ (Figure 10). It comprises five components: governments, financial institutions and investors, advisors, infrastructure companies and MDBs.

This chapter details the role of each component in the ecosystem, and how they contribute to successful infrastructure frameworks and projects. These are key to addressing the infrastructure gap.

Presence of an entire ecosystem

Figure 10: Supporting ecosystem for the infrastructure project lifecycle



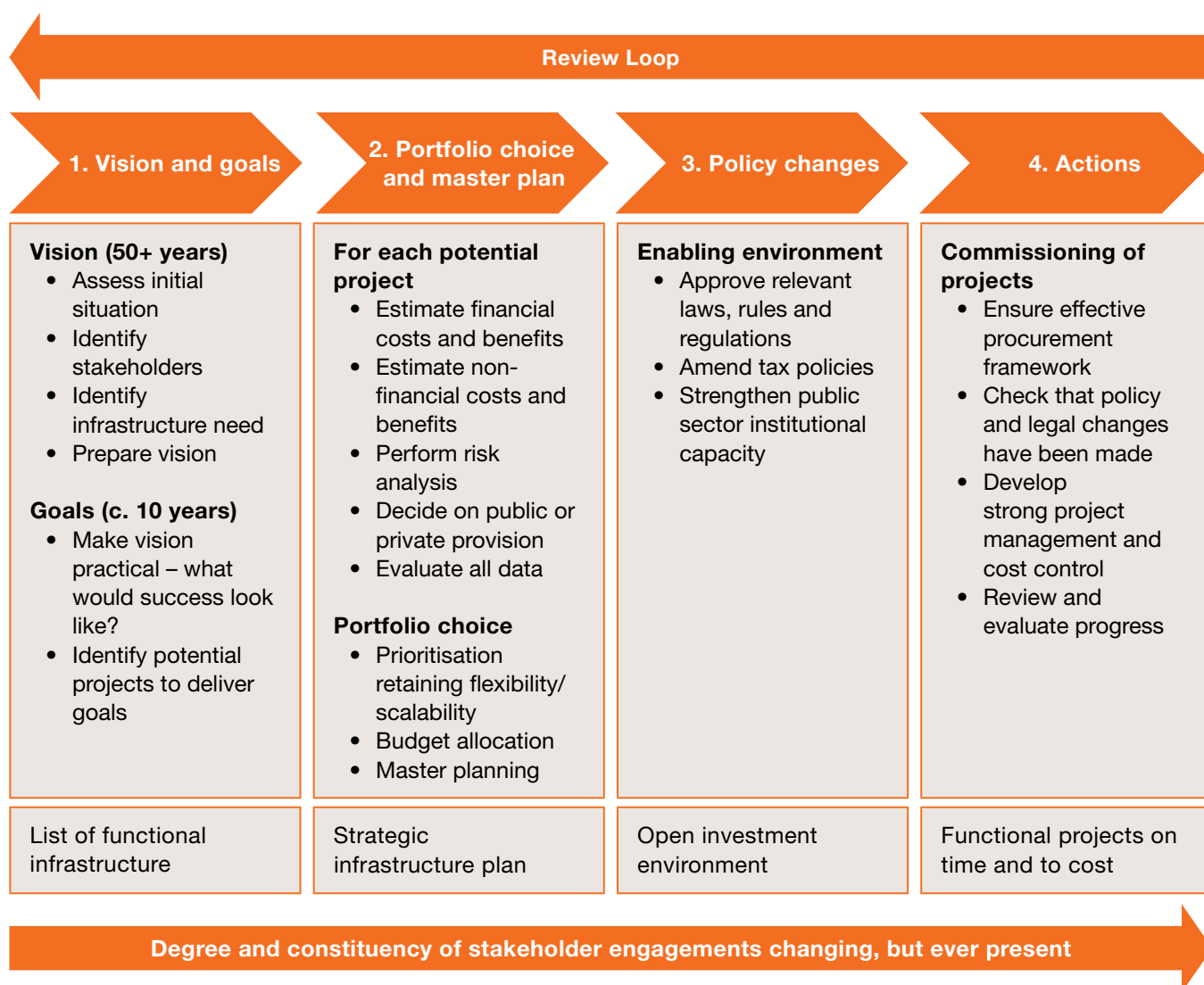
Governments

Role of governments

The first and the strongest pillar of the ecosystem is the government. The vision and approach of the government, as reflected by its policies and regulations and the master plans for business and investment in the nation, has a strong correlation with the state of infrastructure, the inflow of domestic and foreign investments and ultimately the GDP per capita of the country.

In Figure 11, we have noted the role of governments, where the infrastructure plans, investment environment and monitoring policies are results of their goals and vision.

Figure 11: Role of governments in the infrastructure planning process



1. Vision and goals

a. Prepare an infrastructure plan

Governments should prepare a national economic infrastructure plan to optimise the country's portfolio of infrastructure investments. This will clearly state the vision and goals to stakeholders. A good infrastructure plan should have the following characteristics:

- The plan should provide greater certainty to stakeholders. The pipeline of future projects should be clearly disclosed in advance. Doing so ensures that the government is committed to providing a steady, rather than fluctuating, flow of infrastructure projects. This also gives stakeholders ample time for planning approval and keeps material prices steady while allowing the private sector to invest in new capabilities and technologies. A change in the political party that forms the government should not cause major disruptions to the plan.
- The plan should have clear prioritisation methodologies to create maximum benefits with regard to the economy, society and sustainability.
- The infrastructure plan should follow clear principles for procurement, which are aligned with internationally-recognised guidelines and standards.
- Governments should look at strengthening public institutions to facilitate an enabling environment for infrastructure investments.
- The plan should solve a current or potential problem that the country faces. Worst and best case scenarios can be used to test the resilience of the proposed plans.

b. Consider the state of current infrastructure conditions

The government can undertake technical studies and survey stakeholders to obtain an understanding of the state of current infrastructure conditions. As an example, the Strategic Infrastructure Planner Tool by the World Economic Forum can be used to provide a summary of the infrastructure quality,

government readiness, societal readiness and market readiness within a specific market. An early outreach to stakeholders allows the government to identify and consider contentious issues during the planning stage.

c. Envisage future infrastructure vision

Stakeholders' views of the future state of infrastructure should again be considered when the government plans its future infrastructure vision. This long-term vision should be aligned to the government's long term economic, industrial and social visions for the country. With the direction of the infrastructure vision fixed, subsets of outcome-based, medium-term infrastructure goals can be prepared, which will work towards achieving the long-term vision.

2. Portfolio choice and master plan

a. Prioritisation methodology: Cost-benefit analysis

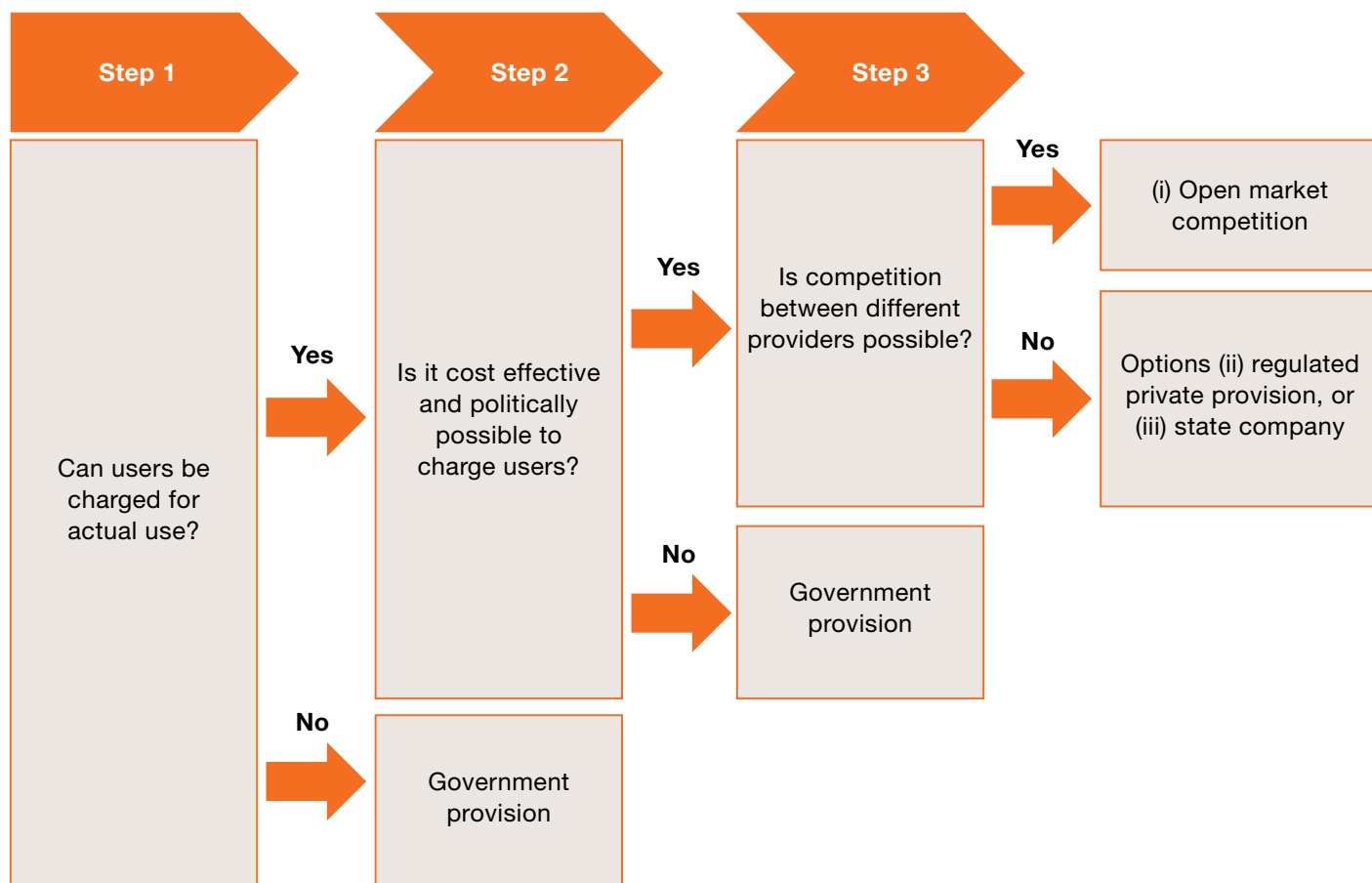
Cost-benefit analysis is an effective method to fully consider the long-term economic, environmental and social implications of infrastructure investments, and these implications should be weighted based on importance. To ensure that the government is fully accountable for its actions, the assumptions and implications of the cost-benefit analysis should be disclosed to relevant stakeholders. This gives credibility to the government and provides assurance to potential project sponsors and investors.

As many governments face tight fiscal constraints, additional government investment is often difficult. It is therefore crucial that investments are strategic in nature to maximise value for money for the taxpayer and society as a whole while maximising economic, social and environmental benefits for the country.

b. Public or private provision

Given budget constraints, the initial presumption should be that users need to be charged for usage, with targeted subsidies for those unable to afford essential infrastructure services. A decision tree that illustrates the key considerations contributing to the funding decision is shown in Figure 12.

Figure 12: Flow chart for funding considerations



3. Policy changes

a. Existence of relevant legal and regulatory frameworks, and strong public institutions

There needs to be a focus on developing a strong and stable legal and regulatory framework to provide a robust foundation on which to attract investment. ASEAN economies also need to identify key gaps within existing frameworks and draft and approve

regulations and laws that address these gaps. It is also important to ensure that these revisions look to global precedents in order to make this process more efficient and ensure that the market can easily understand and respond to these new laws.

This can be achieved in two main areas:

- (i) Presence of dedicated government departments or institutions that support infrastructure development and encourage private sector participation; and
- (ii) Initiatives implemented by governments or regulatory bodies that support companies in infrastructure development or investment at various stages of the project lifecycle.

Indonesia Infrastructure Guarantee Fund (IIGF), Indonesia	Indonesia Infrastructure Finance (IIF), Indonesia
<p>IIGF is a state-owned enterprise established in 2009, wholly-owned by the government of Indonesia and supported by the World Bank.</p> <p>It is the sole provider of guarantees for infrastructure projects under the public-private partnership (PPP) scheme in Indonesia, under a set of clear, consistent and standard guidelines which have been developed with technical assistance from the World Bank.</p> <p>IIGF guarantees are backed by either:</p> <ul style="list-style-type: none"> • IIGF's capital; or • World Bank financing, through financial support provided under the Indonesia Infrastructure Guarantee Fund Project (IGFP). <p>Some benefits of IIGF include:</p> <ul style="list-style-type: none"> • Ensuring transparency in the provision of guarantees • Improving the bankability of projects • Reducing the cost of financing of projects • Attracting private sector investments 	<p>IIF is a private national company established in 2010 by the Ministry of Finance of Indonesia, with the support of the World Bank, ADB and other multilateral institutions. IIF provides infrastructure financing and advisory services for projects in Indonesia.</p> <p>IIF provides financing through two types of investment products:</p> <ul style="list-style-type: none"> • Fund based, such as long-term loans and equity investments; and • Non-fund based, such as guarantees. <p>Some benefits of IIF include:</p> <ul style="list-style-type: none"> • Enforcing international standards for credit, risk management, corporate governance, and social and environmental safeguards for its portfolio of projects • Improving the structure and bankability of projects through financial and transaction advisory services • Addressing financing gaps by providing financing solutions specific to a project's requirements • Facilitating private sector investments

International Enterprise (IE) Singapore
<p>IE Singapore is a government agency that promotes international trade. It provides a network for, and support services to, Singapore companies to venture overseas through their centres in over 35 locations around the world.</p> <p>One relevant initiative administered by IE Singapore is the Internationalisation Finance Scheme (IFS), which is able to help Singapore-based companies obtain financing by sharing the risk of default of payments between IE Singapore and Participating Financial Institutions (PFIs) in selected emerging markets. Initiatives like this can help mitigate some of the risks of financing infrastructure projects, allowing Singapore-based companies to explore the development of more infrastructure projects in ASEAN.</p>

b. Tax policies

Another aspect of policy changes involves tax policies. Governments can implement targeted tax incentives to promote and attract infrastructure investments to their country.

Tax Incentive Schemes for Project and Infrastructure Finance, Singapore	Eastern Economic Corridor (EEC) Bill, Thailand
<p>The Tax Incentive Schemes for Project and Infrastructure Finance in Singapore³⁸ include:</p> <ul style="list-style-type: none">• Exemption of qualifying income from qualifying project debt securities• Exemption of qualifying income from qualifying infrastructure projects/assets received by approved entities listed on the Singapore Exchange (SGX)• Concessionary tax rate of 10% on qualifying income derived by an approved Infrastructure Trustee Manager/Fund Management Company from qualifying activities <p>These incentives, previously scheduled to end after 31 March 2017, have been extended until 31 December 2022—a further indication of the Singapore government's support for infrastructure investments.</p>	<p>Under Thailand's Eastern Economic Corridor, maximum tax incentives implemented include:</p> <ul style="list-style-type: none">• Corporate Income Tax (CIT) exemption of 15 years plus grants for qualifying strategic projects in the Eastern Economic Corridor³⁹• Investment Tax Allowance (ITA) allowing a deduction of up to 70% of investment capital on net profit for qualifying projects⁴⁰

4. Actions

a. Financing decision

In order to deliver infrastructure projects effectively and efficiently, governments need to consider the choice of financing method depending on the sources of available finance, the relative benefits of those sources as well as their costs (both explicit and implicit).

We analyse this through a discussion of the various procurement and delivery models that can be used for infrastructure projects—"traditional" procurement, PPP, government-to-government (G2G) transactions and the hybrid PPP model which is increasing in popularity in some ASEAN countries.

(i) Traditional procurement

Traditional infrastructure procurement is represented by the government's acquisition of infrastructure such as roads and buildings (such as hospitals and schools). Usually, the government specifies the quantity and

quality of the service, while the infrastructure is constructed by private companies to whom the construction is typically awarded through a tender. The government agency enters into different contracts for construction, operation and maintenance, as well as ancillary services. Once the construction is completed, the asset is transferred to and operated by the government. This mechanism includes what is termed 'build and deliver' contracts. In a traditionally procured project, the transfer of risk to the private parties involved is very limited and usually does not extend beyond the construction phase. Most of the project risks lie with the government agency.

(ii) PPP projects

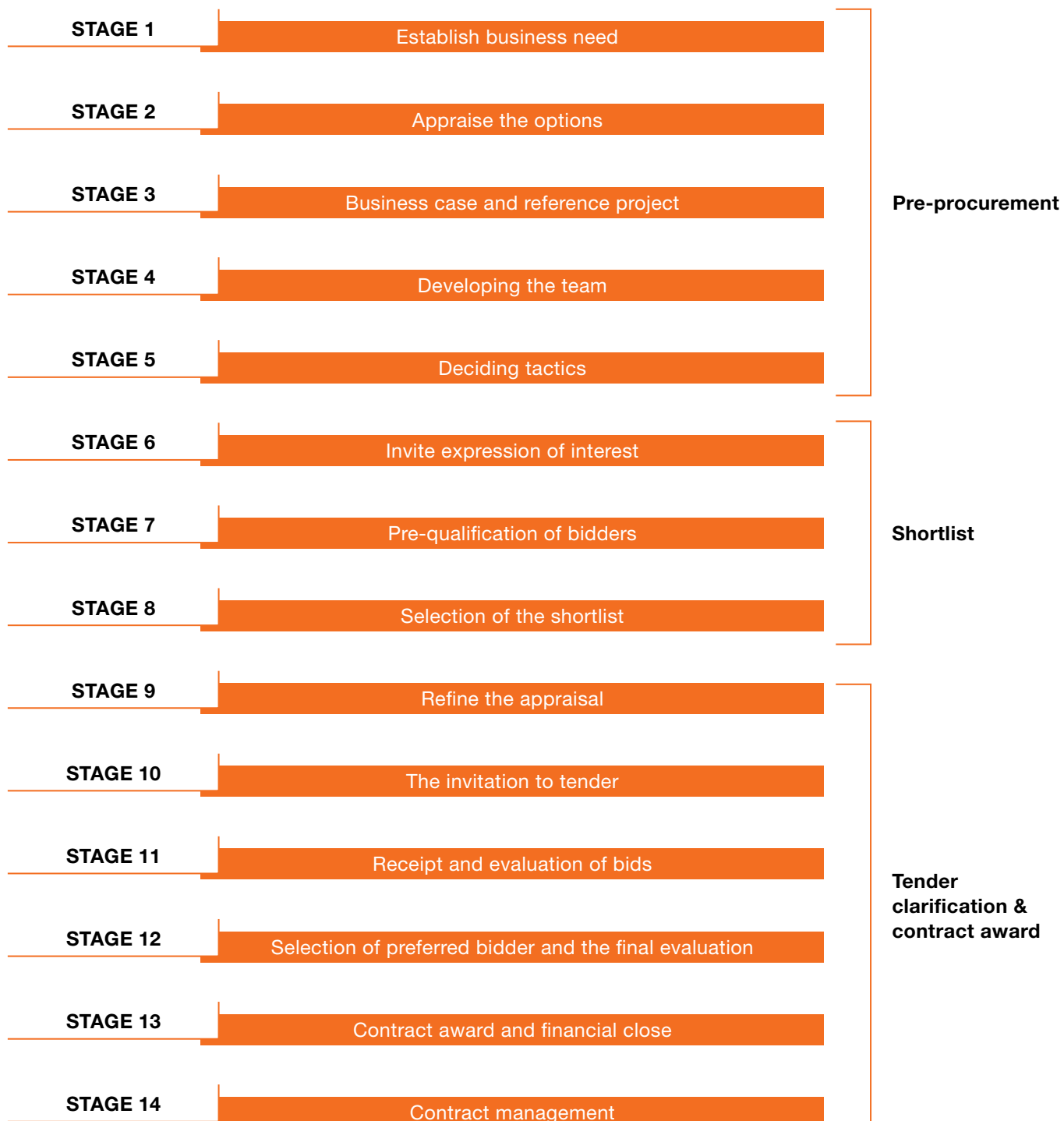
A PPP is a partnership between the public sector and the private sector for the purpose of delivering a project or a service traditionally provided by the public sector. A PPP project can typically be segmented into 14 stages.

³⁸ Budget 2017-Extending the Tax Incentive Schemes for Project and Infrastructure Finance, IRAS, 2017

³⁹ EEC Gateway to Asia, Thailand Board of Investment, January 2017

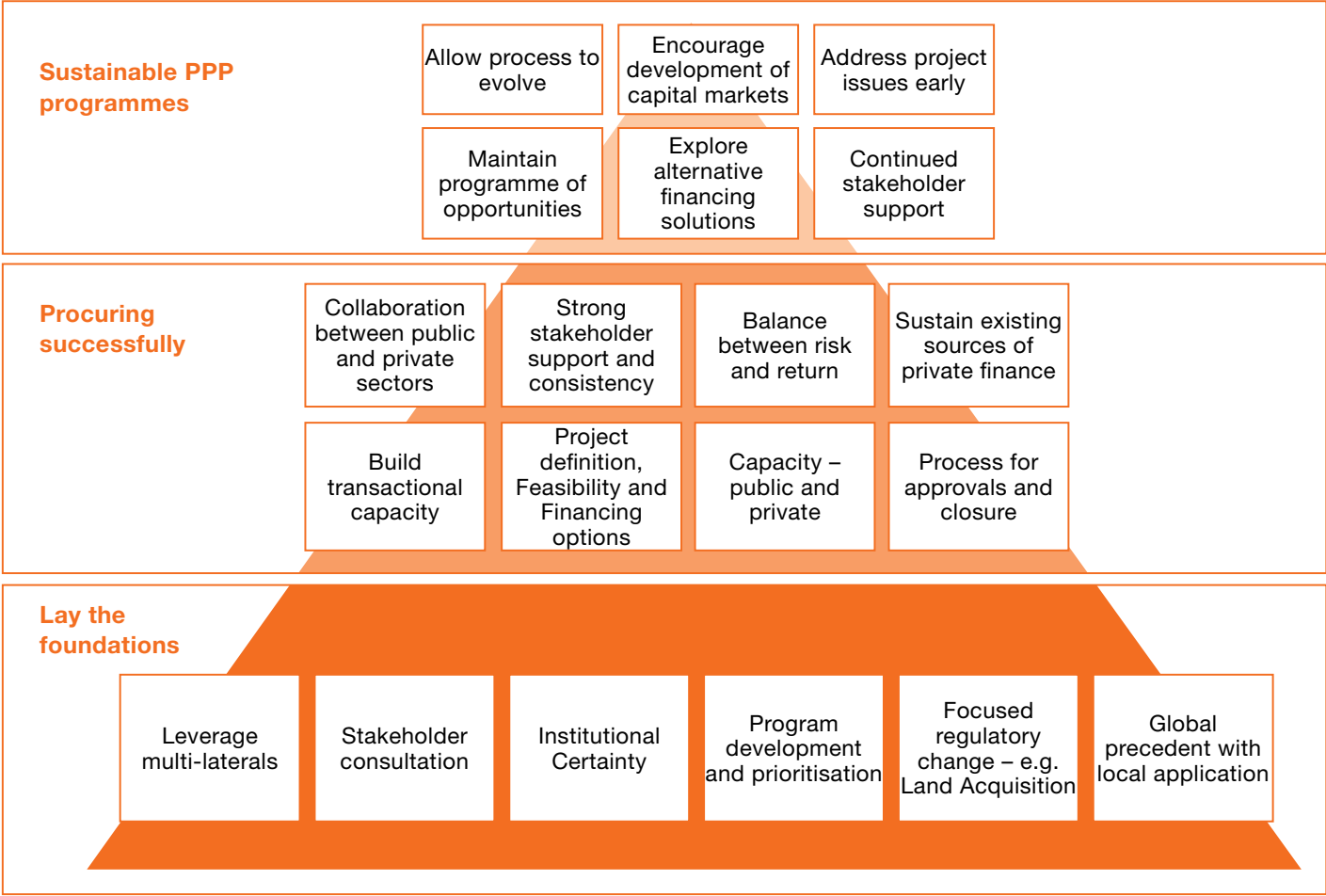
⁴⁰ Opportunity Thailand, Thailand Board of Investment, April 2017

Figure 13: : The 14-stage process of a PPP



To deliver PPP projects, governments need an effective PPP programme. The features of a successful PPP programme are set out in the figure below.

Figure 14: Features of a successful PPP programme



PPPs play a pivotal role in financing infrastructure projects. Compared to traditional capital investments from the government, in PPP projects, financial and operational risks can be more efficiently allocated to the private sector, who tend to be able to manage these costs more efficiently. Additionally, PPPs also allow the state to tap on the innovative ability and managerial talent in the private sector as well as free up public resources, which allows the government to invest available resources in other infrastructure projects or other areas of the society and economy.

However, there are drawbacks of PPP projects. They are often complex and difficult to structure and procure and this can result in longer procurement and delivery timeframes than traditional capital investment. Clear guidelines give investors better knowledge and assurance on which to base their investment decisions and can help to attract the trillions of assets under management by institutional investors, whose primary objective is to seek long-term, low volatility investments—aspects which are pertinent to infrastructure investments.

ASEAN Principles for PPP Framework

The framework was issued in 2014 and developed by the ASEAN Secretariat and the Organisation for Economic Co-operation and Development (OECD) to provide ASEAN member states with guidance on how to effectively implement PPP projects. It is based on the following guidance/frameworks⁴¹:

- Existing PPP frameworks or practices in ASEAN member states
- OECD's "Principles for Public Governance of PPPs" and "Principles for Private Participation in Infrastructure"
- World Bank's "Dedicated Public-Private Partnership Units"
- European Investment Bank's "Guide to Guidance"
- ADB's "Public-Private Partnership Operational Plan 2012-2020"
- UN Economic and Social Commission for Asia and the Pacific's (UNESCAP) "Guidebook on PPP in Infrastructure"

Several member states have taken this framework into consideration by legislating it. For instance, in an effort to attract FDI to infrastructure development, the Vietnamese government issued a decree on PPP investments in 2015. Although the new framework does not fundamentally change the existing PPP laws, it clarifies and improves them.

(iii) G2G projects

Governments, such as China and Japan, have traditionally been major proponents of G2G infrastructure projects in the region due to the potential opportunities for agencies or companies from their countries to participate in such projects. G2G transactions can also align foreign policy objectives in areas such as sustainable economic growth and environmental development goals.

(iv) Hybrid PPP transactions

The government of Philippines is also exploring the utilisation of a hybrid PPP model where the initial upfront construction will be delivered through a G2G arrangement and the operations and maintenance of the project will be managed by the private sector through a PPP contract. Through this, the government intends to reduce the implementation period of projects and the cost of borrowing as they can borrow at lower rates through grants and concessional loans⁴² while still leveraging the expertise and experience of the international infrastructure operators and maintenance companies.

⁴¹ ASEAN Principles for PPP Frameworks, ASEAN, November 2014

⁴² Gov't to apply 'hybrid' formula in implementing PPP projects, Department of Finance, May 2017

Case study: G2G project

Jakarta MRT, Indonesia

Details of infrastructure ecosystem	
Governments	Indonesia and Japan
Financial institution/investor	Japan International Cooperation Agency (JICA)
Infrastructure company	Provincial Government of DKI Jakarta
MDB	JICA

Project background

The first phase of the project is a 15.7km section that links Lebak Bulus in South Jakarta to the Hotel Indonesia traffic circle in Central Jakarta. The construction of the first phase of the MRT project was funded by a ¥125 billion (US\$1.29 billion) soft loan from JICA. Repayment is expected to come 49% from the central government and the remaining from the regional authority, DKI Jakarta. The project's total investment value is expected to be around US\$1.7 billion.

Impact on the region

This project, combined with the current light rail transit (LRT) development, is expected to ease the traffic congestion problems of one of the largest cities in the world. The first phase of the project is anticipated to carry up to 173,000 passengers daily and reduce the travel time from Lebak Bulus to Hotel Indonesia by more than 50% (to less than 30 minutes).

Opportunities

The Japanese government, through JICA, has positioned Japanese companies to take on substantial roles in the contract process from planning through to construction and maintenance, as well as providing opportunities for international companies to act as subcontractors in the construction phase. There are other opportunities for international companies to support on project management and assurance, operations, and training and capacity building of operational staff, given that there is currently no existing MRT in Indonesia.

Source of case study: MRT Jakarta: Digging the city, The Jakarta Post, April 2016

Case study: Hybrid PPP model

Clark International Airport, Philippines

Details of infrastructure ecosystem	
Government	Philippines
Advisor	International Finance Corporation (IFC)
Financial institution/investor	Government of Philippines
Infrastructure company	Bidding process for a contractor was recently launched by the government
MDB	IFC

Project background

The PHP12.55 billion (US\$248 million)⁴³ project involves the construction of a new airport terminal for Clark International Airport, which will expand current airport capacity from 4.2 to 8 million⁴⁴ passengers annually. The project will be jointly run by the Department of Transportation (DOTr) and the Bases Conversion and Development Authority (BCDA). IFC will be advising on the design, structure and implementation of the PPP transaction.

Impact on the region

Along with the expected economic growth arising from the expansion of the airport to accommodate 3.8 million additional passengers annually, lower airport charges are

expected to result from the hybrid PPP model adopted for this project. As the project will be funded and developed by the government, a lower rate of return will be expected when the new terminal is operational and this will be transferred to passengers in the form of lower airport charges.

Opportunities

As the government will be using PPP for the subsequent operations and maintenance of the airport, this is an opportunity that the private sector can target. Further, with the expansion of the airport terminal, tourist arrivals are expected to increase, opening up downstream opportunities in the retail and hospitality industries, which local, regional and international companies can explore.

⁴³ MegaProject 982: Philippines opens bidding for first 'hybrid' PPP project, InfraPPP World, August 2017

⁴⁴ Clark airport dev't opened up to bidders, BusinessWorldOnline, August 2017

Financial institutions and investors

Role of financial institutions and investors

The next important pillar is the financial institutions and investors that provide the necessary capital for building infrastructure projects. Robust capital markets, a strong banking system, the presence of large institutional investors, private equity funds and large scale private investors are all important ingredients for infrastructure development.

Government funds have been the most common source of infrastructure project finance historically with private sector financing coming from commercial banks. However, with government budgets constrained, regulatory restrictions on bank lending and the need for infrastructure still immense, governments must look to release alternative sources of financing. These alternative sources of financing include insurers, pension funds and endowment funds. These investors have long-term investment horizons and trillions of dollars in cash that need investing. Infrastructure investments should be attractive to them.

Generally, pension funds, infrastructure funds or sovereign wealth funds do not invest in greenfield projects or emerging markets as they tend to shy away from exposure to construction risk or non-OECD sovereign risk. However, due to constraints on government budgets and lower levels of liquidity or higher cost of traditional project finance loans, tapping into this long-term liquidity pool is important. This can be done by selling operational aspects to these asset buyers or creating a more conducive environment for investing into greenfield projects.

Institutional investors are an obvious long-term source of capital for infrastructure projects. They can match the long-term, relatively low-volatility, and inflation-protected nature of those investments with their long-term liabilities.

Here, we look at a few examples of funds and other types of private investors that have been investing in and lending to infrastructure projects in ASEAN.

Clifford Capital	Equis Funds	China Construction Bank (CCB)
<p>Clifford Capital was established in 2012 by the Singapore government as an independent, commercially managed company.</p> <p>It offers innovative and competitive debt financing solutions across all stages of the project lifecycle.</p> <p>It aims to act as a catalyst to facilitate more cross-border business opportunities for Singapore-based companies, by addressing constraints in the accessibility and availability of cross-border financing of infrastructure projects.</p>	<p>Equis is Asia's largest independent infrastructure private equity manager, raising over US\$2.7 billion in equity for Asia Pacific infrastructure initiatives in the last five years⁴⁵.</p> <p>With its local-market expertise and management of all aspects of development, construction and operations, it has established a strong presence in 10 Asia Pacific countries and is headquartered in Singapore.</p> <p>Unlike many other funds, Equis takes on development and construction risk.</p>	<p>CCB is China's second largest bank with around 21 trillion yuan (US\$3.1 trillion) worth of assets⁴⁶.</p> <p>CCB has expanded its presence in Singapore to take advantage of the country's strength in infrastructure finance and wealth management, and opened an infrastructure financing services centre to mobilise investments in the BRI.</p>

⁴⁵ Corporate profile, Equis, 2016

⁴⁶ China Construction Bank opens new offices in Singapore, The Straits Times, April 2017

Private Infrastructure Development Group (PIDG)

PIDG was established in 2002 to help overcome the obstacles in private sector infrastructure investments in developing countries. PIDG consists of the following international/multilateral members⁴⁷:

- Department for International Development
- Australian Government Department of Foreign Affairs and Trade
- Swiss Federal Department of Economic Affairs, Education and Research (SECO)
- KfW
- Netherlands Ministry of Foreign Affairs
- Norwegian Ministry of Foreign Affairs
- Swedish International Development Cooperation Agency
- Finance for Development
- IFC

PIDG operates through three main arms which have headquarters in Asia and Africa. The Asian headquarters of the following companies are in Singapore:

- **InfraCo:** InfraCo aims to create viable infrastructure investment opportunities that balance the interests of various project stakeholders. It also reduces entry costs for private sector investments by funding early stage, high risk projects, and providing access to development expertise and advisory services.
- **DevCo:** DevCo, which is managed by the World Bank Group's IFC, seeks to provide financial support for project structuring in developing countries to facilitate sustainable private sector infrastructure investments.
- **GuarantCo:** GuarantCo provides guarantees to lenders to support domestic infrastructure financing and capital market development in low-income countries.

Advisors

Role of advisors

Infrastructure projects often involve professionals who advise on the financial, transactional, legal and technical structures required across the entire infrastructure project lifecycle in order to make projects bankable. The presence of a strong talent pool of advisors is a contributing factor for project success as these advisors ensure a robust project plan and design—an important step towards improving the bankability of infrastructure projects.

Effective planning can avoid cost and time overruns and leads to efficient project implementation. Other than project planning, design and implementation, advisors such as tax experts and lawyers are also an important component of the ecosystem, as they provide investors with the necessary know-how on the country's tax laws and regulations. This makes it easier for investors to decide whether to invest their limited time, capital and capacity in an infrastructure programme. In addition, these advisors can also provide expertise on exit strategies when investors wish to sell their interest in operational aspects and reinvest their capital elsewhere.

⁴⁷ Members, PIDG

Case study

Mawlamyaing power plant project, Myanmar

Details of infrastructure ecosystem	
Government	Myanmar
Financial institution/investor	United Overseas Bank (UOB)
Infrastructure company	Asiatech Energy

Project background

Singapore-based firm, Asiatech Energy, was contracted by Myanmar Lighting IPP Co Ltd (MLC) to construct a 230-megawatt power plant in Mawlamyaing, located in Mon state, Myanmar. The construction was financed by Singapore’s UOB. The plant will be owned and operated by MLC and Myanmar Electrical Power Enterprise (MEPE) will distribute the electricity generated.

Impact on the region

The Mawlamyaing plant is expected to produce a sustainable supply of electricity for five million people when it is

completed, contributing to Myanmar’s National Electrification Plan (NEP) of 100% electrification by 2030⁴⁸.

Opportunities

A reliable and sustainable power supply is needed to support businesses and future growth. It would, in turn, drive the creation of new industries and jobs for Myanmar.



⁴⁸ Electricity to Transform Rural Myanmar, The World Bank, September 2015

Case study

Coc San power project, Vietnam

Details of infrastructure ecosystem	
Government	Vietnam
Advisor	InfraCo Asia
Financial institution/investor	InfraCo Asia and Saigon Hanoi Commercial Bank (SHB)
Infrastructure company	Asiatic Group Holdings, Singapore

Project background

Coc San is a 29.7-megawatt hydropower project in the Lao Cai province of Vietnam that began operations in 2016. Nexif Energy acquired a majority equity holding from InfraCo Asia in the project in early 2016, when it was nearing the completion of construction.

Impact on the region

Coc San is now providing more affordable and reliable power supply to 130,000 people reducing the need to import expensive and unreliable power from other countries. It is also making a positive social and environmental impact as the population in the area was not displaced by the project and Vietnam’s carbon emissions have been reduced by 76,000 tonnes annually.

Key challenges

Before the involvement of InfraCo Asia, the project faced delays in the early stages as there were difficulties in obtaining long-term debt financing. This was partly due to lenders and investors feeling uncomfortable with the insufficient levels of due diligence work, project safeguards and risks of the project.

From 2012, InfraCo Asia’s involvement included:

- Providing development expertise and advisory services to restructure the Coc San project, improving the bankability of the project – US\$23 million debt financing was subsequently obtained from SHB
- Commissioning environmental and social impact analysis to World Bank and IFC standards
- Investing US\$7.54 million into the project
- Providing other development expertise and advisory services throughout the project

Opportunities

The Coc San project created short- and long-term employment opportunities for the people of Lao Cai province. In addition, the availability of a reliable electricity supply is expected to attract and support industrial developments (such as the iron, copper and mining sectors) and investments in the area.

Sources of case study: Coc San Hydropower Project Sheet, InfraCo Asia, 2016; Project Focus — Coc San Hydropower, Vietnam, PIDG, October 2015

Infrastructure companies

Role of infrastructure companies

These form the backbone of the ecosystem. Infrastructure companies play a crucial role in the infrastructure project lifecycle as they provide a range of services including technical advisory, construction, operations and maintenance as well as project management. These help to add value to the various stages of the infrastructure project lifecycle and ensure effective project delivery and operations. In addition, many

infrastructure companies are globally focused, giving them a diverse track record across many territories. Further, these companies often utilise a regional hub model where expertise and skills are centred in one or a few locations, and they are used to support project development and implementation in neighbouring countries.

Siemens	Hyflux
<p>Siemens recently launched the first Siemens Digitalisation Hub⁴⁹ in Singapore to provide digital services and expertise in Southeast Asia through:</p> <ul style="list-style-type: none">• Urban Infrastructure Hub• Digital Centre for Oil and Gas• Industry 4.0 Hub• Healthineers Digital Hub <p>Through this Digitalisation Hub, Siemens aims to supply solutions which include:</p> <ul style="list-style-type: none">• Improving efficiencies, mobility and integration within the region• Creating cost-efficiencies in the oil and gas industry• Increasing productivity and flexibility to help companies meet end-user needs with reduced response times• Facilitating easy and seamless interaction of data and knowledge in the healthcare industry	<p>Hyflux is a global leader in sustainable solutions, focusing on the areas of water and energy. It is headquartered and listed in Singapore, with operations and projects spanning Asia Pacific, the Middle East, Africa and the Americas.</p> <p>Hyflux differentiates itself through its ability to address the challenges in the water and energy sectors with innovative solutions. For instance, their membrane technology can be used in water pre-treatment, water recycling, waste water recycling or disposal, and water desalination in industries such as oil and gas, and power⁵⁰.</p>

CH2M	China Machinery Engineering Corporation (CMEC)
<p>CH2M is a global engineering firm specialising in government, industrial, infrastructure and energy projects. It has an international presence in over 50 countries, with regional headquarters in Singapore and offices across ASEAN.</p> <p>In 2015, CH2M launched its new Asia-Pacific InfraHub in Singapore, which aims to address Asia's growing infrastructure gap by developing solutions across various infrastructure sectors for the region.</p>	<p>CMEC, a major subsidiary of Sinomach, is one of China's top 10 international engineering, procurement and construction (EPC) companies serving the power and renewable energy markets.</p> <p>In 2014, CMEC established Sinland Development Pte Ltd in Singapore as its first overseas regional headquarters to undertake activities such as EPC contracting, procurement, investment and project financing for the region.</p>

⁴⁹ Siemens Digitalization Hub Factsheet, Siemens, 2017

⁵⁰ Industries and Applications, Hyflux

Multilateral development banks

Role of multilateral development banks

MDBs are external aid agencies with a mandate to support less developed and developing countries in their process of development and poverty alleviation through infrastructure development. Their support comes in the form of:

- (i) Loans, grants, technical assistance, policy advice, institutional support and project management support, among others
- (ii) Insurance against political risks
- (iii) Helping countries to further improve their existing capabilities and processes (such as procurement processes) to undertake future infrastructure projects.

World Bank Group (WBG)	Asian Infrastructure Investment Bank
<p>To provide support across the lifecycle of infrastructure projects globally, WBG set up the first Infrastructure and Urban Development Hub⁵¹ in Singapore, which consists of the following agencies:</p> <ul style="list-style-type: none">• International Bank for Reconstruction and Development (IBRD)• IFC• Multilateral Investment Guarantee Agency (MIGA) <p>This would allow governments or the private sector to obtain advisory services and financing and leverage existing expertise via WBG's global reach and through its partners.</p> <p>For example, along with Australia, Canada, China, Japan and Singapore, WBG is one of the funding partners of the Global Infrastructure Facility (GIF). Together with financiers as well as technical and advisory partners, GIF supports governments during the planning, design and execution phases of infrastructure projects. The Clark International Airport in Philippines is one project that was supported by IFC, a technical partner of the GIF.</p>	<p>AIIB is a multilateral financial institution founded in 2016 to provide financing for infrastructure projects. It has formed partnerships with private financial institutions, the public sector as well as international development banks including⁵²:</p> <ul style="list-style-type: none">• WBG• ADB• European Bank for Reconstruction and Development• European Investment Bank• Inter-American Development Bank• Inter-American Investment Corporation• New Development Bank <p>This would give infrastructure projects globally access to a wider pool of financing options, while ensuring that the projects in the region meet development goals of⁵³:</p> <ul style="list-style-type: none">• Sustainable infrastructure• Cross-country connectivity• Private capital mobilisation

Multilateral Investment Guarantee Agency
<p>MIGA is a member of WBG that aims to promote foreign investments into developing countries. Notably, MIGA provides political risk (non-commercial risk) insurance guarantees to the private sector. In 2017 alone, MIGA provided US\$4.8 billion in guarantees, which helped to attract US\$15.9 billion in foreign capital from private sector investors to developing countries⁵⁴. Such guarantees protect investments against non-commercial risks and can help investors obtain access to funding sources with better financial terms and conditions⁵⁵.</p>

⁵¹ Singapore, World Bank Group Respond to Global Demand and Establish Major Infrastructure and Urban Development Hub, The World Bank, October 2015

⁵² Our work, AIIB

⁵³ Strategies, AIIB

⁵⁴ MIGA issues record \$4.8b in guarantees to private investors in FY17, MIGA, July 2017

⁵⁵ Who we are, MIGA

Asian Development Bank

ADB is a multilateral development financial institution that provides financing, technical assistance and grants to member governments as well as financing to the private sector in developing member countries. Infrastructure development is one of the core areas in which ADB is involved.

ADB's operations are not solely focused on assisting existing or upcoming infrastructure projects. It also works to help countries, especially developing ones, further strengthen their current capabilities to undertake and support future infrastructure developments. For instance, Philippines has put in a proposal for a US\$100 million loan from ADB to develop an Infrastructure Preparation and Innovation Facility to gain access to international sources of innovation, expertise, advice, and best practices⁵⁶. The ultimate goal is to further improve the execution and quality of future infrastructure developments in the country by incorporating this knowledge into future projects.

ADB also established the ASEAN Infrastructure Fund (AIF) in 2012, in partnership with ASEAN member countries to address the region's infrastructure investment needs. The objective of AIF is to finance projects that promote infrastructure development within the territories of ASEAN's developing member countries by mobilising regional savings, including foreign exchange reserves. All AIF-financed projects are also co-financed by ADB.

It is important to note that international development organisations have well-established procurement processes and guidelines for projects that are well-understood and respected by the international infrastructure and financing

community. This gives comfort to project stakeholders as to the robustness of the processes and project information and so acts as an important catalyst for investment into infrastructure projects across emerging markets.



⁵⁶ Philippines: Infrastructure Preparation and Innovation Facility, ADB, 2017

Chapter 4: An infrastructure hub: a one-stop shop

As discussed in Chapter 3, the presence of an ecosystem can enable and lead to investments in infrastructure projects as the chance of project success increases. However, most developing countries lack one or more of the pillars of an ecosystem.

In Chapter 1, we shared that ASEAN countries need about US\$3.1 trillion⁵⁷ to meet ADB's estimate for infrastructure spending. However, most Southeast Asian countries lack bankable projects, or suffer due to less friendly business

regulations or the absence of a robust financial system. These nations rely on each other for finances and expertise to fill their infrastructure gap. Singapore, for instance, serves as a regional hub for project finance banks and acts to support the infrastructure financing requirements of fellow ASEAN countries. On the delivery side, developers such as Sembcorp in Singapore are investing in, and deploying project expertise and technology to, neighbouring countries such as Myanmar where they are developing power plants.



⁵⁷ Meeting Asia's Infrastructure Needs, ADB, 2017



Such cross-border harmony and externalities give rise to the concept of an infrastructure hub. We define an infrastructure hub as a geographic region which houses the entire project ecosystem and integrates infrastructure enablers along the entire value chain – be it architecture and engineering, multilateral banks, private financiers as well as other professional services – in one location, such that the whole region can take advantage of the ecosystem.

It is important to note that the concept of an infrastructure hub goes beyond just the presence of an ecosystem. There are other critical factors needed for a country or city to qualify as an infrastructure hub. These include:

- a) **Strategic location:** To serve as infrastructure hub for a region, the country or city should be centrally located within the region and have easy locational access from any place in that region. That is to say, there should be robust connectivity by air, road or rail to and from that place to other parts of the region. Within ASEAN, Singapore, Kuala Lumpur and Bangkok are three such places. They have affordable direct flights to and from all major cities in Southeast Asia.
- b) **Perception of enablers outside the region:** Foreign investment is critical to fill the infrastructure gap. Hence, it is important for the infrastructure hub to be perceived by foreign investors as a place that provides access to the region and offers sufficient scope for returns and investment avenues. A great example of this is Singapore. Several Chinese banks and construction companies have set up headquarters in Singapore so that they can access the entire Southeast Asian region for investments under the BRI.
- c) **Language advantage:** Not only should the place be strategically located, but the majority of its population should also speak a global business language such as English. This allows enablers from outside the region to easily set up base in the infrastructure hub and access other markets within the region.

With a full ecosystem of participants in the infrastructure supply chain, from banks and advisors to developers, Singapore is well positioned to capitalise on the BRI. Singapore is the infrastructure hub of ASEAN, with up to 60%⁵⁸ of ASEAN project finance transactions arranged by Singapore-based banks. With Singapore's expertise in urban planning and financing, complementing the expanding markets of emerging economies, G2G collaborative opportunities will be omnipresent with the potential B&R activities in ASEAN.

⁵⁸ Singapore – Gearing up to be Asia's Infrastructure Exchange, Ministry of Law, March 2017

Case study

Myingyan combined-cycle gas turbine power plant, Myanmar

Details of infrastructure ecosystem	
Government	Myanmar
Advisor	Allen & Overy, Singapore
Financial institution/investor	ADB, AIIB, IFC, Singapore banks including Clifford Capital, DBS Bank, DZ Bank, and Overseas-Chinese Banking Corporation
Infrastructure company	Sembcorp (in partnership with Jurong Engineering and General Electric)
MDBs	ADB, AIIB, IFC

Project background

The Myingyan combined-cycle gas turbine power plant is currently under development in Taungtha, a township of Myingyan district in Mandalay, Myanmar. The 225-megawatt project will become one of the biggest gas-fired power plants in the country upon commissioning in 2018.

Impact on the region

Once operational, the plant would play a key role in meeting the country's growing demand for electricity. The project will improve the reliability and stability of Myanmar's power supply at a competitive tariff, while addressing power shortages and helping it avoid future brownouts that hinder economic growth.

Key challenges

Securing long-term commercial bank financing necessary for large-scale infrastructure investments remains a challenge in Myanmar due to the inability of local banks to lend to these

projects, a lack of track record and the perception of high political risk. The funding agencies played a key catalytic role in addressing this challenge both from public sector and private sector sides while providing the necessary support to allow international project finance banks to participate in the project.

Opportunities

Sembcorp Myingyan Power Company will build and operate the power plant for 22 years⁵⁹, after which the facility will be transferred to the Myanmar government. As the first competitive tender for a gas-fired independent power producer project in Myanmar, the successful financial close and operation of this project is expected to mark a major milestone in the power sector.

⁵⁹ Sembcorp Myingyan Project Powers Ahead, with Signing of Build-Operate-Transfer Agreement with Myanmar's Ministry of Electricity & Energy, Sembcorp, January 2017

Conclusion

In this report, we discussed the outlook of the infrastructure sector in ASEAN, the presence of an infrastructure gap in the region, and the factors driving this gap. We highlighted that current growth rates in infrastructure expenditure are far from the estimated growth necessary to meet ADB's climate-adjusted estimate of US\$3.1 trillion⁶⁰ in infrastructure investments in ASEAN from 2016 to 2030. This results in a widening infrastructure gap.

We then explored the challenges that may be faced in addressing the infrastructure gap, followed by some measures to address these challenges. We also identified that it would be beneficial to leverage a well-developed infrastructure hub (to achieve effective spending), where issues faced, or expertise required, throughout the lifecycle of infrastructure projects can be addressed or supplied with the help of a supporting ecosystem.

The next report within this Infrastructure Series will discuss the future developments in the infrastructure sector, delving into market trends and issues, and project pipelines within ASEAN and the wider region.

When looking at the future project pipeline and developments, the availability of financing is an inevitable question and this is what the third and final report of this Infrastructure Series will focus on. In addition, infrastructure is being promoted as an asset class to attract private investors looking for long-term investment avenues. We will consider infrastructure as an asset class and how it compares with other asset classes while looking at the infrastructure investment landscape and funding developments as well as private sector investments as well as alternative financing sources.



⁶⁰ Meeting Asia's Infrastructure Needs, ADB, 2017

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