



Bridging the gap

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Private investment in future
infrastructure provision

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Abbreviations

ACEG	Advisory Council on Economic Development	NIP	National Infrastructure Plan
AIIB	Asian Infrastructure Investment Bank	NITI	National Institution for Transforming India
ASCE	American Society of Civil Engineers	NPPF	National Planning Policy Framework
BBA	British Banking Association	OECD	Organisation for Economic Co-operation and Development
BCG	Boston Consulting Group	PAB	Private Activity Bond
CfD	Contract for Difference	PAIDF	Pan African Infrastructure Development Fund
CIB	Canadian Infrastructure Bank	PAP	People's Action Party
CIRC	Canadian Infrastructure Report Card	PBO	Parliamentary Budget Officer
CNBS	Chinese National Bureau of Statistics	PF2	Private Finance 2
CPPIB	Canadian Pension Plan Investment Board	PFI	Private Finance Initiative
EC	European Commission	PIP	Pension Investment Platform
EIB	European Investment Bank	PPP	Public Private Partnerships
EPA	Environmental Protection Agency	PwC	PricewaterhouseCoopers
ESG	Environmental, Social and Governance	QPIB	Qualified Public Infrastructure Bond
EU	European Union	RBI	Reserve Bank of India
FAST	Fixing America's Surface Transportation	RICS	Royal Institution of Chartered Surveyors
GAO	Government Accountability Office	RRIF	Railroad Rehabilitation & Improvement Financing
GDP	Gross Domestic Product	SCO	Shanghai Cooperation Organisation
GFC	Global Financial Crisis	SPV	Special Purpose Vehicle
GIII	Global Infrastructure Investment Index	S&P	Standard and Poor
HM	Her Majesty's	TI	Transparency International
ICMSC	International Construction Measurement Standards Coalition	TIFIA	Transportation Infrastructure Financing and Innovation Act
ICP	Investing Canada Plan	UK	United Kingdom
ICT	Information Computer Technology	UNFCCC	United Nations Framework Convention on Climate Change
IES	International Enterprise Singapore	USACE	United States Army Corps of Engineers
IMF	International Monetary Fund	USDOT	United States Department of Transportation
IPA	Infrastructure and Projects Authority	WBG	World Bank Group
IPC	India Planning Commission	WEF	World Economic Forum
IRR	Internal Rate of Return		
IUK	Infrastructure United Kingdom		
KPI	Key Performance Indicator		
LGFV	Local Government Financing Vehicle		
MAS	Monetary Authority of Singapore		
MDB	Multilateral Development Bank		
MGI	McKinsey Global Institute		
MND	Ministry of National Development		
MRT	Mass Rail Transit		
NAO	National Audit Office		
NBC	New Building Canada		
NGA	National Governors Association		
NIA	National Infrastructure Assessment		
NIC	National Infrastructure Commission		



Executive summary

This research enhances understanding of the infrastructure investment landscape within six countries, namely Canada, China, India, Singapore, the UK and the US. The differences in maturity, transparency and openness to international investment across the six countries present both distinct challenges and opportunities for private investors. This research explores the drivers behind the growth in private investment and examines the evolution in infrastructure investment within the six countries over the last decade. This investigation places specific emphasis on investment into greenfield¹ infrastructure projects and includes an exploration of the factors constraining project development pipelines and the implications for private investors.

Through a comprehensive series of interviews with investors, developers, policy makers and advisers, the research produced an evidence base to inform the discussion on the growth of private infrastructure provision, on future policy developments and on the evolution of infrastructure as an investment asset class. Findings across the six countries highlight the importance of governments as ‘facilitators’ of private infrastructure investment; providing strategic vision, sustained political commitment and, perhaps most importantly, active project pipelines.

In the case study countries examined, the protracted and uncertain nature of infrastructure development pipelines and the complexities in governance frameworks that support infrastructure provision have been considerable barriers to enhanced private investment. The lack of active development project pipelines has increased asset price inflation within the secondary market², as increased volumes of new market entrants chase limited asset opportunities. Improved facilitation of investment by policy makers (including more innovative exploration of partnership-based funding solutions) would relieve pricing pressures and ensure that the build-up of capital within the private investment universe is deployed, helping to close the global infrastructure investment ‘gap’. Our research has shown that more efficient procurement and investment models for greenfield projects would also enhance private sector investment flows, which in turn would contribute to the realisation of the societal and economic benefits associated with new infrastructure provision.

¹ The term ‘greenfield’ is used to describe infrastructure projects which need to be developed/constructed – culminating in the creation of new assets.

² Secondary market trading in this context refers to the sale of standing or existing assets.

The infrastructure investment landscape has evolved markedly over the course of the last decade to enable more effective alignment of financial vehicles with project opportunities. A surge in new market entrants has prompted the development of innovative investment vehicles and financial structures. With these new market entrants, demand for assurance through standards and accreditation has increased. However, performance benchmarking within the private infrastructure market remains underdeveloped relative to other asset classes. Sustaining growth and enhancing professionalism necessitates improved performance benchmarking at both asset and market level. Professional accreditation bodies, such as RICS, have an important role to play in enhancing the provision and evaluation of construction cost data, demonstrating the robustness of asset valuations and ensuring that standards keep pace with developments in order to maintain investor confidence.

Infrastructure valuation is complex, due in part to the heterogeneous nature of infrastructure assets, which exceeds the variety found in traditional real estate in terms of purpose, design, cost and financial performance. While some assets occupy a monopolistic position within a market, suggesting a Receipts and Expenditures based valuation approach³, it is challenging to generalise across the various subsectors of infrastructure, as they exhibit contrasting income profiles. Valuation of these subsectors is also hindered by the relative absence of robust cash-flow disclosures. The lifecycle of infrastructure assets is typically assumed to be relatively long, and as a result

they are considered to afford a hedge against inflation. However, the sector is subject to an increasingly diverse spectrum of risks, from political unrest, climate change, carbon reduction targets through to technical innovation. These risks affect the valuation process yet are difficult to identify and quantify. As such, more attention needs to be devoted to ensuring consistency in valuation principles and associated accounting standards.

In terms of construction costs, this research highlights that providing greater clarity about the cost and risks associated with new asset development remains a critical point for many prospective investors. Given the global nature of the infrastructure market, the seminal work being undertaken by the International Construction Measurement Standards Coalition⁴ is a welcome step towards improving data transparency. Finally, to reduce cost over-runs and the backlog of projects in infrastructure development pipelines, the construction sector needs to embrace digitalisation as a means to enhance productivity and ensure greater efficiency in the delivery and budget management of greenfield projects. Digitalisation in construction would also afford operational savings from more efficient asset management across the asset lifecycle as well as improving environmental impact assessments and carbon intensity measurements. RICS has a pivotal role to play in showcasing the advances and benefits of digitalised construction and in ensuring that current and future generations of professionals have the digital skills needed to address the global infrastructure challenge.



³ The receipts and expenditure approach, also known as 'profits valuation', owed its development to the valuation of statutory undertakings or public utilities.

⁴ <https://www.rics.org/uk/upholding-professional-standards/sector-standards/construction/icms-international-construction-measurement-standards/>

Key learning outcomes and recommendations

Realise economic and societal benefits through enhancing private investment into high-impact greenfield projects

There is growing appetite among investors to move up the infrastructure risk curve by investing in new subsectors and extending their investment horizons to include greenfield projects. However, the ability to invest in greenfield infrastructure projects has been inhibited primarily by the lack of investable project pipelines.

Recommendations:

- Develop more integrated decision-making systems/frameworks within the public sector:** By better integrating decision making across the different layers of government and between government departments, more robust, evidence-based project prioritisation and impact evaluation could be achieved. This would enable more effective ‘mapping’ of development pipelines in terms of risks and opportunities.
- Improve the transparency and robustness of construction costs:** This would enhance investors’ ability to assess and monitor the costs and performance of greenfield projects and to mitigate the key risks attributable to the construction phase. The International Construction Measurement Standard (ICMS) launched in 2017 and updated in 2019 provides a very welcome step in this direction.
- Portfolio-based approaches and improved impact assessment:** More exploration of co-investment partnerships between public and private sectors is needed. Moreover, the potential for collaboration across different infrastructure subsectors necessitates further investigation. By mapping out the potential synergies, policy makers and investors can design projects to improve impact and value for money for public sector authorities, while ensuring proportionate levels of return for the private sector.
- Enhanced digitalisation of the construction sector:** More effective integration of digitisation and technical innovation in the construction sector is needed. This will help to mobilise infrastructure project delivery, ensure projects get delivered in line with projected timelines and budgets and increase investor confidence so that the potential social and economic impact of new infrastructure projects is realised sooner. Digitisation and sensor technologies can also improve life-cycle management and support asset value preservation.

Alignment of project opportunities with investor profiles and time horizons

There continues to be misalignment in time horizons between investors and those tasked with procuring infrastructure. Investors are concerned that governments do not understand how investors perceive infrastructure as a product, or how they evaluate and assess risk. Institutional investors are keen to invest in a financial vehicle that delivers a steady income stream and which serves to align with their long-term liabilities. To attract enhanced volumes of private capital towards infrastructure projects, interviewees identified the need for more financial vehicles delivering the characteristics demanded by low-risk income-oriented investors. As the infrastructure asset class continues to evolve and mature, it is imperative that valuation techniques and standards are reviewed to remain relevant, so that investor confidence in the asset class is maintained.

Recommendations:

- Alignment of financial and investment sources with project development pipelines:** The public sector needs to effectively utilise the expanded range of infrastructure finance possibilities and align them relative to the risk profiles of their development pipeline. By conducting national and regional infrastructure needs assessments and identifying and planning for future needs, the public sector can better align both current and future infrastructure projects with the sources of finance most suited to the risk profiles and nature of the projects taking into account that not all ‘essential’ infrastructure projects will be in a position to attract private investment.
- Improving the efficiency of procurement, planning and project delivery frameworks:** The volume of private investment flowing into infrastructure projects need to be coupled with more efficient project delivery processes and procedures. Channelling the increasing volumes of private investment via inefficient and outdated planning frameworks and procurement models reduces the potential societal, economic and environmental impacts. Globally, PPPs remain an important vehicle for infrastructure delivery and are an internationally recognised framework for investment, but in many countries questions persist about the value for money that they ‘truly’ provide in the absence of robust post-project evaluations.

Enhanced performance data provision

Whilst the infrastructure investment universe has accomplished marked strides in terms of transparency and performance benchmarking over the last decade, the asset class is still in the early stages of development. Performance data within the direct and unlisted infrastructure market is difficult to access, whilst 'selective' reporting practices undermine analytical rigour. Furthermore, having the capability to assess and present risk-adjusted performance akin to other mainstream asset classes will be critical to the continued growth and sophistication of the infrastructure asset class.

Recommendations:

- **Improve international valuation standards:** Valuation principles for infrastructure need to reflect the unique characteristics of infrastructure as an asset class and its associated cash flows. Infrastructure is a diverse asset class with very contrasting asset profiles and thus requires valuation standards which can account for this variety and instil investor confidence in the valuation process.
- **Improve reporting standards and performance analysis:** Industry and academia need to work more collaboratively towards greater transparency and consistency in reporting about the direct and unlisted infrastructure sector. Further work is needed to develop performance metrics that are more accurate and reflect the risks and distinctiveness of cash flow characteristics of infrastructure assets. Additionally, further research is needed to highlight which measures of performance are best suited to credibly analysing infrastructure performance at the asset fund/investment vehicle level and relaying same to prospective investors.
- **Inception of regulatory data authority/representative body:** The direct and unlisted infrastructure markets require a governing and regulatory body which seeks to improve standards of performance reporting and disclosure. This will invariably support continued growth and professionalism of the sector as it continues to mature and evolve.

Infrastructure investments exhibit unique risk exposures and value creation opportunities

The elongated nature of infrastructure asset lifecycles and the associated investment time horizons exposes investors to technical as well as political risks that are unique to this asset class. Within these confines it is imperative that present and future generations of asset managers and built environment professionals have the requisite competencies to utilise real asset intelligent models and digitised operating systems. Equally, it is important to appreciate the downside risks of technical innovation for infrastructure investors which can result in premature obsolescence and/or contractions in demand. Whilst technical innovation will create opportunities for infrastructure investors, the speed of evolution will mean that many conventional assets may become 'stranded' or obsolete much sooner than anticipated. Meanwhile, policy change at national and international level also has the potential for huge impacts on the lifecycle of an asset. The most pertinent recent examples are the physical risks posed by extreme weather events and the commitment to reduce carbon emissions under the 2015 Paris Agreement, both of which will have profound implications for present and future infrastructure provisions.

Recommendations:

- **Risk awareness and appreciation:** This research indicates that the risk posed by technical innovation is currently not being priced into deals. The preservation of investor confidence in – and stability of the infrastructure investment market, will depend on investor risk assessments and mitigation measures evolving and adapting in response to technical innovation.
- **Investment in lifecycle maintenance:** In order to protect asset value and prolong the economic life of the asset, there is a need to improve understanding and awareness of the costs and benefits of maintenance over the whole lifecycle of the asset. In the transition towards a more carbon-neutral society asset lifecycle management will assume even greater prominence. It is of increased importance that owners, investors and asset managers are able to combine infrastructure 'know-how' with technical innovations which serve to improve asset design, enhance operational efficiency and improve both the operational and financial performance of an asset over its lifecycle. Moreover, the ability to respond and adapt to policy and market demands (for example decarbonisation) will be key to preserving asset value and prolonging the asset lifespan.

Case Study Key Learning Outcomes

Canada

The Canadian Government has introduced innovative policy frameworks, tools and vehicles to stimulate private infrastructure investment. The National Infrastructure Plan and the Canadian Infrastructure Bank are indicative of the desire to attract private investment to redress an infrastructure gap estimated at US\$700 billion.

More effective integration between government at local, provincial and national levels would afford a platform for more impact-based investment and for the synergies between local and national projects to be optimised.

China

The continuing evolution of foreign investment laws in China means that appetite and opportunities for infrastructure investors will likely continue to grow. Nonetheless, barriers to international investors remain. State controls and interventions are often at odds with a perceived intention to attract private international investment. Specifically, restrictions on the types of infrastructure that can be owned by foreign investors mean that funds are not channelled into projects that could otherwise address underlying shortage problems.

India

Through a series of concerted efforts to reduce 'red tape', promote economic growth and tackle corruption, the Indian government has created a more credible investment landscape for international infrastructure investors. However, historical challenges remain, including the lack of market transparency and the viability of revenue streams which are perceived to curtail international investment appetite.

Singapore

Despite harbouring an abundance of investment capital, the challenge for the Singapore government is to encourage an increase in the supply of corporate bonds in order to grow the size and diversity of the infrastructure investment market, which has historically been dominated by public funding and bank-sourced debt finance. The problematic under-allocation of private institutional investment into infrastructure projects in Singapore has been attributed to the lack of credit-worthy projects and associated development pipelines. Many projects currently seeking investment are poorly structured and lack viable investment and return benchmarks.

UK

Brexit remains a concern in terms of political instability and macro-economic uncertainty, primarily currency risk. Whilst exercising caution, institutional investors continue to be active in the UK market. While government commitment has provided some security in terms of future infrastructure requirements, political risk remains a core concern and work is needed to develop 'scalable' and 'investable' project pipelines. Establishing attractive projects in terms of size and structure requires specialist expertise which is currently lacking within infrastructure-commissioning departments.

US

The most significant barrier to investment in infrastructure within the US pertains to 'finding' a politically-viable solution. Federal governments are perceived as unreliable partners for private investment, due to antiquated government processes inducing delays in project development. In recent years there have been varied attempts to expand federal support for infrastructure. A series of programmes and subsidies have been introduced to direct funds towards the various infrastructure sectors. Direct federal funding, revolving loan programmes, tax-based financing and PPP models have provided viable (new) funding solutions and stabilised the downward trend in infrastructure investment.

1.0 Introduction

The scale and complexity of the global infrastructure investment challenge has been well-documented. McKinsey Global Institute (MGI) determine that £3.3 trillion per annum of infrastructure investment is required globally up to the period 2030 in order to support global economic growth projections⁵. Assuming current global infrastructure expenditure remains constant, this constitutes a shortfall in the region of US\$350 billion per annum through to 2030 (McKinsey, 2016). The nature of the investment challenge is complex, encompassing the maintenance and updating of existing assets as well as the provision and development of new assets to support economic growth and societal evolution. Moreover, investment need is a dynamic target which is subject to many external impact factors including policy reformation, population demographics, societal evolution, environmental change and technological innovation.

Prior RICS-commissioned research highlighted how the magnitude of the investment gap allied with diminishing capacity within the public sector has fuelled unprecedented private investor appetite to become involved in provisioning and financing of infrastructure projects (Haran et al., 2013). The enhanced private sector participation has contributed to a more diverse investor profile within the infrastructure investment universe. New market entrants have nonetheless largely confined their investment activities to the acquisition of brownfield assets⁶, with investment in greenfield (new) assets continuing to be dominated by established investors who have the track record and expertise to finance, develop and deliver new projects. The provision of greenfield

infrastructure assets – those required to meet societal needs as economies develop and populations grow – necessitates enhanced facilitation in order to optimise the impact potential of private investors, including pension funds.

In the last five years, investors have demonstrated increased willingness to absorb construction risk⁷. Notably, this shift up the risk investment curve has included the larger institutional investors, many of whom have assembled the required in-house competence to manage the higher levels of investment risk. However, procuring authorities have not created the conditions and project opportunities that encourage investment from these new sources of private capital. As a result, large volumes of capital allocated for infrastructure investment have not been committed. This inability to commit raised capital culminates in a ‘double negative’ effect – diluting investment performance whilst ensuring that the economic and societal benefits of the new infrastructure provision fail to be realised.

This research report aims to identify the nature and extent of the barriers inhibiting private investment within infrastructure projects. The research depicts the views and opinions of key stakeholders including investors, financiers, developers as well as policy makers and procuring authorities in six key infrastructure investment markets, namely Canada, China, India, Singapore, the UK and the US. All six markets offer considerable investment opportunities whilst the diversity in legislative frameworks and variations in infrastructure market structure, maturity and complexity present distinct risks and challenges for investors. The research serves as a basis for learning



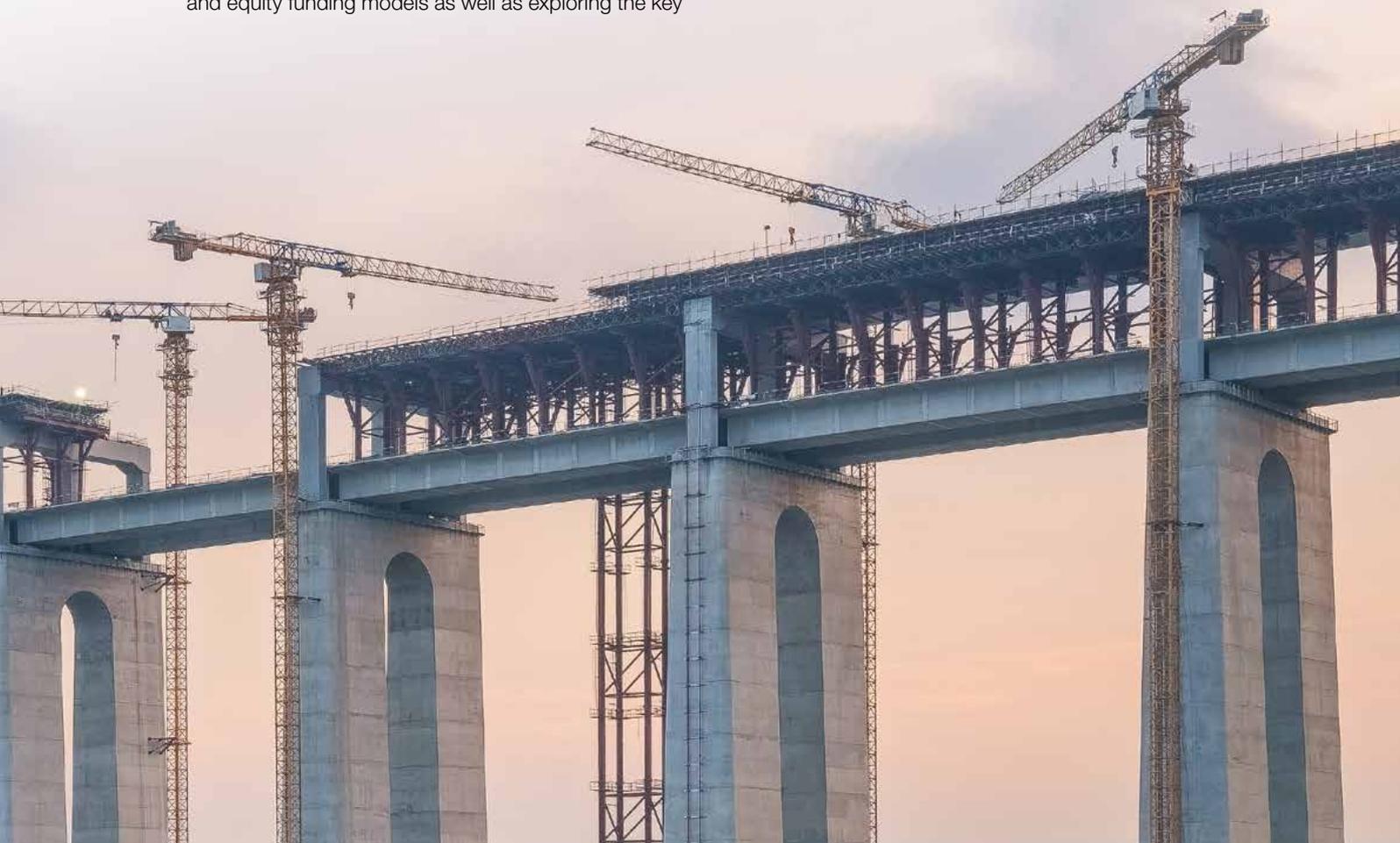
⁵ Based on 2015 constant prices. ⁶ Infrastructure assets which are already constructed often with established cash-flows. ⁷ Increased familiarity and understanding of the asset class, lack of investment assets and the ‘chase for yield’ have contributed to the willingness to absorb construction risk.

and exchange of knowledge – depicting international best practice and learning outcomes – which can help to transpose infrastructure development plans into investable projects. The research has been structured around the attainment of four key objectives:

1. To develop understanding of the magnitude and nature of the infrastructure gap within the six case study countries and to evaluate how government approaches to infrastructure provision have evolved relative to the identified need.
2. To identify pertinent trends in private infrastructure provision and financing globally and evaluate the extent of implementation within the six case study countries.
3. To examine the demand side and supply side barriers to greenfield infrastructure investment and to assess their impact within the different case study countries.
4. To identify market-facing strategies adopted to overcome these barriers and assess the extent to which these solutions have served to transpose infrastructure development plans into 'investable projects'.

In order to attain the stated objectives, this report first presents a detailed content analysis of the existing literature base on private infrastructure investment (Section 2). This section explores the origins and evolution in debt and equity funding models as well as exploring the key

market trends and drivers that have served to fuel the unprecedented growth in private infrastructure investment over the course of the last decade. Section 3 details the empirical framework and methodological design underpinning the six country case studies. The methods employed in the investigation and rigorous stakeholder engagement process have been fully aligned to attain the stated research objectives. Sections 4 to 10 explore six country level case studies examining the nature of challenges concerning the infrastructure gap in each country, the actions taken by respective governments to address their infrastructure funding shortfalls and the associated market 'response'. These sections further draw on interview evidence, the findings of the case studies and the behaviour of investors in the market to identify key drivers and barriers and evaluate the inconsistencies between demand (investor behaviour/sentiment) and supply (available projects, deals closed). The final section presents the key learning outcomes from the research and details a series of clear recommendations (for governments, for investors and investment firms, for academics, for professional and international bodies) to review and redress the infrastructure gap.



2.0 Private infrastructure investment: literature review and exploration of global market trends



Image source: 1 – Volodymyr Kyrlyuk / Shutterstock.com 2 – Derek Teo / Shutterstock.com

In order to address the infrastructure funding gap, national governments face a two-dimensional challenge. On one side, governments need to identify and channel new sources of capital into infrastructure and public service provision. On the other side, governments must enhance the impact of investment by addressing the inherent problems and inefficiencies in existing infrastructure policy frameworks and provision strategies. Historically, the public sector has provided most of the funding for infrastructure provision. This has either been through taxes or through borrowing justified by the perceived socio-economic benefits from developing new infrastructure. However, the last decade has witnessed a paradigm shift characterised by growing appetite among governments and public bodies to lever private finance into their infrastructure development pipelines. Indeed, at the beginning of the last decade Della Croce et al. (2011) highlighted the growing acceptance across the public sector that partnership-based collaboration and the increased involvement of private sector finance

could not only help bridge the funding gap but will also help expedite the delivery of key infrastructure projects bringing forward the associated value uplifts and socio-economic benefits.

This shift in emphasis coincides with an appreciation that the level of infrastructure need greatly surpasses public sector capacity. Precise quantification of the scale of the infrastructure investment challenge is complex as the 'target' is dynamic and will continue to be influenced by an array of externalities⁸. In 2014, PwC reviewed infrastructure spending trends until 2025 and determined that in order to meet projected economic growth, infrastructure expenditure must increase from US\$4 trillion per annum (in 2012) to over US\$9 trillion by 2025, equivalent to US\$78 trillion globally between 2014 and 2025 (PwC, 2014). Meanwhile, Inderst and Stewart (2014) estimate global infrastructure investment requirements at circa US\$80 trillion through to 2030 when accounting for social and green infrastructure.

⁸ For example, advances in technology will continue to determine and shape societal behavior going forward – these advances will also have profound impacts on energy demands for example as well as how society functions. Moreover, unforeseen events (such as natural disasters) serve to widen the infrastructure investment gap due to unforeseen replacement/restoration costs.

2.1 Funding infrastructure through private finance: corporate and project financing

Infrastructure investments have traditionally been financed via public funds, given the associated societal benefits as well as the potential impact upon economic competitiveness. However, diminishing financial capacity, increased public debt to GDP ratios and inefficient infrastructure procurement have led to a reduction in the level of public funds allocated to infrastructure and necessitated the exploration of new and innovative forms of private financing including partnership-based funding models.

Private capital can be channelled into infrastructure through two principal forms; corporate financing, and project financing. Corporate finance is the dominant channel in private infrastructure finance with investors acquiring equity stakes in utility companies or in development corporations in sectors such as waste, ports, oil and gas, and also traditionally in electricity generation. As highlighted by Della Croce et al. (2011), listed companies are sizeable owners of infrastructure assets as well as providers of infrastructure services. By contrast, project financing is typically formulated from limited-recourse lending directly to a project (Gardner and Wright, 2014). Figure 2.1 depicts a typical project financing arrangement whereby project financing capital can be framed as debt or equity.

2.1.1 Debt financing in infrastructure

Project financing arrangements are typically highly leveraged, with debt constituting around 70-90% of the

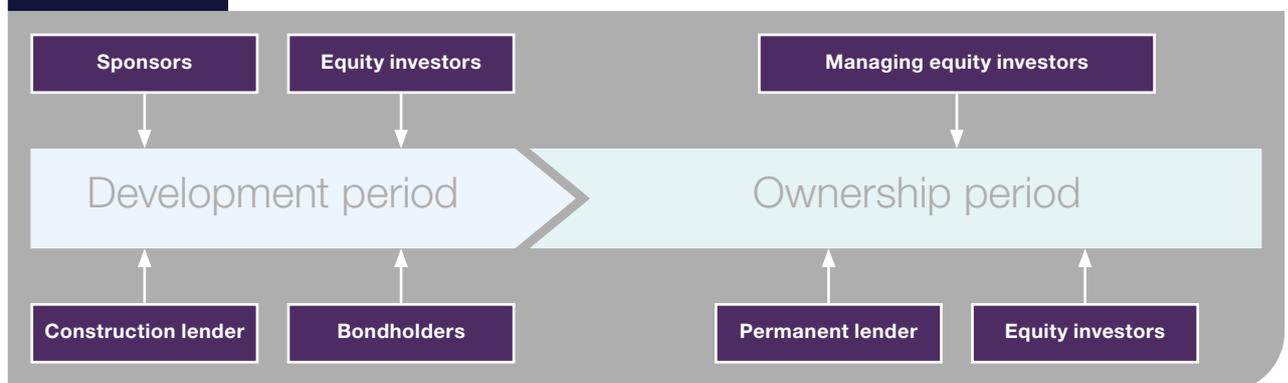
investment (McKinsey, 2013a). This high leveraging is premised on several factors including the low volatility of cash flows and low-to-manageable levels of risk in the operational phase. As such, infrastructure debt financing is typically characterised as fixed-income primarily in the form of loans or bonds. The level of debt provision (and the associated costs of the debt) between greenfield and brownfield infrastructure projects will naturally differ. Greenfield infrastructure projects typically include higher levels of risk in the initial phase of the project when the construction and development of the new infrastructure asset is taking place. Thus, greenfield debt is usually provided by commercial banks who are willing to absorb construction risk (Gardner and Wright, 2014). In contrast, brownfield debt is typically financed against existing assets and avoids the risks associated with asset construction and development stages. Brownfield debt is typically provided by entities such as institutional investors and sovereign wealth funds. With lower risk tolerance than commercial banks, these non-banking institutions have historically preferred to engage with projects in the post-construction phases (Della Croce et al., 2011).

2.1.2 The infrastructure debt market: global trends

As of 2017, the global infrastructure debt lending market was valued at US\$282 billion (Murphy, 2018) representing a growth of 38% since 2013 (Reuters, 2018). In terms of sectoral breakdown, the 2017 figures show that infrastructure debt funding has been prevalent in power, oil and gas, as well as the transport sector. Notably, project debt lending via the Public-Private Partnerships (PPP) mechanism has also been intensifying (Reuters, 2018). Previous RICS-commissioned research affords a detailed examination of the growth in the global PPP market and the potential role and contribution of PPPs within the confines of the infrastructure investment challenge (Haran

Figure 2.1

Conventional infrastructure project financing structure



Source: Adapted from Tan (2007).

et al., 2013). Project bonds continue to hold a marginal, albeit growing presence in the infrastructure debt market following the withdrawal of conventional debt lenders from the project financing market after the global financial crisis (GFC)⁹. In the five-year period from 2007 to 2012, the compiled value of special purpose vehicle (SPV) issued bonds multiplied three-fold from US\$8.5 billion to US\$27 billion (Della Croce and Gatti, 2014). The total infrastructure project bonds market was estimated to be worth US\$50.3 billion at the end of 2015 – equating to almost a quarter of the infrastructure debt financing market (Reuters, 2018). Despite a slow level of uptake, infrastructure project bonds now occupy a significantly larger space in the infrastructure project financing debt sphere. Investment is predominately being levered into utilities (such as water, electricity and gas) and social infrastructure services (such as healthcare, sanitation, education) centred in North America and Western Europe (Della Croce and Gatti, 2014). For investors seeking long-term, predictable and stable cash flows, infrastructure investment via project bonds offers attractive investment characteristics (Ehlers, 2014). Pertinently, interviewees contributing to this study highlighted that the Asian infrastructure bond markets remain underdeveloped relative to the opportunities afforded in Europe and the US and this is something which must be addressed within the confines of the infrastructure funding gap in that region.

Notwithstanding the synergistic commonalities, there are several barriers which have inhibited the free-flow of institutional capital into project bonds. With banks conventionally having undertaken the syndication and organisation of different sources of investment into an infrastructure project, institutional investors, in the main, do not possess the expertise to organise this type of debt provision, at least not on the scale required. This has given rise to new and innovative debt financing models that seek to distribute risk and debt among several parties. An example of this is the ‘originate-to-distribute’ framework, which is a collaborative model between banks and institutional investors for debt capital supply (Della Croce and Gatti, 2014). This framework typically comprises three innovative structures:

- The partnership/co-investment model, in which a bank organises a syndicate, a pre-agreed percentage of each loan is retained in the bank’s portfolio, and the rest of the loan is sold to institutional investors.
- The securitisation model, where a Special Purpose Vehicle (SPV) is created that purchases infrastructure investments from banks. This SPV then issues asset backed securities in the form of bonds to institutional investors.
- The debt-fund model and direct origination; a resource pool or fund that is managed by an asset manager, into which institutional investors can invest. The asset

manager has full responsibility to select, screen and monitor the investments.

Whilst the debt-fund model is less flexible than partnership and securitisation forms, it is perceived as less risky and tends to be appealing to less experienced institutional investors. A key challenge in evaluating the financial performance of these collaborative funding models is the limited availability of robust data. The diverse targets and objectives of large infrastructure projects culminate in a diverse range of development goals and Key Performance Indicators (KPIs). However, a diverse KPI framework should not detract from the need to measure and benchmark financial performance which is central to both investor commitment and sustained public confidence in the models.

2.1.3 Equity financing in infrastructure

Conventionally, the equity tranche for infrastructure projects has been sourced from project sponsors responsible for the facility provision, i.e. those companies/contractors who manage the design and build, and operation and maintenance. Theoretically, this financing was tied to the performance of, and cash flow generated by, the asset, with the understanding that this kind of arrangement would safeguard the quality of the service delivery through the threat of financial penalisation to the facility provider, should the asset not generate cash flow (Gardner and Wright, 2014). However, around the middle of the previous decade (2000–2010), the dynamics of equity investment changed as investment funds started to display signs of growth and the potential for interest. Equity investors now have the option to access infrastructure either directly or indirectly through listed¹⁰ or unlisted instruments¹¹. With only a small number of larger institutional investors possessing the wherewithal to directly invest in infrastructure as owner/operators, the advent and growth in unlisted funds has been a pertinent feature of the evolving infrastructure investment landscape. Consequently, insurance companies, pension funds and other private equity investors are highly active within the unlisted infrastructure funds universe.

Section 2.2 utilises Preqin data to demonstrate the growth within the unlisted infrastructure fund universe and explores key market trends pertaining to private investment¹². Private equity funds have occupied an increasingly prominent role in the delivery of greenfield or new infrastructure asset provision in recent years, which serves to justify the utilisation of this dataset specifically. Moreover, the unlisted funds data affords meaningful insight into the increasingly diverse infrastructure investor profile, with many new market entrants opting to invest indirectly due to the capital intensity of the asset class or because they seek to ‘benefit’ by investing via a fund manager with a proven performance track record.

⁹ For example, the introduction of Basel III in the UK in 2010, coupled with the capital retrenchment implications induced by the GFC, meant that banks no longer had the capital availability nor risk appetite for project lending.. ¹⁰ Funds that issues securities, which are possible to trade in the public market at any time.

¹¹ Funds not traded in public markets; managed funds that are normally held for the duration of a project. ¹² The growth in the unlisted infrastructure funds sector is used to demonstrate the growth in private investment and affords context in the relative absence of meaningful data on the direct infrastructure investment market.

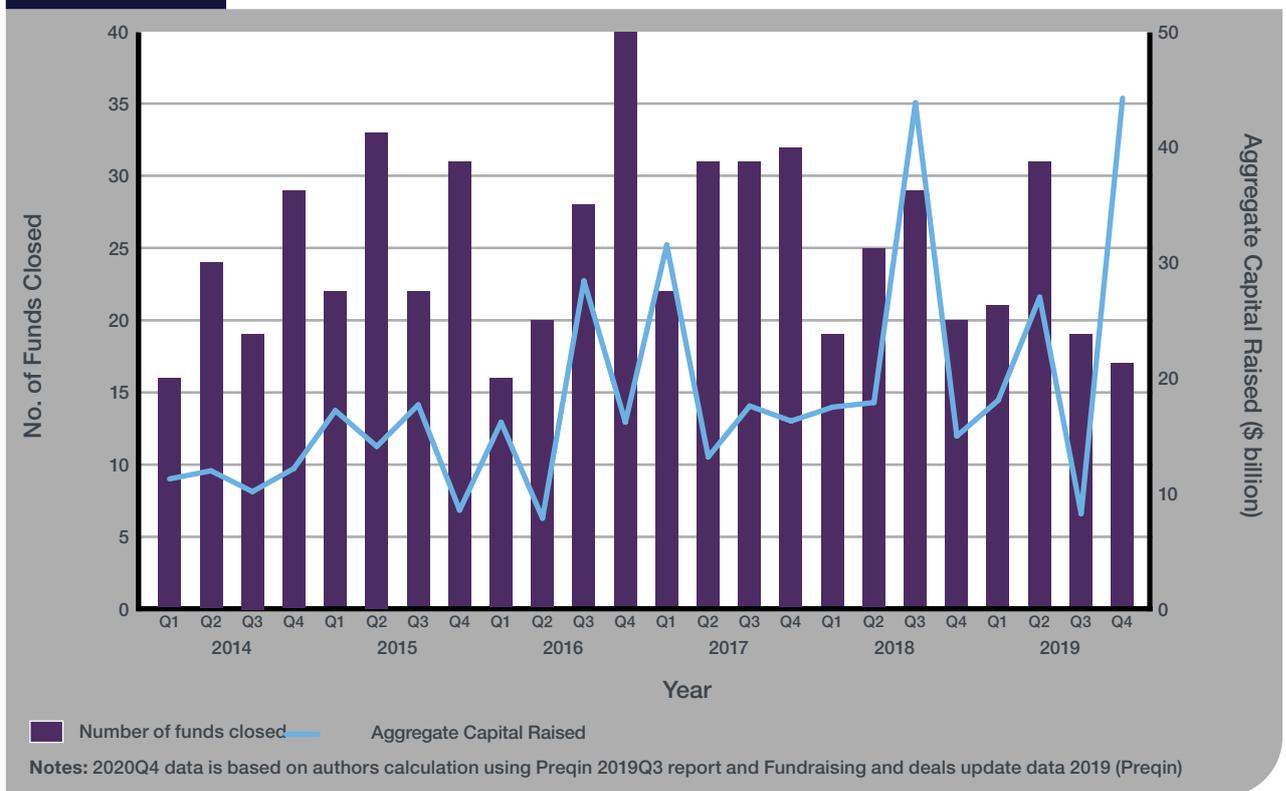
2.2 Unlisted infrastructure funds: global investment trends

The unlisted infrastructure funds universe has witnessed pronounced growth over the course of the last decade. Investors acting in this arena have varying degrees of knowledge and sophistication, as well as contrasting risk thresholds and associated performance expectations. Analysis of the Preqin unlisted funds universe highlights the pronounced volume of investment that has flowed into the infrastructure sector through these funds. In the period Q1 2014 – Q4 2019, a total of 597 unlisted infrastructure funds achieved financial close, with the aggregate capital raised equating to US\$445 billion (Figure 2.2). Over the course of 2019 a relatively small number of funds (n=88) attained financial close across the time series; nonetheless, the aggregate capital raised (US\$98 billion) represented another record year for the unlisted infrastructure funds sector. Notably, the top three funds by capital raised are targeting the US and European infrastructure markets, including Global Infrastructure Partners IV (US\$22.0 billion), Brookfield Infrastructure Fund IV (US\$20.0 billion) and EQT Infrastructure IV (US\$10.2 billion). These three funds represent circa 53% of all capital raised by the funds achieving financial close in 2019.

At the end of January 2020, a total of 253 unlisted infrastructure funds were actively seeking investment of US\$203 billion (Figure 2.3). Competition to secure investment within the unlisted funds, with the 253 funds currently raising capital the highest since 2010. Further to this, there has been a marked increase in the length of time that funds are taking to attain their investment target. A considerable proportion (38.5%) of the funds capital raising at the end of Q4 2019 had spent between 12-24 months trying to raise the desired level of investment. Indeed, the average time that unlisted funds have spent raising capital is currently 18.5 months. The latest figures depict a continuing trend of extended time that funds are 'spending on the road' seeking investment, with funds taking 17 and 16 months to secure investment targets in 2017 and 2016 respectively.

Further evaluation of the Preqin data indicates a continuing trend of capital concentration, with 31% of the capital secured in 2015 raised by just five funds and as stated above 53% of capital in 2019 raised by the three largest funds. These large funds¹³ (premised on their economies of scale), established networks within the infra sector and superior ability to execute deals have been the most attractive to investors over the course of the last five years (Haran et al., 2019). Within these confines, it is notable that those funds achieving financial close in the last four years

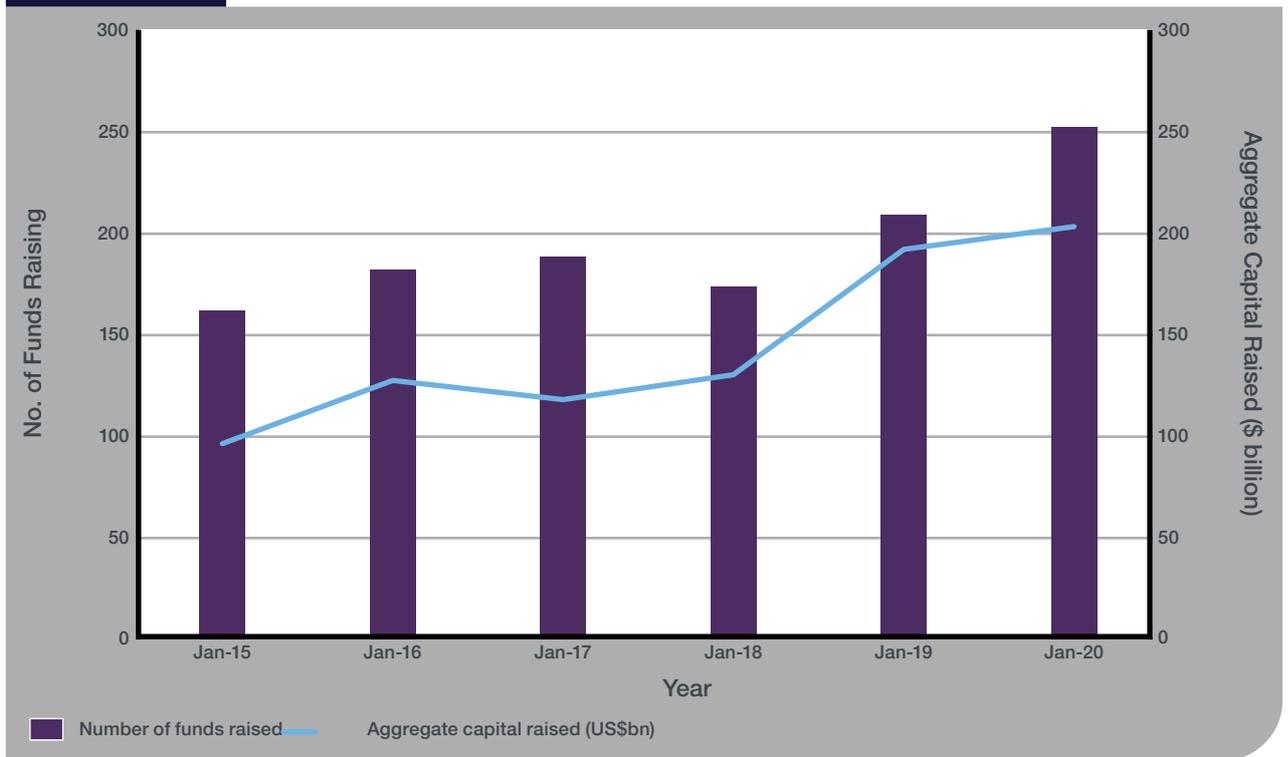
Figure 2.2 Unlisted infrastructure fundraising (2014–2019)



Source: Preqin (2020)

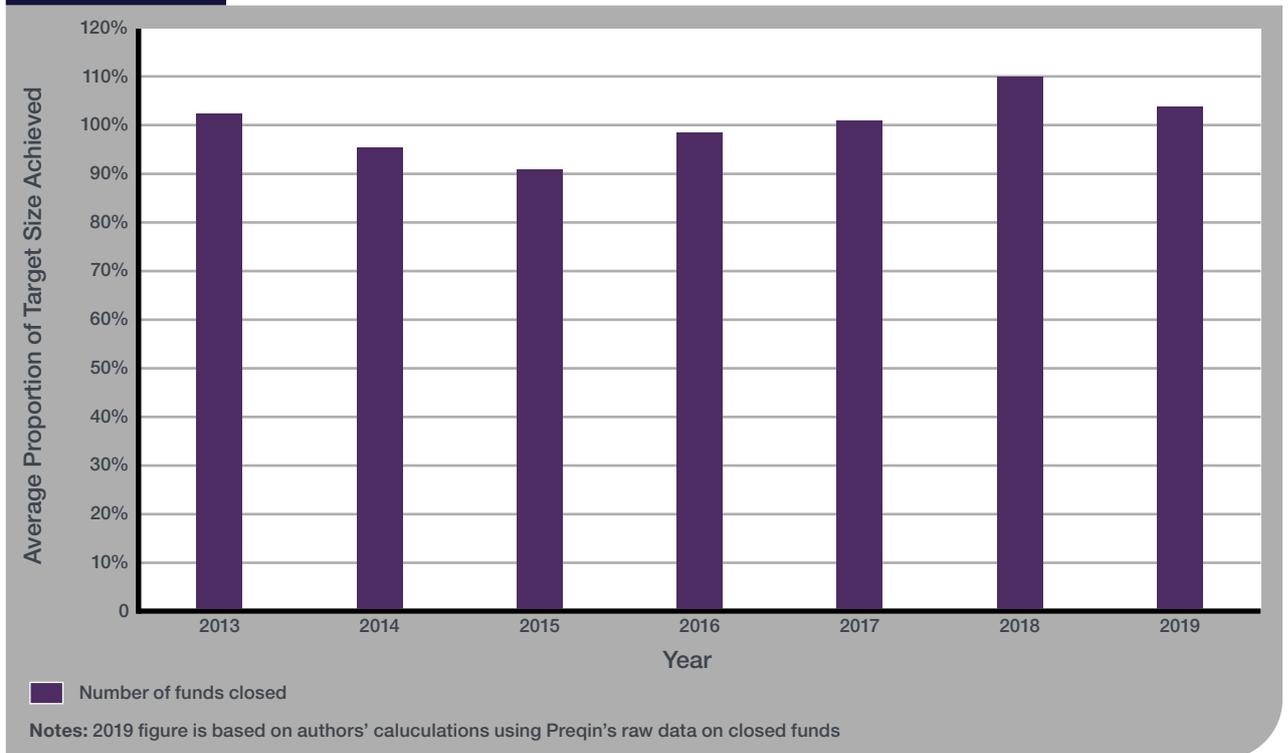
13 Larger funds often have established General Partners (GPs) as well as larger networks permitting greater access to deals whilst also being able to demonstrate the performance/track record of predecessor funds.

Figure 2.3 Unlisted infrastructure funds capital raising (2015-2019)



Source: Preqin (2020)

Figure 2.4 Average proportion of target size achieved by unlisted infrastructure funds closed



Notes: 2019 figure is based on authors' calculations using Preqin's raw data on closed funds

Source: Preqin (2020)

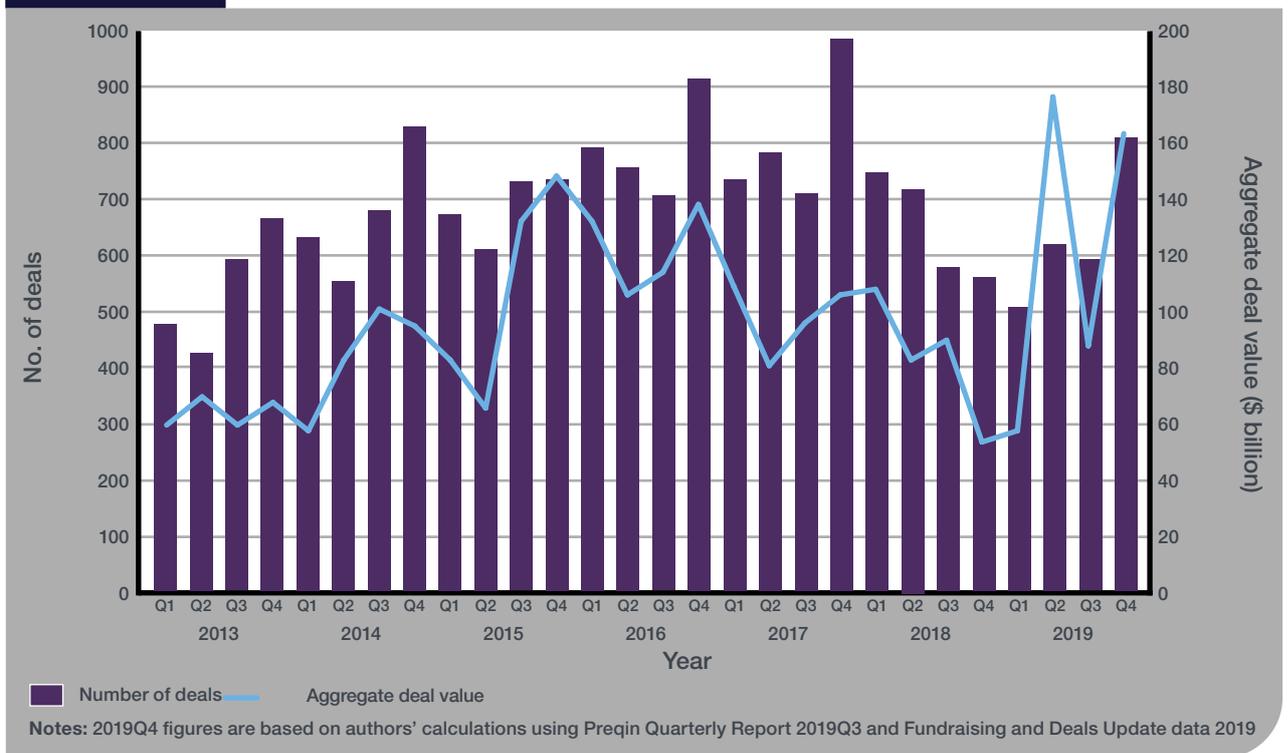
have also been much more successful in attaining their investment targets – something again attributable to the concentration in capital – as more investors opt for fund managers with proven track records in executing deals and delivering on their performance mandates within an increasingly competitive global infrastructure market (Figure 2.4).

Detailed exploration of key global market trends over the course of last seven years (Figure 2.5) highlights the polarised nature of the market. Mega-projects (in the US\$1 billion+ range) command much attention in the media, and whilst there has been marginal growth in the number of mega projects being delivered around the world, in reality such deals remain comparatively small in number and comprise a mere 11.2% of global infrastructure transactions by value in the period 2015Q1-2019Q4 inclusive. Up until 2019Q4 there had been increasing growth in the number of deals completing under the US\$100 million threshold, representing 50.6% of market transactions by number in 2019, compared to 48% of transactions in 2012. This trend can be attributed to a number of factors, including the increased flow of investment in Asia, as well as constrained secondary market trading (trading between investors) within Europe and North America¹⁴. Exploration of 2018-2019 deal flows indicates continued growth of projects within the US\$100-499 million value range – this in part can be attributed to the increased deal flow within Europe and

North America in the last twenty-four months.

Notably, Europe’s status as the dominant regional market has been eroded somewhat in recent years as deal flow in Asia has escalated. In 2009, European infrastructure deals accounted for 44% of global infrastructure transactions by volume, whereas in the last five years, European infrastructure transactions accounted for, on average, 34% of all deals by volume (Figure 2.6). This trend was maintained into 2019Q3 with Europe constituting 37% of deal volume, but accounting for over 47% of all deals completed by capital value. It is notable that Asia’s share of global deal flows by volume has dropped in the last two years to 13% in 2017 and 2018, down from 31% and 33% of all deals by volume in 2016 and 2015 respectively. Despite the recent drop, the growth in unlisted fund investment in Asia has been steady over the course of the last five years with 13% of all deals by capital value in the unlisted funds sector within Asia. This depicts the contrasting opportunities afforded in terms of deal flow as well as the shift in investor focus from the US and Western Europe into more ‘emerging markets’ but as will be detailed in the case study chapters also reflects some of the barriers to private investment within some Asian markets which serves to curtail international capital flows

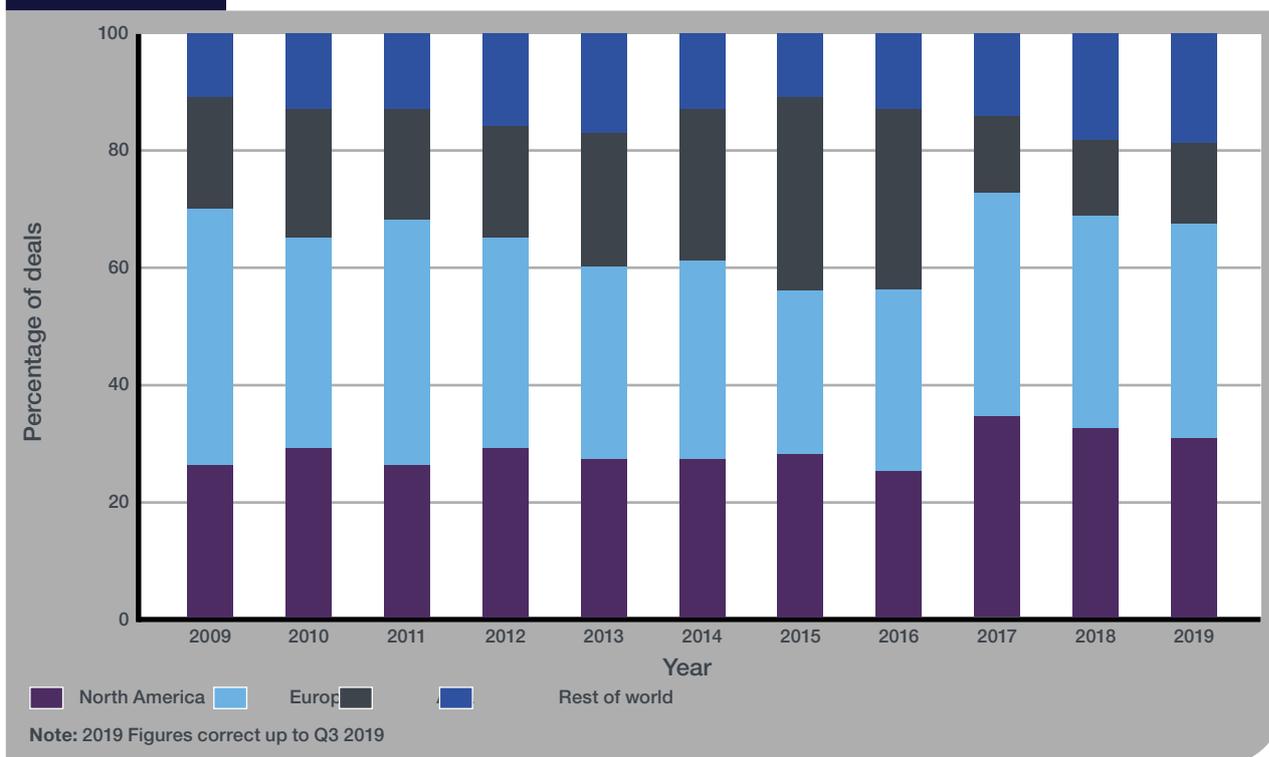
Figure 2.5 Global unlisted infrastructure fund deal flow (2013- 2019)



Source: Preqin (2020)

¹⁴ Asian infra deals have to date been less capital intensive on average over the last five years than deals in Europe and the US. The growth in sub-sectors such as renewals – which are less capital intensive than more conventional projects such as roads has also contributed to the decline in the average deal value.

Figure 2.6 Unlisted infrastructure deal flow by region (2009-2019)



Source: Preqin (2020)

2.3 Growth in renewable energy deal flow

Analysis of deal flow by subsector reaffirms a wider infrastructure investment trend; the increase in the flow of capital into renewable energy. This trend is in line with wider global sustainable development goals - as discussed in more detail within the country case study chapters. Analysis of the Preqin dataset showcases the pronounced growth in renewable energy deal volume, from 384 deals in 2009 to 1,400 deals in 2018. Key sub-sectors include wind energy and biomass, which respectively comprised 45% and 37% of all renewable energy deals completed between 2009 and 2016¹⁵. Renewable energy schemes generally have smaller capital commitments per project – although it is noteworthy that the global drive towards green energy generation has meant that the renewables sub-sector accounted for 57% of all infrastructure deals by volume in 2018 – serving to reaffirm the extent of investor appetite at present coupled with a pronounced pipeline of development opportunities. The marked expansion in private sector investment in renewables also serves to demonstrate how regulatory change has the propensity to impinge upon future infrastructure provision and the considered scale of investment need and reiterates the ‘dynamic’ nature of the infrastructure investment need forecasts. In this case, national government commitments to the 2015

Paris Agreement on climate change under the United Nations Framework Convention on Climate Change (UNFCCC) have served to drive the marked expansion in green energy production. Given policy directives the 25% decline in capital spending on renewable energy between 2018 and 2019 within the unlisted funds sector is noteworthy but has been attributed to reduced technology costs rather than any form of retrenchment from the sector (Preqin, 2020).

2.4 Institutional investors and investment innovations

The long-term asset life of infrastructure presents an attractive proposition for institutional investors and other alternative sources of capital. In addition, infrastructure investment – be it in water, telecoms and power, in social infrastructure or in renewables - is very much aligned with the corporate and social responsibility mandates of many of the large institutional investors. As custodians of ‘the people’s capital’, pension funds are inclined to ensure their investments conform to their long-term liability matching obligations (for example, when payment of the pension is due), whilst simultaneously contributing to societal development. The increased exposure of local authority pension funds to infrastructure investment is evidence of a more societal focus where the ambition is to promote socio-economic development on the

¹⁵ Author calculations using Preqin data.

back of 'local' investment in key infrastructure projects. Notwithstanding these converging qualities, the prevailing barrier prohibiting the flow of private financial resources appears not to be overly concerned about where the capital is derived from, but rather how capital can be levered into infrastructure projects more easily, in order to optimise the potential impacts.

On the face of it, the long-term investment horizon of institutional investors infers a natural match to the infrastructure asset class. Yet, the mismatch between investment tenors (the maturity period of a loan), vehicle life (the asset development lifetime), the high investment and management fees, in addition to the highly geared leveraging arrangements, have collectively acted as barriers (Della Croce and Gatti, 2014) to further institutional investment in infrastructure. As such, only a minor portion of assets under management by the top 100 alternative investment managers has been allocated to infrastructure; circa US\$120.6 billion (0.38%) out of a potential US\$3.2 trillion (Della Croce and Gatti, 2014).

Further to this, it is noteworthy that increased competition within the unlisted funds universe has resulted in the inability of some fund managers to execute deals in an efficient and timely manner. This not only detracts from the capacity of the unlisted funds sector to contribute to the redress of the infrastructure investment gap but also inhibits the financial performance of the fund. Figures compiled by Preqin detail the growth in 'dry powder'¹⁶ within the unlisted infrastructure funds universe from US\$73 billion in December 2012 to US\$220 billion at the end of December 2019 (Preqin, 2020). The inability of some managers to execute deals has prompted a number of larger institutional investors to develop their own initiatives, with the intentions of directly investing into infrastructure assets, in an effort to exert greater control over their investment strategies (Haran, Lo and Milcheva, 2019).

This has manifested in the emergence of new collaborative in-house investment / co-investment platforms, which enable investors with aligned interests to pool their resources (Della Croce et al., 2011). Noteworthy examples include the Pension Infrastructure Platform (PIP) in the UK and Canadian Pension Plan Investment Board (CPPIB) in Canada, which operate a syndicated style model. Other pertinent innovations include the arrangement of public and private partnering co-investor funds such as the Pan African Infrastructure Development Fund (PAIDF) and the Marguerite Fund which invests in European renewables, transport and digital infrastructure projects¹⁷. These platforms pool resources from multiple sources in order to optimise impact, but are further illustrations of the need to transcend the public-private boundary in the serving to redress the infrastructure investment challenge (Della Croce and Gatti, 2014).

¹⁶ Dry powder – capital that investors have targeted but not yet committed. ¹⁷ The successor fund - Marguerite II Fund achieved a financial close of €475mn in December 2018.

2.5 Chapter summary

The content analysis of the literature encompassing an exploration of key market trends within the unlisted infrastructure funds universe has detailed the capability for private capital to fund infrastructure provision. The last decade has witnessed a marked increase in institutional investment flowing into the infrastructure sector, both directly and indirectly through the unlisted funds sector. Moreover, the investors' intentions survey undertaken by Preqin (2019) details ambition on the part of institutional investors to increase their exposure to the infrastructure market. For this aspiration in growth to be translated into committed capital, increased collaboration between the investment community and infrastructure providers is needed to engineer investable opportunities which more effectively align investor profiles with project opportunities. The continued innovation and expansion in short-term and long-term debt and equity solutions provide the platform for more effective alignment. By contrast, public sector procurement processes and decision-making frameworks remain protracted and have failed to maintain pace with private sector financial and investment evolution across the infrastructure market.

Perhaps the most important finding from the evaluation of key market trends is that the large volumes of investment earmarked for infrastructure are not getting deployed in a timely and effective manner. This ultimately has repercussions for wider society, as the potential benefits that could result from deploying this money are not being realised. The evaluation of key market trends within the unlisted funds sector highlighted that there is presently over US\$220 billion of dry powder within the global unlisted infrastructure funds universe, and a further US\$203 billion of capital currently being raised. Assuming a 40:60 equity-debt structure, the existing dry powder and the capital from the funds being raised, combined with leverage, could support the acquisition or deployment of over one trillion USD in new infrastructure projects across the globe. Based on current execution rates it could take 7-8 years for all this capital to be invested.

The lack of project development pipelines in key infrastructure markets has been cited by investors contributing to this investigation as a key factor in the inability of fund managers to place capital. The lack of investment opportunities, in tandem with the marked increase in investors seeking entry to the infrastructure market, has fuelled asset price inflation within the secondary market. This has served to impact the performance forecast of unlisted infrastructure funds and prompted some investors to seek out direct investment opportunities; nonetheless the pipeline of 'investable' product of the scale and risk profile relative to institutional investors is limited. The inability of fund managers to commit raised capital and the challenges and barriers which serve to curtail private investment in the infrastructure market will be the subject of detailed exploration within the empirical phase of the investigation encompassing case studies of six countries. Each respective case study depicts the specific challenges relative to the overall infrastructure need and explores the models and vehicles employed to facilitate private investment flows into greenfield infrastructure projects.

3.0 Empirical framework and methodology



Image source: 1 – Meunier / Shutterstock.com

The literature analysis delineated several themes pertaining to the growth and expansion of the role of the private sector in the funding and provision of essential infrastructures. The key themes that merit exploration include:

- 1. The role of governments:** as providers of infrastructure as well as ‘facilitators’ of private investment in terms of generating confidence and creating a viable development pipeline.
- 2. The assessment and pricing of risk:** how this contrasts between the public and private sectors. Moreover, how greater appreciation and understanding of infrastructure investment has culminated in more ‘mainstream’ investors willing to absorb construction-associated risks.
- 3. The growth in private sector infrastructure investment:** culminating in a more diverse investor universe, characterised by high volumes of new market entrants in recent years.
- 4. The evolution in investment vehicles and models:** offering investors a more expansive range of investment options and enabling project opportunities to be more effectively aligned to investor expectations.

These four themes are in many ways inter-linked, although some are more pertinent in some of the case study countries than others. These themes guided the development of the research framework and formed the basis for the research interviews and group-based stakeholder discussions. A diverse range of stakeholder groupings within the six countries contributed to the investigation. The research team, although predominantly UK based, worked alongside local academics in each of the other five countries¹⁸. Interview templates were devised to ensure continuity and consistency of thematic exploration and analysis of interviews across the six case studies. Interviews comprised a combination of face-to-face and telephone interviews, with interviewers afforded licence to probe and ask additional important questions relative to the interviewees background and country context. Care was also taken to ensure that those interviewed represented both the public and private sector perspectives. Public sector contributors included local and central government departments (those with infrastructure mandates) as well as government advisors, or individuals with an infrastructure mandate from banks, institutional investors or infrastructure developers. Interviewees were selected based on their expertise in the provision and financing of infrastructure projects. More than 40 interviews were conducted across the six countries. An overview of interview participants has been provided in Appendix A. Where necessary, key industry reports and government publications were also critically reviewed in order to provide underpinning context and perspective.

¹⁸ The integration of local researchers served to open pathways to key stakeholder groupings whilst the inherent local market knowledge was invaluable in framing the interview context and perspectives.

4.0 Infrastructure investment in Canada

The Canadian infrastructure market is one of the most sophisticated and active infrastructure investment markets in the world. Canada has a proven track record of delivering infrastructure using innovative funding and procurement approaches, amounting to US\$45 billion spent and 9,200 projects delivered since 2002 (Infrastructure Canada, 2016). Canadian infrastructure has largely been funded by a combination of direct public finance and a well-developed PPP approach. Interviews highlighted that Federal investment has stood at between 20% and 25% of total infrastructure investment in Canada over the course of the last decade, with the bulk of capital coming from provinces (circa 50%) and municipalities (circa 25%).

Canada is recognised as a global leader in PPPs with interviews with policy makers and advisors in the Canadian infrastructure market detailing how the PPP model has served to bolster public expenditure and enhance infrastructure provision. Interviewees highlighted how the PPP model had been extensively deployed and refined within the provinces. For example, Infrastructure Ontario has received global acclaim for the effective management and utilisation of PPPs as a key tool in the delivery of its infrastructure plan. The PPP model is also used extensively within British Columbia and Quebec. Interviewees from within the public sector in Canada highlighted that capacity building at provisional government level has been the key to this success story and for also generating a strong project development pipeline. There was consensus amongst all interviewees on the important role of PPP Canada in developing expertise and competencies within public sector departments tasked with infrastructure provision (particularly at federal level). PPP Canada also served as a funding provider to PPP projects such as the PPP Canada fund. Since 2012, the PPP Canada fund invested over US\$1 billion in 25 infrastructure projects across Canada with a combined capital cost of over US\$4.5 billion. Infrastructure Canada claim that the PPP approach generated savings of approximately US\$1.4 billion compared to traditional procurement approaches. They state this is the result of enhanced efficiency across the procurement process culminating in adherence to key project milestones and deadlines (Infrastructure Canada, 2018)¹⁹. Figures compiled by the Canadian Council for Public-Private Partnerships (CCPPP) detail that there were 285 active PPP projects in Canada at the end of December 2019, with those already in operation or under construction valued at more than US\$104 billion (CCPPP, 2020).

¹⁹ PPP Canada was dissolved as a corporation in 2018 in line with wider policy initiatives centred around the creation of the Canada Infrastructure Bank (CIB). Transition plans have been developed through until 2022.



Image source: 1 – Elijah Lovkoff / Shutterstock.com
2 – c.l.l.o / Shutterstock.com

However, despite this solid platform of investment, the volume of funds committed have not been sufficient to support long-term economic growth plans, and as such, there remains a considerable infrastructure provision gap. The precise scale of infrastructure investment needed within Canada is difficult to accurately quantify, given the requirement of new asset development and the significant challenges presented by the need to maintain and replace existing assets. This is compounded by the fact that currently there is no national source of information on the stock and condition of infrastructure assets in Canada²⁰. A report by the Boston Consulting Group highlights that a number of prominent think tanks and thought leadership institutions have attempted to calculate the size of Canada's infrastructure deficit. Estimates vary widely, ranging from US\$50 billion to US\$430 billion with most averaging between US\$83 billion and US\$204 billion. The Advisory Council on Economic Growth proffers one of the most wide-ranging estimates, calculating the gap in First Nations infrastructure to be in the region of US\$30 billion, and for the rest of Canada, estimates range widely from US\$150 billion to US\$760 billion (Advisory Council on Economic Growth, 2016). Interviews undertaken for this investigation suggest infrastructure need in the region of US\$700 billion will be required to attain economic growth projects, maintain social development and contribute meaningfully to global sustainable development goals²¹.

Although there is no agreed figure for Canada's infrastructure financing gap, the consensus of opinion amongst respondents in this study was that Canada should be investing significantly more capital in infrastructure. The 2019 Global Competitiveness report ranked Canada's infrastructure quality at 26th in the world (WEF, 2019) although more critical insights have been identified in the 2019 Canadian Infrastructure Report Card (CIRC). The CIRC report classified over 30% of infrastructure assets in Canada as being in either 'Very Poor', 'Poor' or 'Fair' condition. "Very poor" indicates that assets are unfit for sustained use and are near or beyond their expected

service life. "Poor" indicates that assets are approaching the end of their useful life whilst "Fair" is used to describe assets that show signs of deterioration and some elements exhibit deficiencies. The latest CIRC report also highlights the aging profile of infrastructure assets detailing that a majority of the infrastructure that Canadian's rely on every day is more than 20 years old. This finding emphasizes the need for continued reinvestment (CIRC, 2019).

4.1 Government approach to infrastructure

In light of the acute financing gap, Canada has developed a new Infrastructure plan entitled the 'Investing in Canada Plan' (ICP). Announced in the 2016 Budget and further expanded upon in Budget 2017, the ICP will allocate US\$140 billion for infrastructure investments in the 10-year period to 2027-28. In the first three years of operation (2016-2019) the ICP approved 48,000 projects predominantly in forms of social infrastructure including affordable housing. The transport and communications sectors were also key beneficiaries with investment targeting the extension and upgrading of transit networks and roll stock whilst the connection of remote communities to broadband networks was also a key goal of the phase one tranche of the ICP strategy. In total, the 48,000 projects represent committed federal investment of US\$31.5 billion in the first three years of the ICP vision (Infrastructure Canada 2019).

Whilst this 'new' federal investment is encouraging, there is a pressing need to ensure that the impact of this public finance is augmented by institutional capital. To help achieve this, the second phase of the ICP has seen the establishment of a Canadian Infrastructure Bank (CIB) to attract alternative sources of infrastructure financing.

Established in 2017 the CIB is intended to complement the already operational 'New' Building Canada (NBC) Fund.



20 Statistics Canada is currently undertaking a survey to shed more light on the scale of investment need premised on the stock, condition, performance and asset management strategies associated with Canada's core public infrastructure. 21 Projections premised on commitments needed in line with the Infrastructure Canada Plan timeline. 22 US\$62.2 billion will be incremental funding

The NBC fund was launched in 2014 with each province and territory receiving a base amount of US\$188 million plus a per capita allocation based on the Statistics Canada Final 2011 Census. Post ICP the NBC Fund was improved to accelerate funding and increase flexibility in how the funding can be used by communities. Of these funds, approximately US\$2.2 billion will continue to be made available each year for municipal projects through the Goods and Services Tax Rebate and the federal Gas Tax Fund (Infrastructure Canada, 2018).

However, interviews with prominent academics and policy advisors highlighted that the Canadian Government had thus far provided limited details on the performance measurement framework through which to evaluate the impact of ICP. Moreover, despite the ICP framework depicting bi-lateral agreements between Infrastructure Canada and the provinces and territories, there remains a significant gap and lack of visibility on the link between budget measures to the underlying infrastructure projects. In 2019, the Office of the Parliamentary Budget Officer (PBO) reports that Provincial capital spending on infrastructure was US\$4 billion lower than what it should have been after accounting for additional infrastructure funding delivered through the ICP. The PBO report suggests that funding from the federal government has displaced provincial investments in infrastructure. By contrast many municipalities including Toronto, Montreal and Calgary have leveraged federal investment to bolster their investment (PBO, 2019). Importantly, given the pertinence of the ICP to the Government's overall economic plan, such a wide disparity between funds planned and the value of projects identified indicates that Federal Government is at risk of not achieving its funding allocation projections. Additionally, Federal investment will not be as impactful as initially forecasted if commitments are not being utilised effectively as a leverage for other sources and means of funding commitments both by the provinces and in respect of attracting increased private investment.

4.2 Infrastructure investment challenges

In 2019 the World Economic Forum Global Competitive Index ranked Canada 26th in the world in terms of infrastructure quality (WEF, 2019). Whilst significant strides have been attained in enhancing the quality of infrastructure provision in the last five years a major challenge to optimising the impact of infrastructure investment remains the relatively ad hoc nature in which federal and provincial governments identify and target their infrastructure need. Investor interviews suggested that a coherent strategy is urgently required to identify nationwide policies to private sector investors and provide further surety of infrastructure opportunities and procurement competitiveness. Moreover, such an approach would also permit greater flexibility and responsiveness to changing infrastructure need and

enhance industry effectiveness.

Additionally, despite international recognition of the success of the Canadian approach, doubts about the efficacy of the PPP model (in its broadest sense) in bridging the finance gap can come to the fore from time-to-time and call into question the value for money of PPPs. For example, in 2014 the Auditor General of Ontario (2014) suggested that traditional approaches would outperform PPP "if conventionally procured projects were simply 'managed better' by government". Criticisms centred on the protracted nature of the planning and development process vis-à-vis PPP timelines whilst value preservation of the asset can be compromised due to inadequacies of lifecycle maintenance. While the Auditor comments depicted a province level perspective at the time (2014), it served to highlight that the performance of PPPs were still subjected to intense scrutiny. That said, it is noteworthy that Ontario has subsequently delivered an expansive PPP portfolio of projects, and based on interviewee consultation in this study the province is now widely regarded as an exemplar of best practice.

Accordingly, there was consensus amongst interviewees around the growing public acceptance of PPP within Canada, mainly due to the successful roll-out at province level. A number of interviewees from the public sector perspective did highlight however that PPP is not a panacea. Indeed, they emphasised that when incorrectly applied, it can fail to perform in terms of value for money to the tax payer. In addition, there are numerous examples of non-performing PPP projects across the world needing to be transferred into public ownership due to the essential nature of service provision. This calls into question the true extent of risk transfer between the public and private sectors and can also damage the reputation of PPP as a key policy tool that could be successfully utilised in other scenarios. Not all PPPs in Canada have been without misgivings but the consensus is that the model has made a valued and growing contribution to infrastructure provision.

Going forward, one of areas of concern pertaining to the continued growth and development of the PPP market in Canada is the proposed changes to accounting standards for measuring and classifying infrastructure procured through PPPs. Drafted by the Public Sector Accounting Board (PSAB) of Certified Public Accountants (CPA) the proposals are broadly consistent with the International Public Sector Accounting Standard IPSAS 32 in relation to Service Concession Arrangements. Whilst recognising the need for accounting standards to evolve relative to the PPP market maturity the CCPPP have raised specific concerns about the lack of detail afforded to the distinction between PPP and conventional procurement in respect to the cost of capital, risk transfer, life cycle costing and the repayment structure. The CCPPP suggest that the PSAB proposal will have unintended consequences which adversely impact the business case for PPP (CCPPP, 2020). At the time of compiling this report the PSAB's proposal are subject to consultation with definitive implications yet to be determined²³.

²³ The PSAB consultation on the proposed standards closed on 29th February 2020.

In terms of the wider infrastructure investment ambitions laid out by Federal Government in the ICP concerns have been expressed about the level of infrastructure investment being planned – particularly at a time when most Canadian governments are struggling with chronic budget deficits and growing debt (Lammam et al., 2017). National Government has made significant fiscal commitments to increase funding of infrastructure, however, the scale of infrastructure investment needed means there is little scope or capacity for additional funding allocation for other essential services, including healthcare and education (Lammam et al., 2017). In essence, budgets have not necessarily increased but have been reapportioned and prioritised.

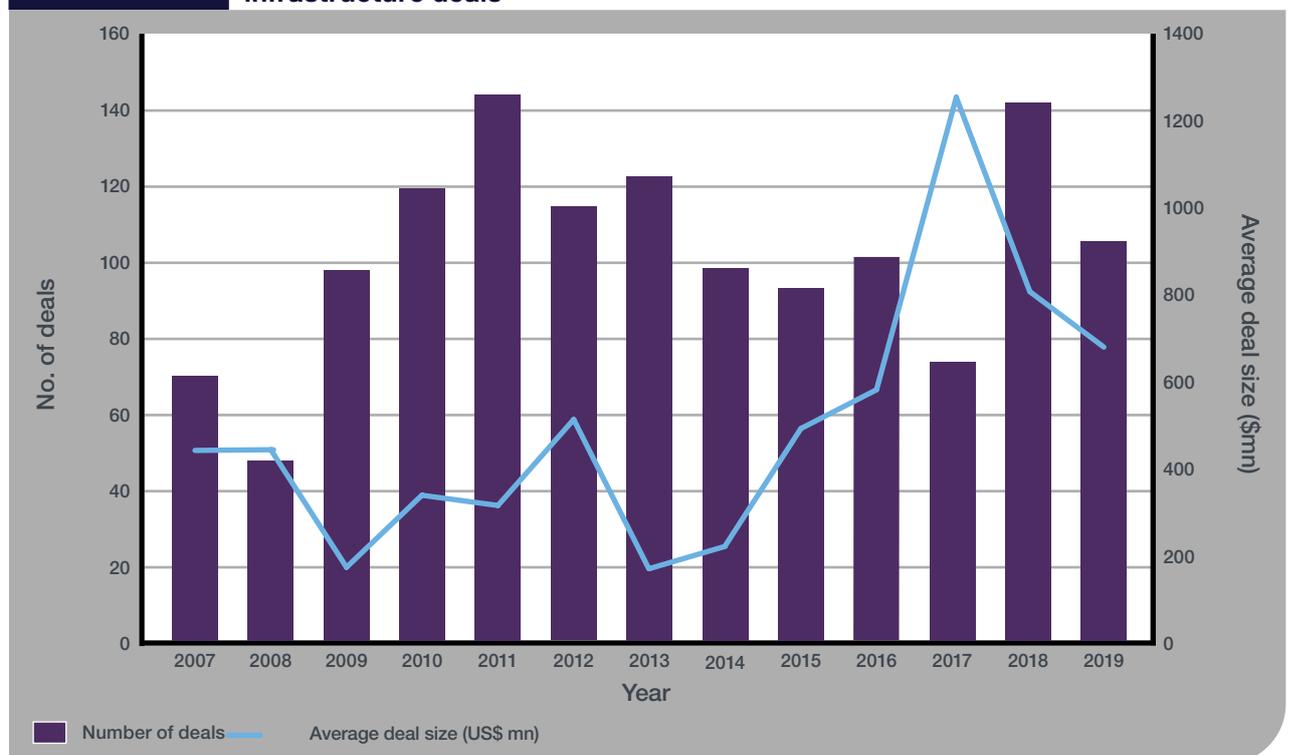
There is acceptance within national Government that fiscal capacity through tax payers will not come close to meeting the infrastructure investment need. Against this backdrop a report by KPMG (2017) highlighted that in addition to its inability to locate new sources of revenue for infrastructure provision via fiscal policy, Canada also lacked a mechanism that encouraged private financing through the mitigation of risk (KPMG, 2017). Subsequently, the Canadian Infrastructure Bank (CIB) was established with the specific aim of creating an attractive investment environment for institutional investors and specifically pension funds, as a means to help deliver major infrastructure projects and

close the funding gap. Key policy advisors and financial experts interviewed as part of this research perceive the CIB as a ‘step-change’ for the infrastructure market within Canada, and describe it as a key component of the financial toolkit which serves to underpin what is a more integrated infrastructure delivery plan.

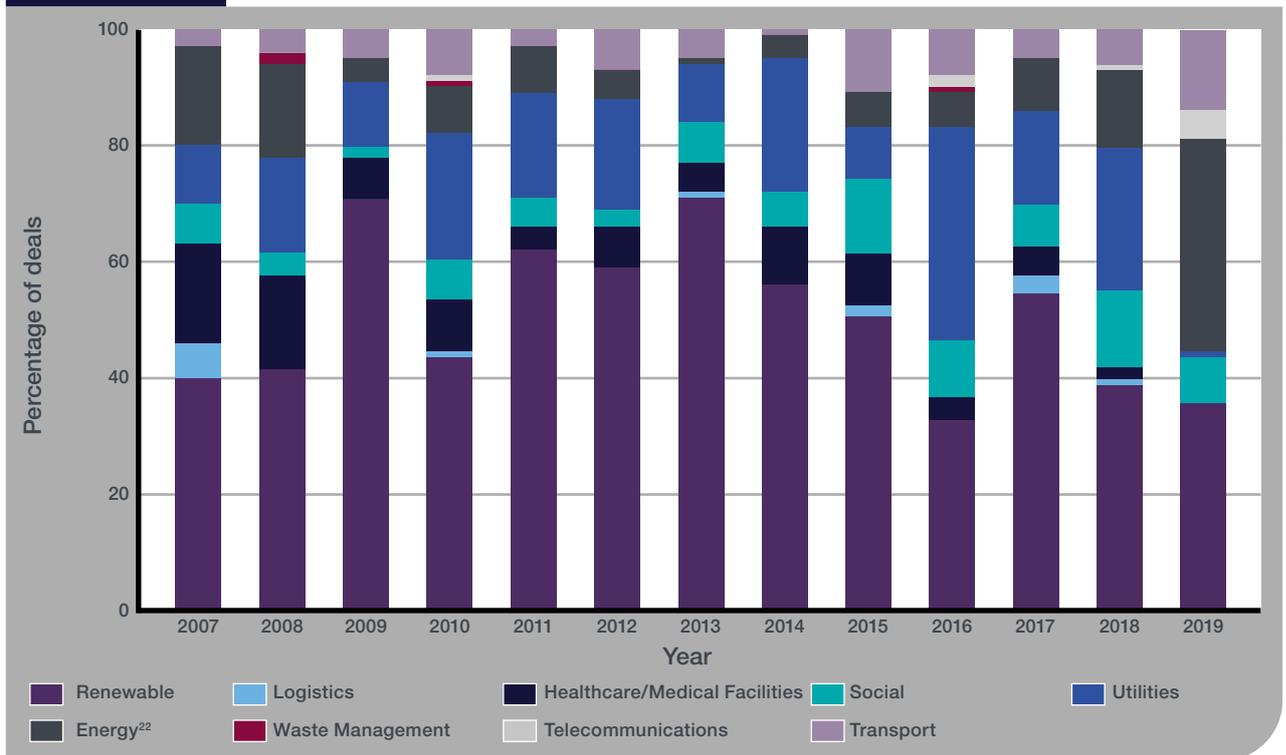
Pertinently, a number of the interviewees including investment advisors suggested that the CIB could serve as a catalyst for more active involvement of Canadian pension funds going forward. Canada’s pension funds include 6 of the top 20 largest pension fund infrastructure investors in the world. Their combined infrastructure investments exceeded US\$34 billion in 2016. However, many Canadian pension funds invest less than 15% of their infrastructure portfolio in Canada (Boston Consulting Group, 2017). Interviewees suggested that this was in part due to a sociability issue with projects at provincial and municipal levels rarely having the critical mass to appeal to these pension funds, while Federal projects were often considered too ‘politicised’. While it is too early to make definitive inferences around the impact of the CIB in addressing the infrastructure challenge within Canada, its formation is an important step in providing the financial wherewithal and creating an investment environment conducive with levels of infrastructure need.

Figure 4.1

Annual number and average value of completed Canadian infrastructure deals



Source: Preqin (2020)

Figure 4.2 Breakdown of completed infrastructure deals in Canada by sector

Source: Preqin (2020)

4.3 Infrastructure pipeline and focus

Exploration of the unlisted infrastructure fund universe serves to demonstrate the increasingly prominent role of the private sector within the Canadian market. Indeed, there is a clear correlation between the infrastructure sub-sectors highlighted as priorities at national, provisional and local government levels as detailed within the ICP. The volume and average size of Canadian infrastructure deals completed by the unlisted infrastructure funds sector over the last 10 years are depicted in Figure 4.1. It can be seen that deal flow peaked in 2011 (143 deals). The volume of deals in 2018 was the highest since 2011, however deal volume has in the main fallen whilst the average deal size has increased greatly. Average deal size over the course of the last three years has been in excess of USD 900 million. It is noteworthy that the average deal size has declined marginally year-on-year between 2017 and 2019 largely driven by a shift in investor focus from healthcare and conventional energy to the transport and renewable energy sectors conducive with the ICP development pipeline of opportunities.

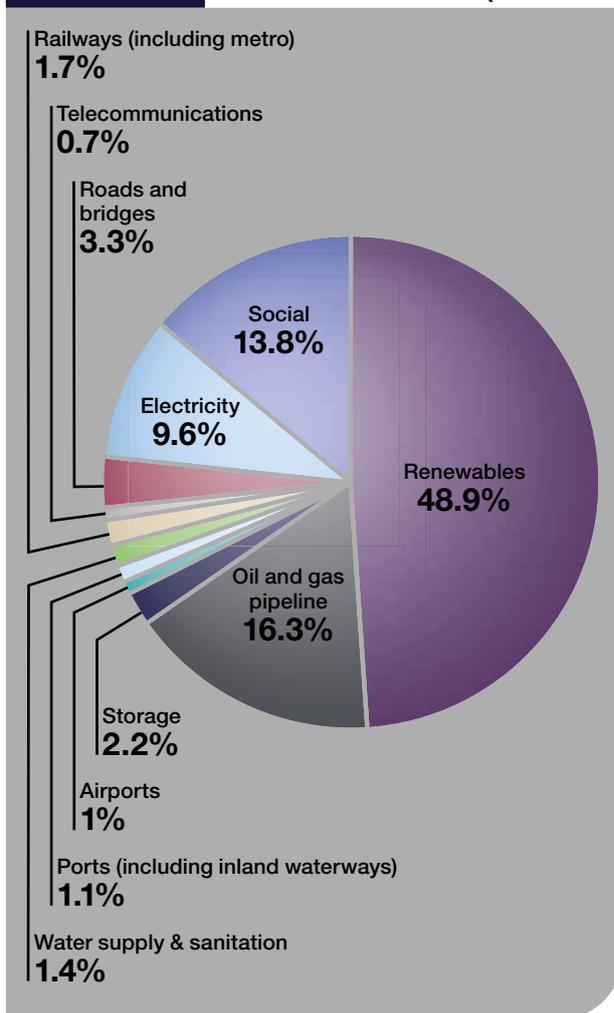
As exhibited in Figure 4.2, there are a number of noteworthy trends across the sub-sectors of infrastructure in Canada. One such trend is the dominance of energy, notably renewables, which comprise 50% of deal completion by volume in the period 2017-2019. In line with the recent

ICP ambitions to develop communities and invest in social infrastructure within the provinces and at municipal level, it is noteworthy that 2018 and 2019 witnessed a marked increase in investment in energy, social infrastructure and transport related deals. Indeed, social infrastructure deals constituted 13% of all deal volume within Canada in 2018 premised on deals completed by the unlisted funds sector. In 2019, energy related deals constituted 37% of all deals completed by volume with the public transport also witnessing significant investment comprising 14% of deals by volume. Social infrastructure, energy and transportation were among the key areas earmarked for increased investment within the ICP (Infrastructure Canada, 2018).

Figure 4.3 depicts the volume of investment by sector in the period 2007-2019. Again, the importance of energy infrastructure is apparent, with 49% invested in renewables and a further 10% in electricity. The earlier (and to an extent ongoing) concentration on social infrastructure is evidenced by 14% allocation of total capital committed to social infrastructure projects. Against this, only a relatively modest 3% is allocated to roads and bridges, perhaps reflecting the problematic state of road transport associated infrastructure, which is identified as a major national concern within the CIRC report 2019 (CIRC, 2019).

Against the backdrop of increased investment by the unlisted funds sector, it is also noteworthy that there has been a definitive policy shift to establish clear criteria in terms of both location and sector for schemes to be fundable.

Figure 4.3 Breakdown of investment allocation in Canada by infrastructure sector (2007-2019)



Source: Preqin (2020)

Federal expenditure for the foreseeable future is forecast by many observers to remain relatively constant, at around 6-7% of GDP, as indicated by figures from BMI (2017). Moreover, whilst there is some overlap between the focus of the PPP development pipeline for example and activity within the unlisted funds markets, there is also clear evidence of how different vehicles and sources of finance can be used in harmony to make considered inroads to the infrastructure investment challenge. Accordingly, Government will need to play a crucial role in defining the need, creating the opportunity in the form of a development pipeline of projects (or investable assets) and in creating the environment conducive to investment. The CIB will continue to occupy a pivotal role in leveraging private investment, at the end of February the CIB had committed over four billion Canadian Dollars to a series of projects across a number of sectors with a number of MOUs in place in respect of future development pipelines²⁴.

4.4 Canadian market summary

- Interviews suggest that Canada has an investment shortfall in the region of US\$700 billion, if the vision detailed within the NIP is to be realised. As such, attracting enhanced volumes of private investment to deliver the infrastructure vision remains a key priority for those tasked with infrastructure provision.
- Canada is rapidly creating the environment to facilitate the investment through capacity building across the public sector as well as introducing innovative tools and vehicles that serve to stimulate that investment.
- Canada already has a relatively strong platform upon which to address the infrastructure finance gap with a combination of PPP type approaches affording a range of market facing solutions, either via formal PPP routes or via project participation via the CIB.
- More effective alignment between government at provincial and national level would serve to further enhance the impact potential of projects and to channel private investment relative to the NIP.
- The need for accurate robust data to inform the scale of investment need encompassing new asset development as well as the replacement of existing assets coming to the end of their useful life has already been identified as an area requiring more attention. The continued development of the Infrastructure Quality Score Card aligned to the work being undertaken by Statistics Canada is to be welcomed in this regard.
- The introduction of the CIB is tangible evidence of Canada putting in place the tools to lever private investment. Interviews affirmed the view that the CIB has already added much needed financial capacity to the market, particularly in terms of projects of strategic importance but not financially viable for the private sector. The CIB has acted in the role of strategic advisor as well as co-investing with private investors including pension funds to deliver a series of complex and strategically significant infrastructure projects.

²⁴ <https://cib-bic.ca/en/projects/>.



Image source: 1 – B.Zhou / Shutterstock.com 2 – Lewis Tse Pui Lung / Shutterstock.com

5.0 Infrastructure investment in China

The Chinese government has consistently maintained public spending on infrastructure development as a means to modernise its economy. In the last decade, Government stimulus programs and development plans have driven significant growth in infrastructure investment which has increased from US\$0.62 trillion in 2008 (13% of GDP) to US\$2.1 trillion in 2015, accounting for approximately 20% of GDP (Wildau, 2017). Nonetheless the investment challenge remains acute with research conducted by McKinsey (2013b) forecastings the infrastructure investment needed in China to be approximately US\$16 trillion through to 2030. This constitutes an investment of 6.4% of GDP, just to maintain stock of assets at current levels (McKinsey, 2013b). In 2019, China invested over US\$ 120 billion in the ten largest infrastructure projects by value, despite its economy showing signs of slowing growth²⁵. In terms of source of capital, public funding continued to provide the majority of that investment but interview based discussions highlight a concerted attempt in recent years to expand international private investment. The increased government investment has seen China improve markedly in terms of its infrastructure quality ranking. In the 2018-2019 World Economic Forum Global Competitiveness report ranks China 36th in terms of infrastructure quality improving from 46th overall in the 2017-2018 report (World Economic Forum, 2019)

Interviews with policy makers and prospective investors highlight that the scale of economic ambition pertaining to infrastructure quality will necessitate a pronounced increase in private infrastructure financing, which will be a comparatively new phenomenon. In contrast to developed economies such as the UK where approximately 70% of infrastructure is funded by private sources infrastructure investment, in China this has historically, in the main, been undertaken by the state (Wilkins and Zurawski, 2014). The Global Infrastructure Hub estimates that total Infrastructure investment in China amounts to US\$3.3 trillion over the five-year period 2013-2018. It is noteworthy however that private investment constituted a mere US\$10 billion of that total investment across this period (GIH, 2018).

The Chinese National Bureau of Statistics (CNBS) confirms that 78.9% of fixed assets infrastructure investment by value (approx. US\$1,986 billion) are classified as “state-holding”, while the remaining 21.1% (approx. US\$530 billion) is financed by either public-private joint ventures or private sector investors (CNBS, 2017). Furthermore, as highlighted by Ansar et al. (2016), state-holding investment has had the most pronounced growth, from US\$0.5 trillion in 2008 to US\$1.45 trillion in 2015, which is largely a direct consequence of government-led

²⁵ Source: <https://www.scmp.com/economy/china-economy/article/3047305/chinas-top-10-infrastructure-projects-2020-and-beyond-will>

development programmes initiated after the 2007/08 Global Financial Crisis. There are emerging opportunities and reforms which may alter the infrastructure investment landscape and present extensive opportunities to international investors. Interviews with policy makers and advisors showcased how China's continuing urbanisation offers a major flow of extensive infrastructure projects and associated investment opportunities. In addition, a number of institutional investors contributing to this research inferred that major reforms and guidelines have seemingly improved the investment environment and paved the way for significant international investment in railways, gas pipelines, telecommunications and clean energy in recent years. From a very marginal position, the private investment market has expanded markedly in recent years, constituting circa 9.4% (or US\$60 billion) of the entire market composition in 2008 and increasing to approximately 18.3% (or US\$461 billion) in 2017 (CNBS, 2017).

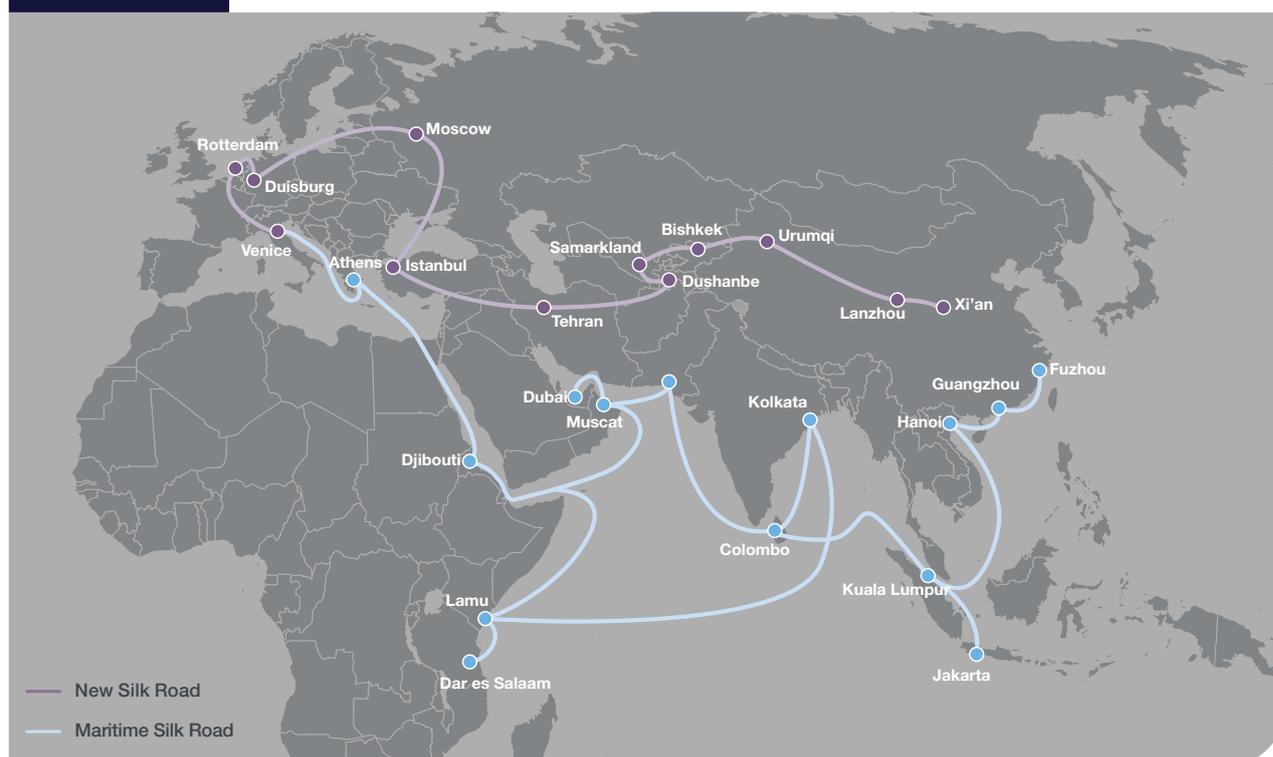
5.1 Government approach to infrastructure

Interviews with international investors highlighted that China's regulatory regime remains a major deterrent to investors as it affords the government considerable latitude and discretion relating to sectoral investment strategies. Specifically, such discretion included the selection or restriction of foreign investment which would compromise

the national interest or compete with state-owned or domestic enterprises. In 2012, the Chinese government announced major reforms to foreign investment laws. The Twelfth Five Year Plan on Foreign Capital Utilization (the "12th Foreign Capital Five Year Plan") provided a blueprint for a series of market entry reforms designed to improve transparency and efficiency in the infrastructure investment market and to incentivise and increase private investment opportunities (Liu, 2018).

China's 13th Five Year Plan adopted in March 2016 increases the focus on new infrastructure investment as well as upgrading existing stocks of assets, both within China and beyond over the next five years (National Assembly of China, 2016). The 'signature' foreign policy initiative, the New Silk Road (The Belt and Road initiative) was launched in 2013. The New Silk Road is a trans-continental development plan to improve and create new trading routes and links across over 60 Eurasian countries by channelling large scale state-led investment into infrastructure throughout the region (Summers, 2016). More specifically, the Plan is composed of two elements; The Silk Road Economic Belt (One Belt) and; The 21st Century Maritime Silk Road (One Road). The Silk Road Economic Belt (The Silk Road or One Belt) covers six main 'economic corridors', and includes infrastructure projects for roads, railways, natural gas and oil pipelines and energy. The 21st Century Maritime Silk Road (The Maritime Silk Road or One Road) is a development initiative that emphasises linking the Asia-Pacific economic region by building a network of port cities and upgrading

Figure 5.1 China's Silk Road Initiative



Source: Adapted from Xinhua (2018)

existing maritime infrastructure (Figure 5.1).

The Chinese government anticipate that the Silk Road network of highways, railways, pipelines, ports, telecommunication links and logistic hubs will potentially benefit more than 70% of the world's population (Kin and Chen, 2017). This level of ambition certainly represents a 'step-change' in the scale of international infrastructure investment collaboration as well as in the complexity and multifaceted nature of the scheme itself. It is estimated that by 2020, countries along the one-belt-one-road route will need approximately US\$2.38 trillion for investment in transport infrastructure alone and about US\$2.95 trillion in total (PwC, 2017). This single project is more than twice the size of the current Chinese domestic infrastructure market.

In response to this funding need, the Asian Infrastructure Investment Bank (AIIB) was established in 2016 with an initial capital of US\$100 billion (Kin and Chen, 2017). The Chinese government provided US\$15 billion, with the remaining funds derived from the other AIIB member states²⁶. Since its inception, the AIIB has granted US\$12.24 billion loans across sixty-four projects whilst the China-backed Silk Road Development Fund, set up in 2014 with an initial injection of capital of US\$100 billion, has distributed circa US\$6 billion of funds across fifteen projects in its first three years of operation²⁷. Since 2015, US\$160 billion of projects have been planned or are underway and it is also expected that the New Development Bank (NDB)²⁸ and the SCO Development Bank, amongst other organisations, will play a significant role in financing the development initiative (Kin and Chen, 2017). The AIIB has committed investments of US\$7.85 billion in loans across a number of infrastructure sectors in 21 different economies.²⁹ Pertinently, this equates to less than a quarter of the expected amount, as the AIIB was expected to lend US\$10 billion-US\$15 billion a year for the first five or six years (Wong, 2016). Further to this, there remains limited data detailing how much of the approved lending has actually been distributed. Perhaps of even greater surprise is that so far only one AIIB loan has focused on China, a US\$250 million investment in an air quality improvement project in Beijing (AIIB, 2017). Interview evidence would suggest that, moving forward, economic circumstances will dictate that more of the AIIB funds will be focussed on the Chinese Infrastructure market.

Whilst there are undoubtedly concerted efforts to attract greater levels of private investment to support such initiatives, the current governmental approach to the financing of infrastructure investment also presents some concerns. Although it is relatively normal that large scale

infrastructure projects are financed by central government and smaller projects by local government, the fiscal structure of the Chinese Budget Law means that local governments are prohibited from engaging in borrowing from banks or running budget deficits (Lu and Sun, 2013). They therefore do not always have capacity to finance investment. This concern is exacerbated by figures from the Chinese National Bureau of Statistics (2017) suggesting that provincial governments have been the backbone of infrastructure financing activity in terms of decision making and financing, contributing to approximately 90% of the total infrastructure investment volume (CNBS, 2017).

Interviewees detailed that in order to circumvent the legal restrictions, it is common practice for local officials to set up what is known as Local Government Financing Vehicles (LGFVs) to finance infrastructure projects. These vehicles are off-balance-sheet municipal financing agents, hosted in a corporate setting de facto, but treated as a state-owned enterprise statutorily. To fund infrastructure projects under a LGFV, local governments provide capital primarily by means of budget allocations or transfer of land use rights and/or rights to existing state assets such as bridges and roads. Alternatively, funds could be derived from bonds issued by the central government on behalf of the local government (Bai et al., 2016). The LGFV then multiplies its capital base by issuing equity or bonds to private sector investors, and/or by non-recourse borrowing from banks, with land and other assets transferred by the local government as collateral. As of 2015, there are 7,170 LGFVs in China, whose investments in local infrastructure projects account for roughly 2.4% of the country's total GDP (Bai et al., 2016). Standard & Poor (S&P) estimate that local governments' off-balance-sheet borrowings may be as high as US\$4.4 trillion – constituting a potentially catastrophic debt mountain (S&P Global, 2018).

A number of international investors contributing to this investigation highlighted that LGFVs have come under considerable scrutiny within the international investment community. Investors called into question the sustainability of China's provincial government debt whilst many inferred that the infrastructure procured via LGFVs will not generate sufficient financial returns to service such debt. China's local governments are not permitted to guarantee the debts of third parties, as such, lenders to LGFVs have little assurance that they will be repaid. The S&P global rating agency suggested in 2018 that many LGFVs in Xinjiang region are very weak financially (S&P Global, 2018). This has prompted a lack of investor confidence and reflects the gradual weakening of the (financing vehicles') roles and links with their local-government parents.

26 The AIIB is a multilateral development bank (MDB) that aims to improve social and economic outcomes in Asia and beyond. As at 31 December 2109 it had 102 approved members worldwide (AIIB, 2020). 27 Silk Road Fund, (2020). 28 Formally known as the BRICS bank. 29 AIIB (2020).

5.2 Infrastructure investment challenges

Despite recent progress towards broader economic reform, those interviewed from the international investment community highlighted that there remain considerable barriers to private investment in infrastructure. This includes both the lack of market transparency and the lack of market price mechanisms which increases the risk of poor investment decisions. Pertinently, China is ranked 87th out of a total of 180 countries in 2018 by the Transparency International (TI) Corruption Index³⁰ (TI, 2018). Interview evidence suggests that the international investment community still have reservations about entering the market. Indeed, a number of institutional investors suggested that the Chinese government's plans to advance its economic ambitions are often at loggerheads with its protectionist economic policies. For example, as the vast majority of infrastructure development projects are state-led, state-funded and state-operated. Consequently, restrictions on international investment funds and the sectors of infrastructure that they are permitted to invest in, mean that capital is not channelled into projects that could otherwise effectively address underlying shortage problems.

Further to this, broad sectors of the Chinese economy remain firmly off-limits to international investors. The National Development and Reform Commission and the Ministry of Commerce released the latest Foreign Investment Industries Guidance 'Catalogue'³¹ (National Development and Reform Commission, 2017). Under the Catalogue, several infrastructure industries previously classified as 'restricted' or 'prohibited' have become less restricted or even 'encouraged'. This includes economic infrastructure such as transportation, electricity supply, water and clean energy. Industries such as healthcare remain restricted, as do 'sectors of vital national interests', including telecommunications. Even for those industries where international investment is 'encouraged' or 'permitted', local and sectoral rules and regulations often impose an extra layer of administrative control on the specific forms of foreign investments that acts as a barrier to this investment.

In addition, interviews with institutional investors highlighted the propensity for new regulations or policies to come into force without prior market consultation³², serving to heighten risk for investors considering entry to the Chinese market. Such regulatory risks are, in the opinion of investors contributing to this investigation, compounded by legislation and policies pertaining to real estate ownership. More often than not, the ownership of land or other real properties is a prerequisite to the successful initiation, development and operation of an infrastructure project. This, combined with restrictions prohibiting foreigners from directly owning real estate assets, leaves few options available to the foreign investor except a joint venture with Chinese partners. The lack of freedom to invest independently is a barrier to attracting international capital, while the shares of joint ventures with local Chinese partners are in practice not readily saleable or transferrable. This has not only served to hamper investors' confidence in long-term investment prospects, but more importantly has detracted from the government's credibility as a facilitator of inward international investment.

Recently, China and the United States concluded a bilateral trade agreement, namely the US-China Phase One Agreement, which is indeed a direct result of trade disputes between the two countries over matters such as economic openness, provision of a level playing field of business and compliance with the rules and principles of W.T.O. in relation to the elimination of state protectionism across various sectors. The first phase of the trade deal mainly focusses on agricultural and manufactured products, reduction of tariffs on goods and intellectual property rights. Investors are generally cautious about the development of the trade relations and expect the next phase of negotiation to cover more fundamental trade issues such as trade barriers for foreign investors engaging in telecommunication and infrastructure. The results of the negotiations could have a lasting and significant impact upon the way in which international investors conduct business in China going forward. Nevertheless, uncertainties surrounding the political and social developments in both countries – for instance the presidential election in the U.S. in 2020 and the recent outbreak of Covid-19 virus in China – could carry wide-ranging and significant implications within the investment landscape of the Chinese infrastructure market in the medium to long term.

30 1st in the ranking depicts high transparency and low levels of corruption. 31 Initially published March 2015 and revised June 2017. 32 For example, in November 2016, the Chinese government tightened scrutiny of currency transfers due to massive capital outflows arising in part from investors' fear of further depreciation of the Chinese yuan.

5.3 Infrastructure pipeline and focus

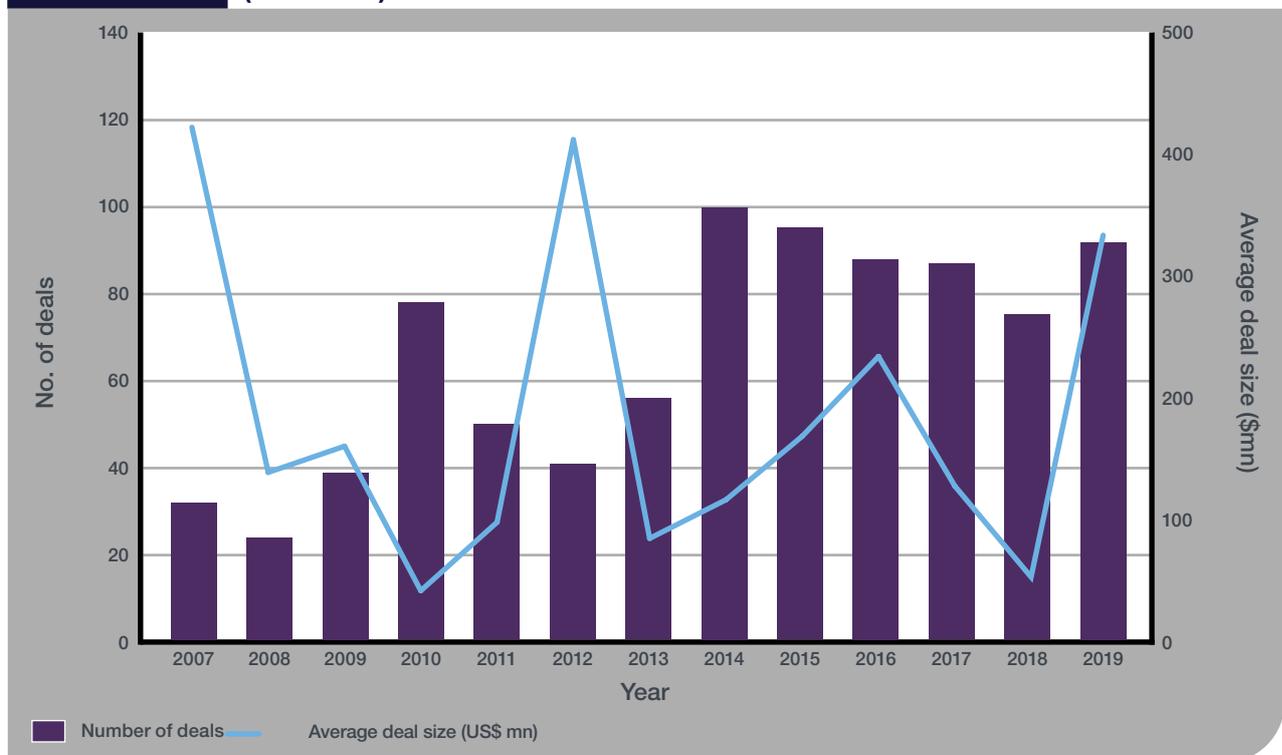
There has been a sizable and consistent increase in both the number and average deal value of completed deals within the Chinese market in the period 2014-2019 (Figure 5.2). Exploration of the Preqin unlisted funds database highlights that the number of infrastructure transactions completed peaked in 2014 with a total of 100 deals completed. The average size of Chinese infrastructure transactions has fluctuated since 2008, but the 2019 figures show the greatest increase in value since 2012. In 2019, average deal value stood at US\$330 million a marked increase from the US\$133 million and US\$60 million recorded in 2017 and 2018 respectively. Given the scale of infrastructure investment need it is perhaps surprising that unlisted funds have not assumed greater exposure to the Chinese market, but concerns over legislative and governance frameworks continues to serve as a barrier for many international investors, as highlighted in the interviews.

Figure 5.3 shows the composition of completed infrastructure deals. In 2007, the market was heavily dominated by energy, utilities and waste management transactions (71%) and transport infrastructure transactions (10%). Energy, utilities and waste management transactions increased in 2008 to comprise 75% of market transactions, however 2009 witnessed a sizeable decrease in energy, utilities and waste management transactions (to 28% of market volume) with renewables monopolising the market (constituting 72%). Renewables have been the prominent sector for completed deals since 2013. In 2019, renewable energy alongside utilities and waste management transactions accounted for circa 83% of deal flow by volume. This emergence is undoubtedly due to the newly formed economic plans adopted by the Chinese government recently within the 13th Five Year Plan.

In terms of investment, sectoral analysis indicates that renewables (53%), water supply and sanitation (24%) and electricity (11%) comprise the highest proportion of allocated funding (Figure 5.4). The concentration in investment within these three sub-sectors depicts the primary infrastructure needs within China and the progress that has been made in bringing forward these particular forms of infrastructure in recent years.

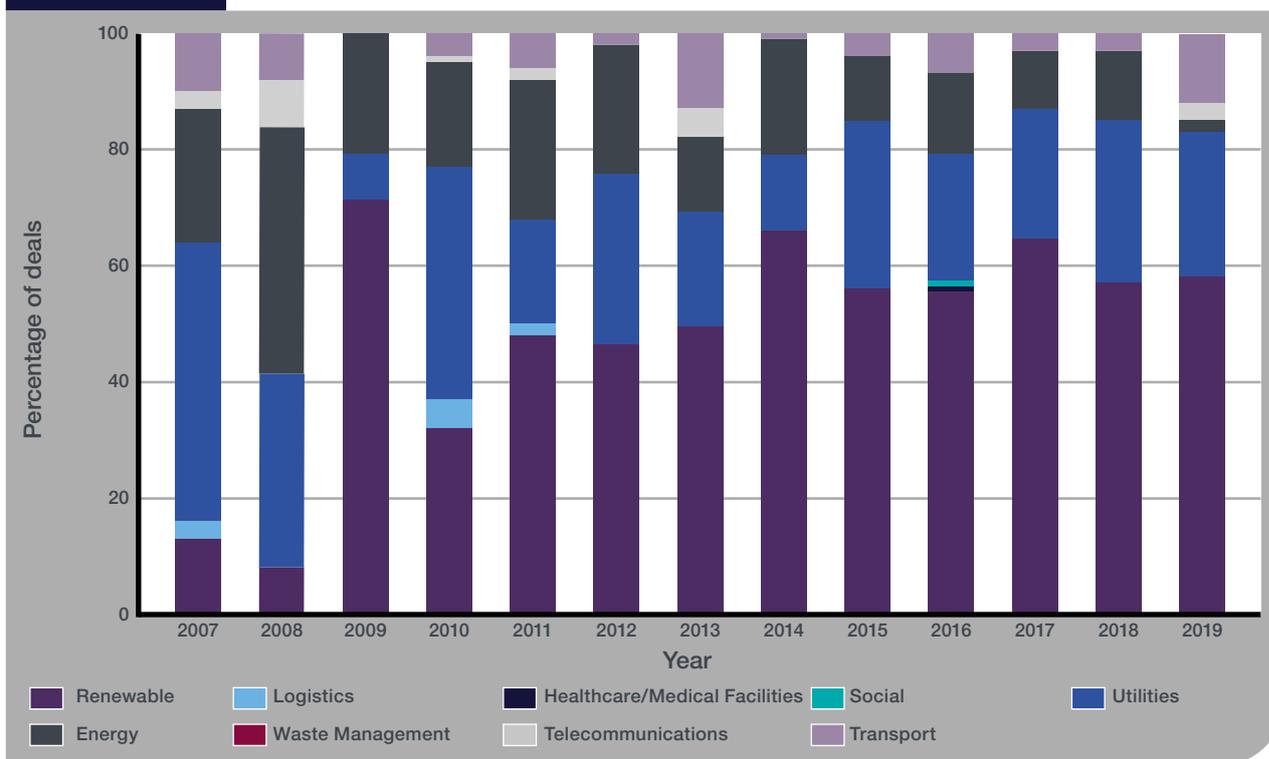
Figure 5.2

Annual number and average value of completed Infrastructure deals in China (2007-2019)



Source: Preqin (2020)

Figure 5.3 Breakdown of completed infrastructure deals in China by industry (2007-2019)

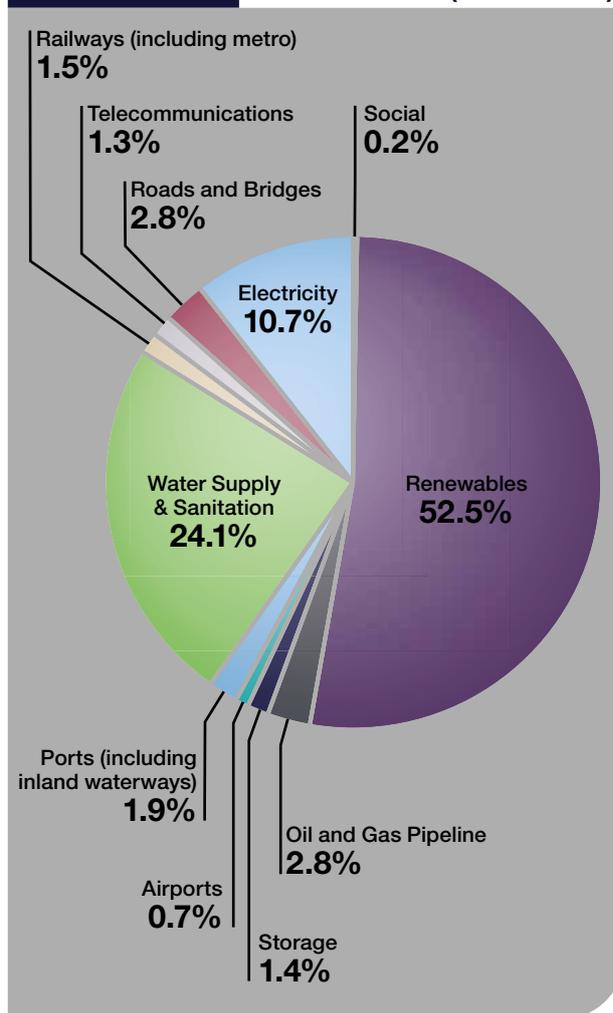


Source: Preqin (2019)



Figure 5.4

Breakdown of investment allocation by infrastructure sector – China (2007 – 2018)



Source: Preqin (2020)

5.4 Chinese market summary

- Infrastructure investment in China has proceeded rapidly over the past few decades, contributing significantly to economic growth. Reforms to the investment environment and slowing economic growth have undoubtedly led to the opening up of the Chinese infrastructure market and the resultant growth in specialist infrastructure funds.
- The continuing evolution of foreign investment laws, guidelines and broader institutional settings means it is likely that the appetite and opportunities for infrastructure investors will continue to grow over the short and long-term and that international investors will be increasingly viewed as an effective means for providing infrastructure finance.
- A number of regulatory, political and institutional challenges remain for investors wishing to take advantage of the strong demand in the developing China economy. Private sector investment requires appropriate legal and institutional systems, increased transparency to minimise risk as well as clear and well-informed government decision-making processes.
- Owing to the absence of a level-playing field in direct infrastructure, indirect investment such as stocks and unlisted funds seem to be a more effective and reliable avenue to gain access to the Chinese market for foreign investors. Nonetheless, state controls and interventions are virtually omnipresent across the entire financial sector, culminating in an environment which is contrary to the ambition to attract international investment.

6.0 Infrastructure investment in India



Image source: 1 – Panoglobe / Shutterstock.com 2 – Subodh Agnihotri / Shutterstock.com 3 Tukaram.Karve / Shutterstock.com

India is undergoing a rapid process of rural-urban migration, requiring greater infrastructure development to support the burgeoning urban population and sustain economic expansion³³ (MGI, 2016a). Despite increased infrastructure investment within successive spending reviews over the course of the last decade, existing infrastructure is in a poor state of repair and at critical capacity, falling below the requisite standards and benchmarks required for basic (current) provision. Decades of underinvestment have left the country with deficits in critical areas including railways, roads, ports, airports, telecommunications and electricity generation (PwC, 2013). The Finance Minister, Government of India stated in December 2019 that India needed to spend US\$1.4 trillion on infrastructure till 2024-25 in order to achieve GDP of US\$5 trillion.

It is estimated that more than 2,400 institutional investors are active in the Indian infrastructure market, with circa 56 based in India. Banks, financial institutions and insurance companies account for 61%, with 14% private wealth investors. Most investors (61%) have a separate allocation to infrastructure and have a propensity to invest through unlisted infrastructure funds. However, unlisted infrastructure fundraising for Indian-only assets has been relatively small, with only 21 such funds (Prequin, 2016). The Twelfth Five Year Plan (12th FYP)³⁴ estimates total infrastructure investments need to be in the order of Rs. 55.7 billion (circa US\$1 trillion) at prevailing exchange rate. Pertinently, the 12th FYP highlights that circa 48% of total funding gap will have to be sourced through private investment. As India's total infrastructure funding gap has expanded, the reliance on private investment has also grown from 22% of total investment need (Tenth Five Year Plan) to 37% (Eleventh Five Year Plan). In 2018, the five-year plan framework was replaced by the National Institution for Transforming India (NITI Aayog) 15-year 'vision document'. The vision document is accompanied by shorter sub-plans – a seven-year strategy for 2017-24, and a three-year 'Action Agenda' from 2017-18 to 2019-20. No fewer than 300 specific action points covering a wide range of sectors have been drawn up as part of the 15-year vision which is aligned with wider macro-economic cycles, financial markets and global sustainability goals through until 2030 (NITI Aayog, 2017).

³³ The Indian economy has witnessed significant economic growth at 7.5% per annum over the last five years. The ambition is to grow to USD 5 trillion in the next five years from the 2019 level of 2.9 trillion (Indian Ministry of Finance, 2020). ³⁴ The 12th FYP ended on 31 March 2017 which was extended six months for enabling ministries to complete their appraisals. .

6.1 Government approach to infrastructure

Infrastructure has been a political priority in successive budgets stemming from the late 1990s. Over this period, the Indian Government has undertaken a series of reforms in an attempt to alleviate the infrastructure challenge. Early budgetary statements looked towards the provision of public and private economic stimulus packages targeted toward the infrastructure sector in order to tackle the key infrastructure bottlenecks and improve efficiency. More recent statements including the 11th and 12th Five Year Plans have been concerned with the regulatory environment and structure, to facilitate the implementation and funding of infrastructure investment to improve economic growth. The Eleventh Five Year Plan (2007-12) for example, allocated 9% of the total budget to physical infrastructure, with education (20% of the total budget) and energy (4% of the total budget) respectively also deemed key priority areas for development. Meanwhile, the 12th Five Year Plan (2012-17) also contained a clear remit to ensure that infrastructure sectors expand sufficiently to assist growth (India Planning Commission, 2012).

While the urgency in developing infrastructure has been recognised and financial resources have been allocated, largely through central budgetary allocation, progress has been piecemeal and cumbersome. Interviews with investors and prospective investors highlighted how the lack of coordination between ministries and the different tiers of government has led to delayed approvals (in project implementation) and in some instances conflicting regulations and costs overruns within (newly initiated) infrastructure projects. In order to improve the effectiveness of infrastructure service delivery, and to bridge service level gaps, India has embarked on an ambitious journey of PPP-based projects. Interviews with policy makers and investors highlight that this has yielded mixed results generally demarcated by sectoral performance, with sectors such as transport (highways in particular) flourishing, whereas municipal services (water, waste management) remain somewhat underdeveloped. As highlighted by Haran et al. (2013), one of the key factors constraining development within the waste and water services centres on the repayment mechanisms and the security of cash flows. In the absence of demonstrated uptake in infrastructure service user charges, private sector investment continues to exploit 'Viability Gap Funding'³⁵ as a means of bridging revenues, costs and enhancing profits. International investors contributing to this investigation stated that the public sector is still grappling with identification and adoption of the successful determinants of PPP projects in order to prove value for money. To address the slackening investor appetite for projects being implemented through PPP arrangements, newer models such as hybrid annuity model (HAM) and toll-operate-transfer (TOT) (highways) have been introduced. These modalities have also been met with mixed reactions as hybrid annuity projects still have notable premiums (ADB, 2019), meanwhile certain projects under TOT arrangement failed to attract any bidders.

Pertinently, interviewees from both the public and private sectors highlighted that regulatory interventions had prompted a dramatic increase in PPP contract disputes within the judicial system. Delays in land acquisition and clearances, shifting of utilities, right of way issues leading to time and cost overruns have all been factors in the escalation in these disputes. Moreover, inadequate due-diligence by project developers as well as project finance banks has also resulted in many bank loans being rendered as non-performing within the PPP sector (World Bank Group, 2017). The demand for contract renegotiations and restructuring of service provision has left the PPP model in a somewhat limbo state. Accordingly, the Indian infrastructure sector has in recent years unsurprisingly witnessed a suite of delayed or stalled projects across a range of sectors that the government is trying to revive. As highlighted by the World Bank Group (2017), a series of government initiatives have been designed to tackle the biggest challenges head on, and include:

- The establishment of the National Investment and Infrastructure Fund (NIIF), a quasi-sovereign wealth fund, as a catalyst for supporting commercially viable projects, including stalled projects.
- Procedures for obtaining environment and forest clearances have been expedited and simplified and is now an online process.
- In the roads sector, a new hybrid annuity model has been launched with good response from private players.
- The National Highways Authority now awards projects only after 80% of the project land has been acquired.

As per the Economic Survey conducted by the Ministry of Finance (2015), the total value of stalled projects (within infrastructure) is considered to be approximately 6.9% of GDP. The Centre for Monitoring Indian Economy (CMIE) had reported that the stalled projects were at an all-time high in 2017-18 indicating that there has not been any substantial improvement³⁶. This has been largely attributed to the underperformance (in investment terms) of the PPP market and the weak regulatory environment, which have combined to curtail private investment within infrastructure development. Interviewees highlighted that the Reserve Bank of India's surveys of order books, inventories and capacity utilisation indicates that, in the last three years, the public sector has taken the lead in new investments while the private sector has not shown much improvement. Interviewees highlighted that the enabling environment for PPPs needs to be strengthened, including developing sector-specific institutional frameworks with independent regulators in order to attract investors into sectors such as water and sewage. Moreover, Interviewees suggested that an efficient and unambiguous dispute resolution mechanism needs to be built into PPP contracts, whilst a dispute resolution body should be appointed for expeditiously resolving disputes in existing projects in order to delay the impacts and costs associated with protracted litigation.

³⁵ Government grants to support projects that are economically justified but not financially viable; up to 20% of the total project cost. ³⁶ CMIE, 2020.

6.2 Infrastructure investment challenges

The availability of adequate finance for projects has been one of the major impediments to the Indian infrastructure sector. Challenges in this aspect pervade across the entire public and private financial investment ecosystem. The financial market in India is not yet developed enough to accommodate a full range of investment objectives and mandates. Interviewees from the international investment community highlighted that most infrastructure projects in India are financed through conventional means: debt, equity and to some extent mezzanine financing instruments. Domestic banks continue to be large providers of debt finance in India, however, as they rely mostly on term and savings deposits from retail and institutional investors (whose maturity profile is short-term), they are exposed to asset – liability mismatches. Interviews with policy advisors and infrastructure providers in the Indian market highlighted that the inability of the banking sector to service long-term infrastructure projects has significantly affected the quality and volume of lending.

A fundamental issue within the infrastructure finance arena is the stagnation of credit and escalation of non-performing assets in the Indian market. Interviewees, including policy makers highlighted that a number of private developers have bid aggressively for infrastructure projects over the last decade, resulting in a high level of over-leveraged balance sheets among the largest Indian private sector players. Coupled with inherent delays in project execution, low revenue realisation and lack of exit options, has resulted in trapped equity within existing infrastructure projects, seriously dampening investor interest in new capital expenditure (Nallathiga and Shah, 2014). Indeed, the Sectoral Deployment of Gross Bank Credit and Financial Stability Report statistics (2015) reveals the infrastructure sector to have the highest proportion of stressed assets (circa US\$12 billion, translating to approximately 31% of all infrastructure assets). As of March 2015, the gross value of non-performing assets held by scheduled commercial banks stood at 4.6% of the total advances (US\$40 billion) with stressed advances (incl. restructured standard assets) equating to 11.1% (US\$97 billion) of the total advances. Interview discussions highlighted that the collapse of Infrastructure Leasing & Financial Services Limited (IL&FS), one of the largest infrastructure development and finance companies in the country, in late 2018 exerted a further pressure on the loan books of the banking sector, prompting a new wave of non-performing assets.

Interviews with a number of investors and policy advisors within the Indian infrastructure market highlighted that over reliance on debt products to finance new infrastructure ensures the Indian infrastructure financing economy is very susceptible to volatility. This susceptibility to fluctuations in interest rates and the performance of the financial markets is impacting upon the returns performance of infrastructure. This barrier is a culmination of the general lack of long-term funding options. With debt markets under developed, long-term debt instruments remain almost non-existent. In addition, the bond market remains nascent, due to various legislative and regulatory challenges. Aligning the frequency of disclosures on the financial performance of issuers of listed debt with their equity-listed peers, and giving debt market participants and credit-rating agencies access to data repositories, will be considerable steps forward in the development of the bond market. Moreover, regulations must also promote fair valuation practices. For example, floating-rate instruments play³⁷ an important role in hedging interest-rate risk. They need liquid benchmarks as reference points to price credit, which can also be traded (Suyash, 2018). Finally, commercially-viable securitisation options for infrastructure assets in India have not been developed, making risk sharing within the broader market difficult.

There has been considerable growth in the number of institutions to facilitate infrastructure development and investment in India. Infrastructure financing is becoming more mature, with co-financing deals being witnessed across various infrastructure sectors. Interviews determined that co-financing has been necessitated by sectoral, group and individual exposure limits imposed by the Reserve Bank of India (RBI) on Indian banks. However, this refinancing of the infrastructure market has not picked up as anticipated. A key barrier to increased uptake of financing has been disputes and delays over land ownership, acquisition and compensation. In 2015, the government introduced a new act (the Land Acquisition, Rehabilitation and Resettlement (Second Amendment) Act, 2015) designed to address previous failings and regulate compensation arrangements for land acquisition, but, according to those interviewed, this topic remains a contentious issue and remains a barrier to market participation.

³⁷ Floating rate instruments protect against interest rate and inflation increases – typically they hold their value better than fixed-income bonds in a rising interest rate environment.

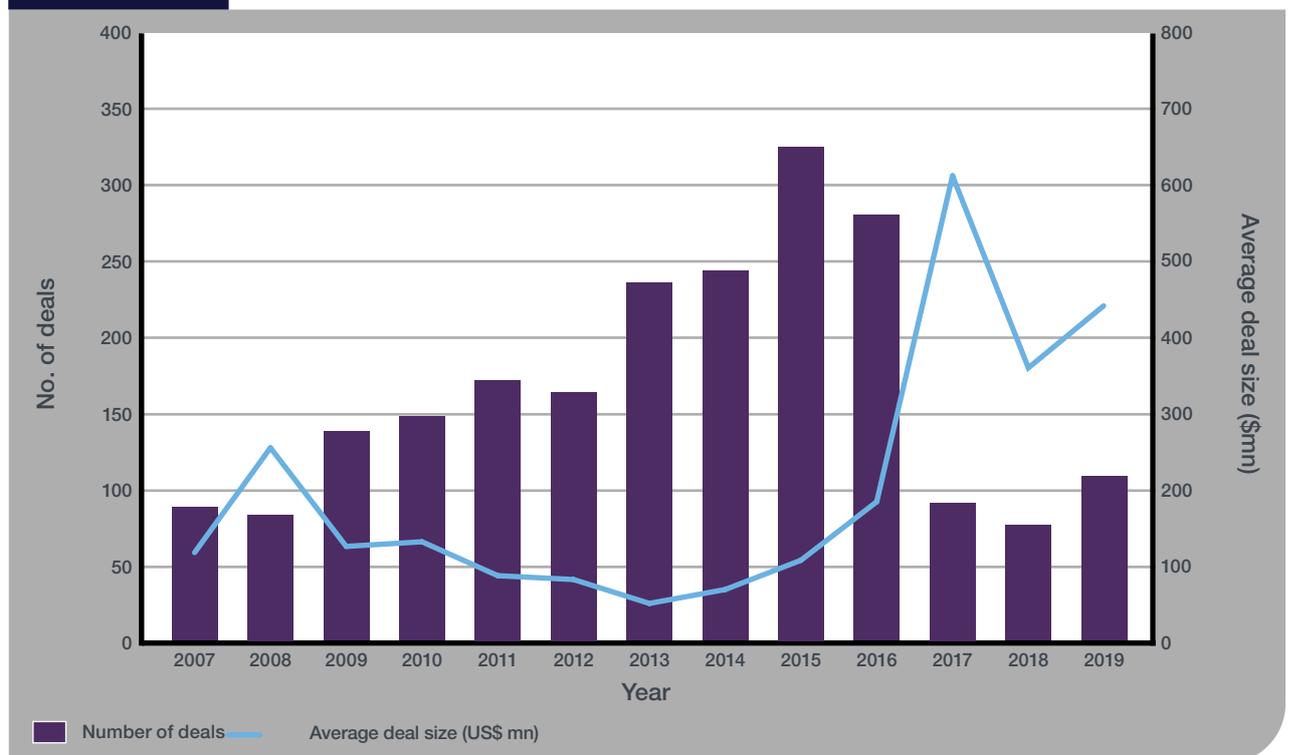
6.3 Infrastructure pipeline and focus

The volume and average size of Indian infrastructure deals over the last 10 years can be observed in Figure 6.1. Deal flow peaked in 2015, while deal size has grown exponentially in the period 2016-2019. While deal volume has exhibited a noticeable decline post-2016 (only 28076 deals completed in three years to December 2019), the overall size per deal depicts a marked increase in the period 2017-2019. Indeed, 2017 represented a sizeable increase in the value of deals underpinned by the unlisted funds sector in India (US\$610 million). To put this into context, the 2017 figure constitutes more than double the capital values of deals completed across the period 2014 to 2016 inclusive. The 2019 figures detail average deal size at US\$440 million with pipeline activity by way of deal volume (113) up on 2017 (91) and 2018 (76).

Figure 6.2 reveals that the energy and transport sectors have monopolised the Indian infrastructure industry, with the exception of 2013 which witnessed a higher proportion of utilities (20%). Overall, both energy and transport have tended to account for nearly two-thirds of infrastructure investment year-on-year, perhaps reflecting more centralised government spending initiatives and the superior regulatory and stable pricing environment. Renewables has become an increasingly dominant subsector within the Indian market in the period 2017-2019 accounting for 40% of all deals in this three-year period.

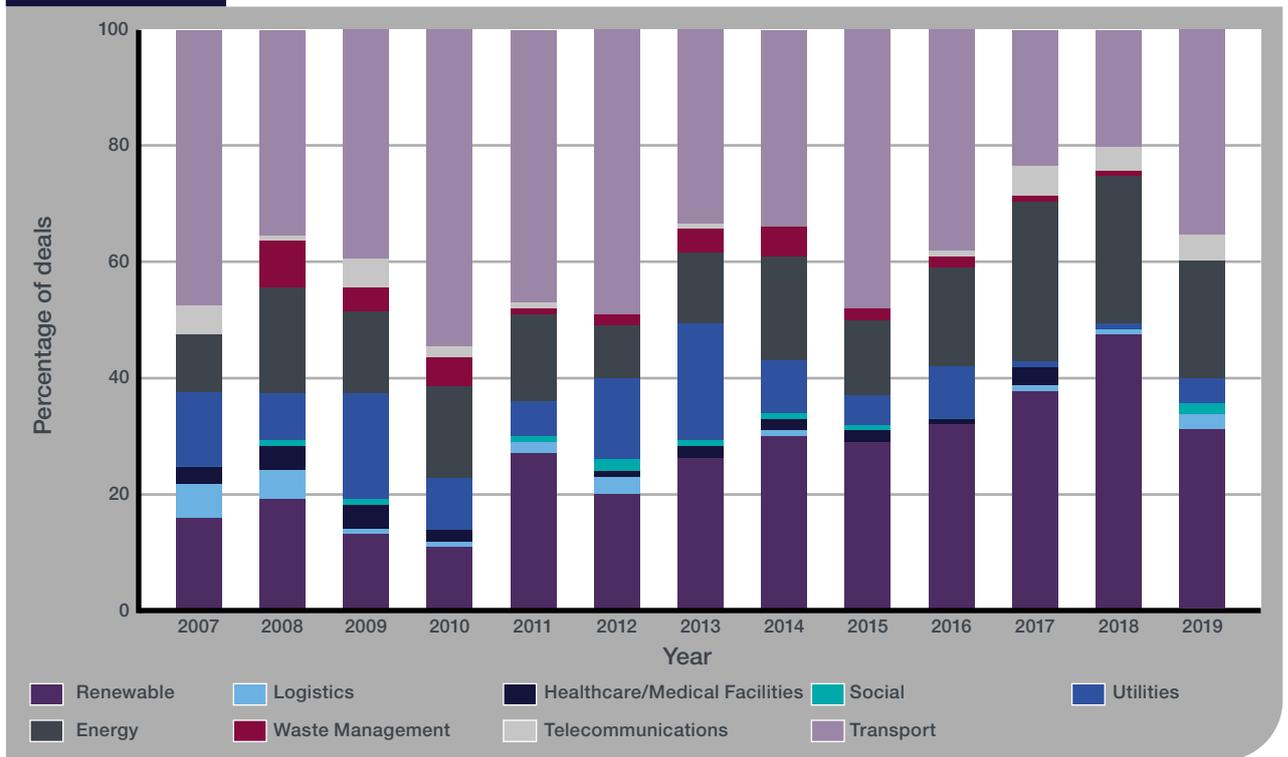
The volume of investment committed by sector is detailed in Figure 6.3. Roads and bridges comprises the largest investment allocation (34%) with investment also primarily driven towards water supply and sanitation and energy-related investment; primarily renewables (27%), and electricity (11%) which equate to a total investment allocation of 38%. Interestingly, in terms of indigenous investment-based market players, banks comprise 38% of the market, followed by insurance companies (23%) and corporate based investors (14%).

Figure 6.1 Annual number and average value of completed infrastructure deals



Source: Preqin (2020)

Figure 6.2 Breakdown of completed infrastructure deals by industry



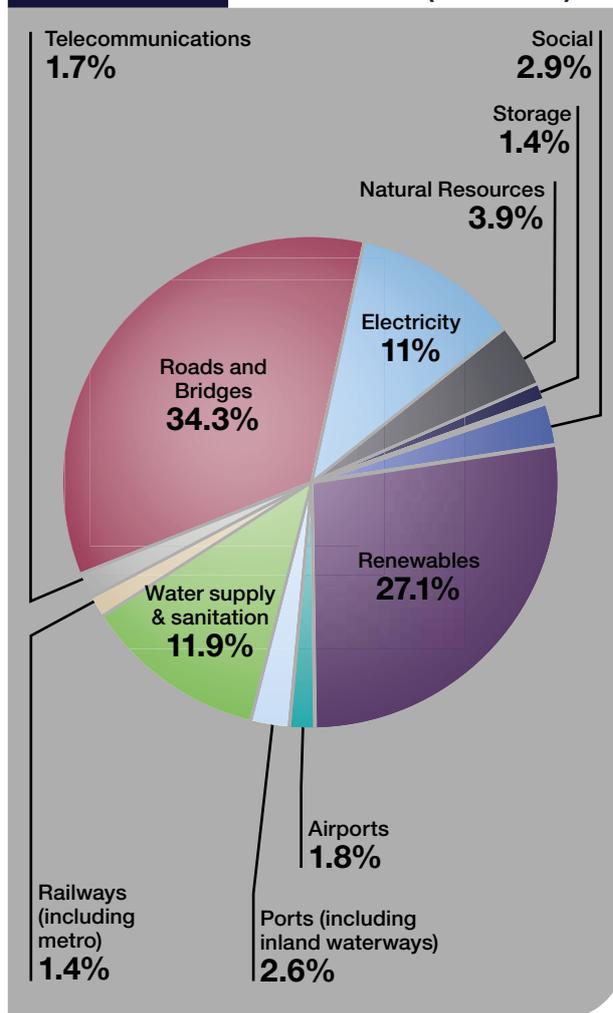
Source: Preqin (2020)



Image source: Hari Mahidhar / Shutterstock.com

Figure 6.3

Breakdown of investment allocation by infrastructure sector – India (2007-2019)



Source: Preqin (2020)

6.4 India market key point summary

- Whilst India remains an attractive market for foreign investors due to the scale of its expansive infrastructure market, a suite of regulatory and policy reforms is required to match investment criteria and address historical challenges which have limited infrastructure investment. Key concerns include market opacity, robustness of the legal and regulatory structures as well as the high business risk and corruption³⁸.
- Barriers to investment include unclear government decision-making processes, difficulties in identifying appropriate revenue streams for PPPs and the current pressure on the already overloaded infrastructure system which has recently been further impacted upon by a series of judicial and statutory interventions. These have only served to accentuate risk averseness of primary stakeholders, namely government agencies and propagated stress in the financial system due to over leveraged private sector balance sheets.
- While concerns persist, the present government's aim to reduce red tape, bring transparency in land markets through digitization of land records and simplifying land acquisition has served to create a more credible investment landscape for international investors. These sentiments are borne out in the Global Competitiveness Index of World Economic Forum which highlighted that India has improved significantly on its institutional pro-business, pro-growth and anti-corruption stance of government.
- The commitment to solve the infrastructure conundrum is positive but has yet to adequately provide a robust investment environment. This goes against the apparent investment potential of the Indian economy, limiting investment sentiment and severely restricting progress in modernising Indian infrastructure, to the detriment of Indian economic development.

³⁸ India ranks 85th out of 175 countries (2014 Corruption Perceptions Index).

7.0 Infrastructure investment in Singapore



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 4 Saiko3p / Shutterstock.com

The city-state of Singapore is a mature economy with high quality infrastructure. In the Global Competitiveness Report 2019 rankings (WEF, 2019), Singapore was ranked first out of 141 countries for infrastructure, illustrating its maturity in terms of infrastructure provision. In Mercer’s 2017 global survey on quality of living, Singapore was ranked number one for city infrastructure among more than 200 cities around the world (Mercer, 2017). Similarly, Singapore ranked 2nd only to New Zealand in 2019 for its ‘conducting business environment’. Notably, Singapore ranks 1st worldwide for public sector performance, the labour market is extremely efficient (2nd in the global rankings), whilst the financial sector is well developed, stable, and trustworthy (3rd in the global rankings) according to the latest data released by the World Bank Group (WBG, 2019)³⁹. Singapore was also ranked 4th out of a total of 180 countries in 2019 by the Transparency International (TI) Corruption Index⁴⁰ (TI, 2019). Thus, Singapore is an attractive market for infrastructure investment due to excellent government planning, favourable business frameworks and a low-risk environment.

Despite this continued success, the country faces prominent challenges as a result of population growth and demographic changes. Figures compiled by the Department of Statistics Singapore (2019) show that population has increased from 2.1 million in 1970 to 5.7 million in 2019, of which around 61% are indigenous citizens with the remaining foreign workers and residents. Average life expectancy in Singapore is strongly increasing (66 years in 1970 to 83 years in 2019), with home-ownership rates rising exponentially (29.4% in 1970 to 90.4% in 2019), (Department of Statistics Singapore, 2019). As a result of these demographic changes, there is need to provide infrastructure programmes for housing, healthcare and education. The development of transport infrastructure is also seen as vitally important for maintaining and enhancing the trade competitiveness of the country (PwC, 2014a).

The financial and capital markets in Singapore are well developed, with over 700 domestic and foreign financial institutions active in the market (Ehlers et al, 2014). The Monetary Authority of Singapore (MAS) is the central bank of Singapore and is the sole regulator of the financial system and capital markets, highlighting the high level of integration and transparency within the investment markets.

³⁹ The World Bank 2019 ‘Doing Business Report’ measures the business environment in 190 economies around the world. ⁴⁰ 1st in the ranking depicts high transparency and low levels of corruption.

Moreover, as a consequence of a favourable tax treatment and a well-developed legal system, Singapore plays a particularly important role as a conduit for direct foreign investment into developing Asian countries (particularly India and those of South East Asia), who structure their investments through vehicles established in Singapore.

The infrastructure market in Singapore continues to evolve and infrastructure provision is a clear priority of the Ministry of National Development (MND). Recent estimates show that Singapore's overall infrastructure spending is expected to approach US\$18 billion a year by 2025 (PWC, 2014b). The majority of the residential housing developments in Singapore are publicly governed and developed via the Housing Development Board, who have large-scale plans, including, growth of the housing stock over the next decade, the provision of three new hospitals and doubling the Mass Rapid Transit (MRT) network by 2030 (MND, 2016). Developments are also underway to increase the airport and port capacities as a means to augment Singapore's position as a regional hub whilst commitments to telecommunications and digital infrastructure over the next three years is aimed at enhancing national and personal data security within the country (MND, 2020).

7.1 Government approach to infrastructure

Singapore has a multi-party parliamentary system, which has been dominated by the ruling People's Action Party (PAP) since 1959, providing a very stable governance environment. The centralised system has no direct elections for local government, but there is a system of regional Mayors and town councils. In this regard, investors interviewed for this investigation deemed Singapore to be one of Asia's most politically stable countries. Indeed, in the Global Economy 2018 political stability index, Singapore was ranked third out of 195 countries (The Global Economy, 2018). The Ministry of National Development (MND) is the key government ministry responsible for developing infrastructure in Singapore. Over the past decade the MND has introduced several initiatives to enhance the position of Singapore as a regional and international centre for infrastructure finance. The Infrastructure Finance Centre of Excellence was established in 2010, in cooperation with the World Bank, to increase the success of PPPs (World Bank, 2010). In terms of financial innovation, International Enterprise Singapore (IES) and Clifford Capital was set up at the initiative of the government to act as a specialist advisor and a providers of structured finance solutions. These bodies offer competitive and bespoke project finance, asset-backed and other structured debt financing solutions for eligible

Singapore-based companies in support of their overseas investments or exports in the infrastructure, offshore marine and shipping sectors (Clifford Capital, 2016). International Enterprise Singapore and The Standards Productivity and Innovation Board (SPRING) came together in April 2018 as a single agency to form Enterprise Singapore.

Other innovative solutions have been adopted in order to meet the growing need for infrastructure financing. The Monetary Authority of Singapore (MAS) – the central bank and financial regulatory authority – encouraged the setting up of an infrastructure debt takeout facility, whose purpose is to facilitate the transfer of infrastructure debt from banks to institutional investors beyond the initial project commencement stage. In July 2018, Clifford Capital successfully priced the first infrastructure securitisation in Asia. To allow institutional investors to more objectively evaluate infrastructure investment opportunities, MAS has supported the creation of usable performance benchmarks, EDHECinfra, for privately held infrastructure debt and equity investments. These benchmarks aim to provide investors with enhanced data on the return and risk characteristics of debt and equity as well as to facilitate comparison with other asset classes (MAS, 2016). Moreover, in partnership with World Bank Group and the G20's Global Infrastructure Hub, MAS is promoting the adoption of essential contractual clauses to improve the quality of project documentation to improve bankability.

Since 2015, Singapore has fully embraced the smart cities movement⁴¹, identifying five key domains in which digital technology can have a significant impact: transport, home and environment, business productivity, health and enabled ageing and public sector services. These ambitions, if they are to be realised, require major investment in ICT infrastructure, resulting in the very best connectivity to home and business, a state-of-the-art transport system and the sharing of useful data between agencies. Cross-border investment is also a government priority evident with the announcement in December 2016, that Singapore and Malaysia had signed an agreement to construct a high-speed rail link between Singapore and Kuala Lumpur (Land Transport Authority, 2016). Unfortunately, this project has been deferred until 2020, with construction now due to be completed by 2031. Nevertheless, these initiatives demonstrate the ambition of Singapore to increase infrastructure activity in the region, while enhancing its reputation as a financial centre and home to companies with delivery expertise.

41 The Smart Cities Council defines a smart city as one that “uses information and communications technology (ICT) to enhance its liveability, workability and sustainability.”

7.2 Infrastructure investment challenges

The opportunities for infrastructure investment are relatively limited compared with the developing Asian economies, due to the level of existing high-quality infrastructure already in place and the capacity for government funding. Singapore's recent investment in infrastructure has been funded from a variety of sources. These include:

- government-controlled companies operating on a commercial basis to raise private finance
- a limited number of PPPs deals to fund social infrastructure
- bank lending
- bond finance.

Ehlers et al. (2014) highlight that financing for infrastructure has been principally and readily available through the banking sector and, to a limited extent, has been funded by bond finance. While project bonds are not common, infrastructure-related government-linked entities and SPVs for infrastructure-linked firms have successfully issued local currency corporate bonds. That said, interviews undertaken for this investigation detailed that project bonds and other forms of institutional investment in infrastructure remain underutilised, despite the recognised efficiency of the local currency bond market. These findings are consistent with previous research by Ehlers et al. (2014), which highlighted that the infrastructure lending market is still dominated by a liquid banking sector which appears to be able to satisfy much of the local demand.

Amidst increasing global financial market volatility, downgraded economic outlooks and persistent forecasts of a renewed global slowdown, policy makers in Singapore are actively looking to bolster growth through infrastructure. However, a number of interviewees contributing to this study highlighted that within the Ministry of Finance, there have been reservations about their overreliance on the Multilateral Development Banks (MDBs). Indeed, the Ministry of Finance has initiated plans to undertake reforms targeted towards the private sector in order to encourage competition and facilitate infrastructure and urban development. In 2018, it was reported by the managing director of MAS, that more than 90% of infrastructure investment in the region is financed by the government, clearly illustrating the need to attract additional private sector sources of finance (Reuters, 2018).

The 2018 Budget statement also afforded insight into future infrastructure funding including plans to 'save ahead' as a means for more effectively planning for and absorbing the lumpiness and capital intensiveness of future infrastructure provision. Additionally, the budget details the desire to lever more effectively the strength of capital reserves (without actually drawing down the reserves). Plans are also outlined to enhance

borrowing with the prospect of a government guarantee to underwrite long-term borrowings for critical national infrastructure. These guarantees will undoubtedly enhance the confidence of creditors and reduce borrowing costs. Furthermore, Statutory Boards and Government-owned companies which build infrastructure will also be encouraged to borrow to ensure a more effective spread of infrastructure costs (Ministry of Finance, Singapore, 2018).

Interview based evidence compiled in the course of this investigation highlights that despite harbouring an abundance of investment capital, the challenge for the Singapore government has been how to increase the supply of corporate bonds, including project bonds, in order to grow the size and diversity of the overall corporate bond issuance. There have been other challenges which limit wider institutional investors from entering into the market. Market research conducted by the EDHEC Infrastructure Institute (2016), highlighted that investor's perceptions and expectations from investing in infrastructure can be highly variable, depending on their ability to enter what is a small market in terms of investment opportunities but also a competitive market in terms of the number of investors seeking entry. The government of Singapore (2016) intends to develop infrastructure as a stand-alone asset class and to make infrastructure assets mainstream for institutional investors (The Business Times, 2016). Whilst this direction of travel is in line with some investor perceptions who believe that private infrastructure should be a separate asset class, other investors question whether listed infrastructure has distinctive characteristics, preferring to classify an infrastructure asset according to its contractual rather than industrial features⁴².

A number of institutional investors participating in this study stated that the under allocation of institutional money into infrastructure projects in Singapore is due the lack of credit-worthy infrastructure projects. Among those projects seeking investment, many are perceived to be poorly structured as there are no usable investment and return benchmarks available for those considering infrastructure. The traditional close-ended private equity infrastructure fund is also perceived to be outdated, and in comparison to other markets, some of those interviewed thought that infrastructure does not produce the same kinds of returns on investment. Indeed, opinions about infrastructure investment returns remain divided in Singapore; some see it as low yielding whereas others see the potential of higher returns. Those who are the most sceptical about infrastructure investment returns question the accuracy of valuations reported by infrastructure managers. As highlighted in the research by EDHECinfra (2016), a vast majority of asset owners are concerned about the levels of 'dry powder'⁴³ accumulated in private infrastructure equity and debt mandates and how they potentially undermine the quality of future investments.

⁴² Finkenzyler et al. (2010) detail the debate on the merits of infrastructure being depicted as an investment asset class. ⁴³ Dry powder is the term given to capital raised by funds but not yet committed to the market

7.3 Infrastructure pipeline and focus

The number of deals completed and the average deal size have been extremely variable year-on-year since 2007 (Figure 7.1). This is perhaps reflective of the range of investment opportunities which are spread across a number of infrastructure subsectors. There was a noticeable increase in both deal value and the number of transactions in 2016-2017. Deal flow peaked in 2016 (n17) whilst the highest average deal value was recorded in 2017 at just over one billion USD coinciding with high levels of investment in telecommunications and renewable energy. It is noteworthy that deal volume has fallen back since 2017 which could be indicative of the Singapore government commitment to increasing infrastructure spend which has meant that infrastructure opportunities for the private sector within Singapore have been limited over the course of the last two years.

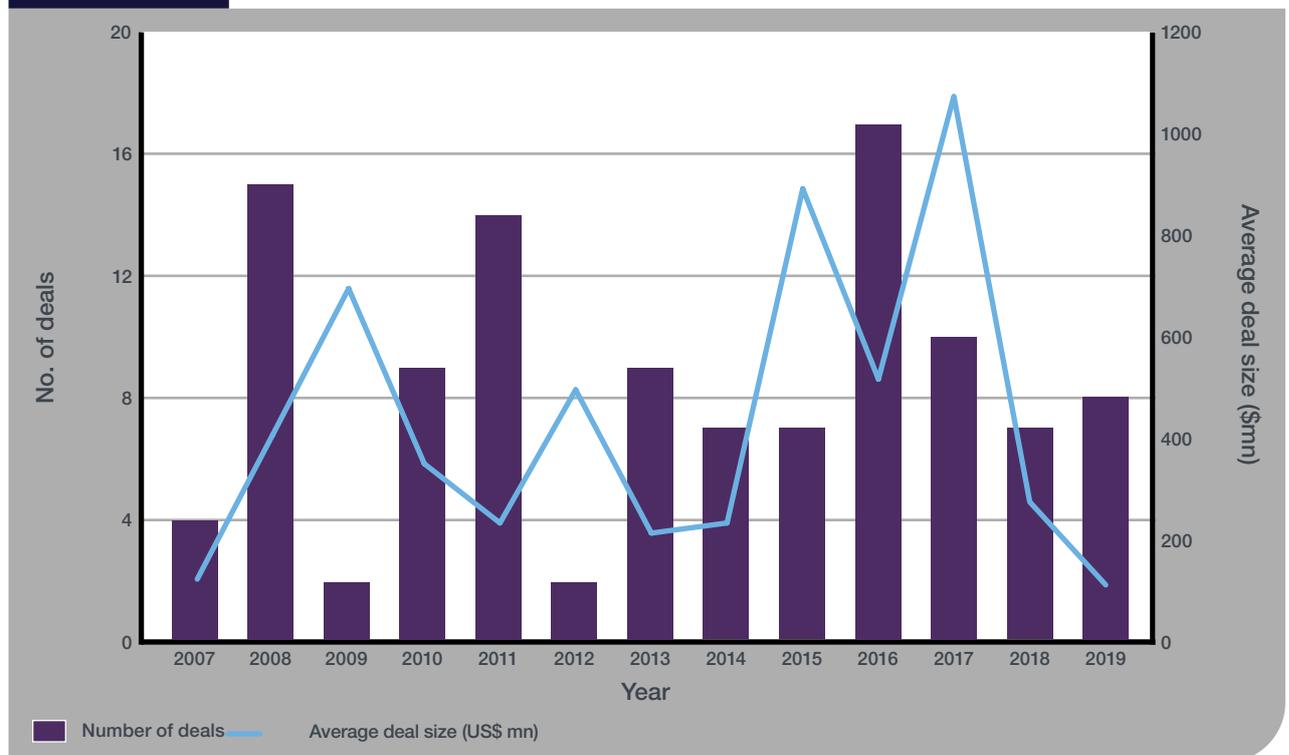
In terms of industry, the Singapore market has exhibited a very dynamic picture over the period 2007-2019 (Figure 7.2). Each year reveals a very diverse pattern with varying infrastructure sectors dominating demand and government focus, reflecting the targeting of particular infrastructure requirements. Generally, in terms of industry,

the majority of investment has been in the energy, transport and social sectors. Renewables, in line with sustainable development goals and smart cities ideologies, have assumed greater prominence in the period 2017-2018. The twelve months to the end of December 2019 has seen deals very much diversified across a number of sectors with telecommunications just marginally coming out as the largest sector by deal flow.

This dynamism is also reflected in the sectoral allocation of investment (Figure 7.3). Renewables is the largest sector, accounting for 24% of the overall investment. Railway, electricity and water supply and sanitation also display great importance, each contributing 12% of the nation's infrastructure investment. Given that Singapore has one of the largest ports in the world and is, strategically speaking, a geographical and financial gateway into developing economies in Asia, it is not surprising that Singapore's ports and encompassing inland waterways have a rather high allocation of investment (9%). All other infrastructure sectors show a uniform consistency in investment allocated, with, oil and gas pipeline, roads and bridges and social comprising the smallest investment. Although the increased emphasis on social infrastructure as detailed in the 2020 budget may see this change in coming years.

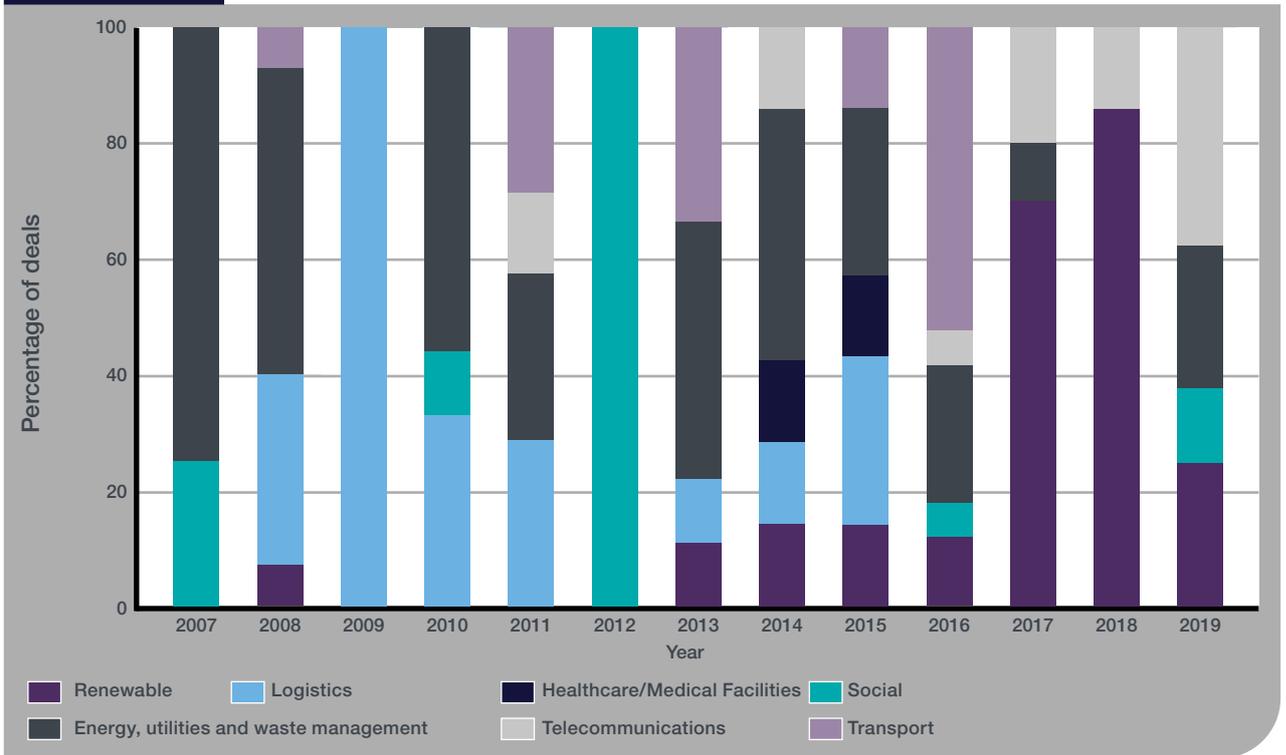
Figure 7.1

Annual number and average value of completed Singaporean infrastructure deals



Source: Preqin (2020)

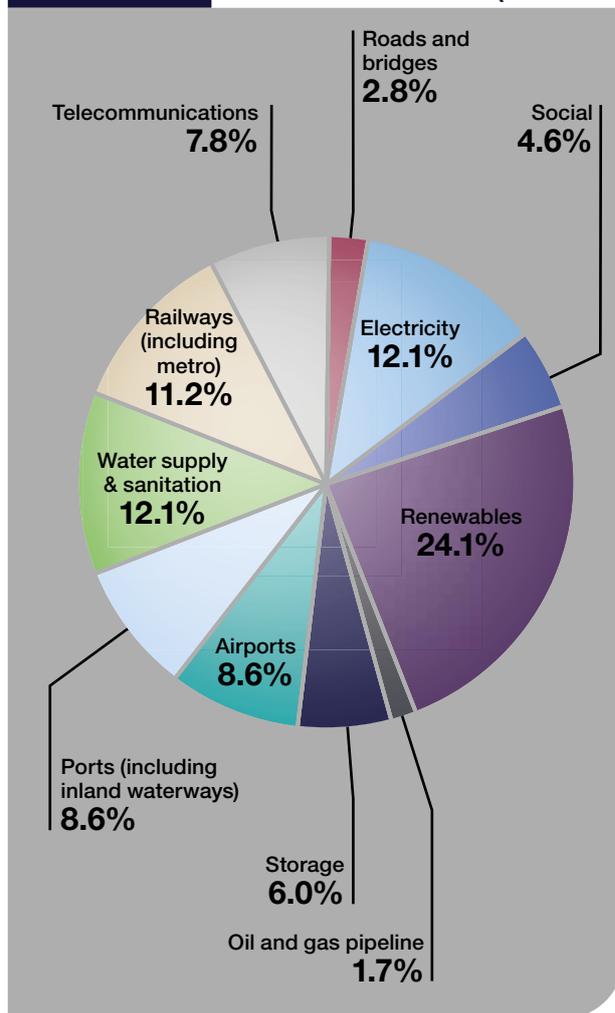
Figure 7.2 Breakdown of completed Singaporean infrastructure deals by industry



Source: Preqin (2020)



Figure 7.3 Breakdown of investment allocation in Singapore by infrastructure sector (2007-2019)



Source: Preqin (2019)

7.4 Singapore market key point summary

- Singapore's investment market is one of the most stable in the region, if not the world. Its existing infrastructure is of high quality, well financed, with Singapore acting as a centre of expertise and a gateway to the wider Asian region. Nonetheless, demographic pressures and a need to maintain competitiveness are driving further infrastructure expansion, notably in housing and transport. Government support and the transparent nature of the market places Singapore in a good position to successfully develop this infrastructure.
- The Singapore government have been committed to financing infrastructure provision through the creation of an environment highly conducive for private debt-based finance solutions, performance analysis and clarity in contractual complexities.
- Despite heralded success, the generally strong nature of existing infrastructure limits the overall size of the market opportunity compared to other Asian Markets which poses a few potential barriers to further achieving the level of required infrastructure investment. The market is dominated by public funding and the availability of bank sourced debt finance leaving more limited provision for corporate financing in this area.
- Project bonds and other forms of institutional investment in infrastructure remain underutilised, despite the recognised efficiency of the local currency bond market. Findings allude to the inherent challenge in creating a more diverse marketplace which is competitive. Despite harbouring an abundance of investment capital, the challenge for the Singapore government has been how to encourage an increase in the supply of corporate bonds, including project bonds, in order to grow the size and diversity of the overall corporate bond issuance.

8.0 Infrastructure investment in the United Kingdom (UK)



A period of sustained underinvestment had resulted in a marked deterioration in the quality of infrastructure provision in the UK. Expenditure in the provision and maintenance of infrastructure plummeted by 26%; from a high of US\$73.3 billion in 2009/10 to US\$54 billion in 2013/14 (National Audit Office, 2015). This led to a marked decline in the state of the UK's infrastructure asset base. A study undertaken by EY (2015) estimates that if these trends were maintained, there could be an annual loss to the economy of circa US\$116 billion by 2026 (EY, 2015). The International Monetary Fund (IMF) advocated that the UK urgently required capital spending on key and strategic infrastructure projects in order to recover this deficit (IMF, 2013). Further criticism of the UK government approach was evidenced in a study conducted by the OECD (2015) who warned that inertia within UK infrastructure was attributable to the insufficient long-term planning by successive governments (OECD, 2015).

This perceived inaction and lacklustre approach by successive governments towards infrastructure has served to dampen the wider investment community's appetite for UK infrastructure investment. The investment community have perceived this to be result of 'political paralysis'; a consequence of a relatively prolonged, highly politicised system which has lacked long-term clarity on infrastructure policy. The Second Global Infrastructure Investment Index (GIII) (2014) report included scepticism over the UK government statement that it is 'open for business' when political inaction over long-term infrastructure policy is holding back private investment. The foremost issues holding back investment are concentrated around credit availability through the recent recessions and the government's lack of policy commitment to create an attractive environment for investment. The private investors that support most infrastructure projects need greater security to commit to large, long-term investments and the government has failed to put the policy levers in place that are needed to support this (GIII, 2014).

The end of 2014 witnessed a watershed in terms of government (in)action. The UK government undertook a series of reforms and measures as part of a long-term strategic plan for enhancing UK infrastructure. These government-based measures, designed to stabilise the UK infrastructure market and improve overall 'investability', have culminated in some traction over the past five years. The UK climbed from 13th position in the 2012 GIII to 9th in 2016, making the UK one of the highest risers (Gill, 2016). Although the austere economic plan

Image source: 1 – mkos83 / Shutterstock.com 2 – Richard Whitcombe / Shutterstock.com 3 nrqemi / Shutterstock.com

(reducing the deficit and fixing public finances) has been criticised, the low-interest rate base has unequivocally provided a burgeoning, stable and low-risk business environment for the investment community. Indeed, the UK is becoming an increasingly credible and attractive market for infrastructure investment. In 2015/2016, public sector investment in infrastructure totaled US\$44 billion, representing circa 1.9% of GDP (Infrastructure Projects Authority, 2017).

8.1 Government approaches

The provision of new infrastructure in the UK has historically relied heavily on an often fragile and incomplete political and public consensus (NIC, 2016). The UK government established Infrastructure UK (IUK) in October 2010 in order to plan, prioritise, design and deliver the government's infrastructure strategy via an annually published National Infrastructure Plan (NIP). The first of these NIPs (published in 2010) identified 40 major infrastructure projects, while the second (published in 2012) added a further 550 projects to the list (estimated at a cost of US\$482 billion). Around 90% of this list was in energy and the rest in transport, illustrating the government's new drive towards these sectors (National Infrastructure Plan, 2014).

In addition to the NIP, the National Planning Policy Framework (NPPF) was also launched in 2012 to reform the planning system and create a presumption in favour of sustainable growth. The NPPF also created sector-specific National Policy Statements and aimed to prevent local objections to a project from trumping the national interest (HM Treasury, 2012) and create a mechanism through which policies could be 'translated into development'. The NPPF also included devolution agreements with City Regions and local areas. This has given local leaders the power to drive growth in their areas and support the delivery of local infrastructure projects. This trend towards the devolution of powers aims to provide new opportunities for regional investment programmes tied to infrastructure provision, which is controlled at a local level. The National Infrastructure Plan was created to provide a strategic approach (via 'prioritisation') to infrastructure development (Helm, 2013). Regardless of these recent improvements, there remained no overarching and independent process in the UK to assess the country's long-term infrastructure needs. Indeed, a number of reviews examining the UK's approach to infrastructure have highlighted that, despite the introduction of the NIP, the UK lacks a clear, long-term strategic vision for infrastructure. Critically, the Armitage Review (2013:2) explained that:

'we urgently require a coherent 25-30-year national infrastructure strategy which is underpinned by an evidence-based assessment of our needs and clear plans as to how these needs will be fulfilled.'

This was further stressed upon in the UK government's consultation on establishing the National Infrastructure Commission, which highlighted that:

'the provision of new infrastructure in the UK has historically relied on an often fragile and incomplete political and public consensus. This has led to changes of direction and a lack of certainty. In the past, individual infrastructure proposals were discussed and assessed at length. The UK's strategic infrastructure has suffered over recent decades from a legacy of underinvestment and a poor record of long-term planning' (NIC, 2016:10).

To combat the suggested shortcomings, the UK government started to enact a more transparent and unified approach towards infrastructure. To enable a more conducive framework for investment, two newly created bodies have been established effective January 2016: The Infrastructure and Projects Authority (IPA) and the National Infrastructure Commission (NIC). In order to uncouple infrastructure from politics, promote a more consensual approach to policy making and create a coordinated structure for dialogue, the NIC produced the National Infrastructure Assessment (NIA) offering a transparent, objective and rigorous method for undertaking a comprehensive 'whole system approach' (NIC, 2018). The IPA integrated Infrastructure UK and the Major Projects Authority into a single organisation. The IPA has a mandate to ensure the timely and cost-effective delivery of the government's infrastructure priorities in conjunction with other strategic government projects and programmes, and underpins the government's commitment to invest more than US\$1128 billion in infrastructure as part of the National Infrastructure Delivery Plan 2016-21 (IPA, 2016).

The UK government is actively creating an environment for accelerating infrastructure investment and development through a suite of sweeping reforms. In the May 2016 Budget statement, the government announced reforms to taxation structures and introduced targeted taxation measures, such as abolishing the Petroleum Revenue Tax by permanently reducing the rate from 35% to 0%, and reducing the Supplementary Charge from 20% to 10% (HM Treasury, 2016). These measures were designed to encourage investment in exploration, infrastructure and late-life assets. In this regard, the UK government is removing regulatory barriers and making legislative changes. The UK government has brought forward Hybrid Bills⁴⁴ to secure the development of key/strategic transport projects. Furthermore, through strategic implementation of the NIC's recommendations, the UK government is in the process of removing regulatory and policy barriers in an attempt to position the country as a world leader in smart technologies such as electricity storage. The government is also targeting and auctioning contracts for renewable energy infrastructure (HM Treasury, 2016). These measures build on the devolution of powers detailed in the Autumn Statement (2015), which permitted local government municipalities to retain business rates and gave elected city-wide mayors the power to levy a business rates premium for local infrastructure projects.

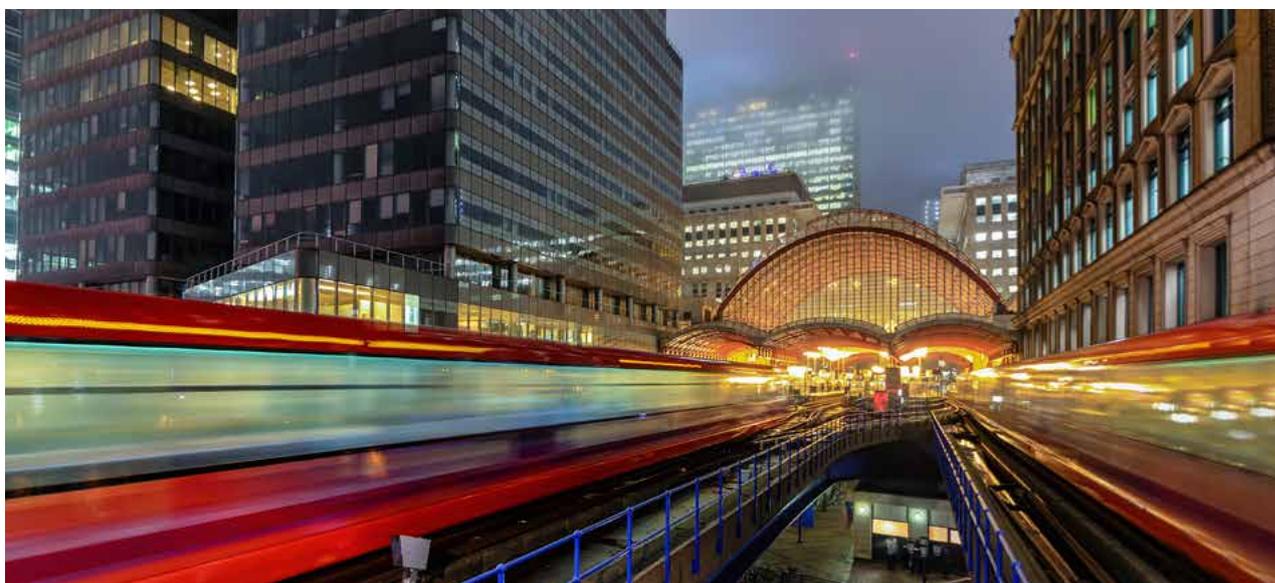
⁴⁴ Hybrid Bills mix the characteristics of Public and Private Bills and often propose works of national importance in the UK. Examples include the Crossrail Bill to build a new east to west rail link through central London passed in 2008.

This creation of an enabling environment for infrastructure investment has resulted in the publication of the UK's first National Infrastructure Assessment (NIA) detailing the nation's infrastructure needs and priorities through until 2050 (NIC, 2018). Additionally, as detailed in the Autumn Budget 2018, the UK government is committed to developing its first comprehensive National Infrastructure Strategy (HM Treasury, 2018) although the timeline around this has moved out due to other political priorities over the course of the last 18 months. This new found prioritization on infrastructure has seen the UK rise to 9th overall in the world in terms of infrastructure quality in the latest Global Competitiveness Report (WEF, 2019). The UK was ranked 24th in the world for infrastructure quality as recently as 2013. Interviewees highlighted that in order to deliver on some of the ambitions detailed within the NIA government will need to serve as enablers and facilitators of investment, particularly in projects and sectors which carry high levels of risk and rapid innovation such as digital technologies. Interviewees highlighted that the government already has some established mechanisms to support private investment such as the UK Guarantee Scheme whilst the Green Investment Bank was cited as an example of a mechanism which served as a catalyst for the development and upscaling of the renewables sector. Uncertainty pertains over the ability to access funds from the European Investment Bank following Brexit, and with the Green Investment Bank having been privatised, there is certainly an onus on government to put in place mechanisms to maintain momentum towards a more sustainable, energy efficient infrastructure sector. Interview based discussions detailed that whilst High Speed 2 had grabbed a lot of media attention there remains a 'vacuum' in terms of firm commitments whilst the delaying of the budget announcement and continued absence of the proposed National Infrastructure Strategy serve as further evidence of 'making all the right noises but failing to deliver on their commitments'.

8.2 Infrastructure investment challenges

Despite the recent climb in its infrastructure ranking and the revived government commitment to infrastructure development, a number of key barriers still persist within the infrastructure investment landscape in the UK, particularly investment funding and financing project delivery. Unsurprisingly, interviews were dominated by the political risk and uncertainty surrounding the UK's protracted exit (Brexit) from the EU. Institutional investors and infrastructure fund managers contributing to this investigation highlighted that the prevailing uncertainty of what a post-Brexit UK infrastructure market ultimately looks like is a fundamental concern for investors, not only for currency risk in terms of financing and structuring deals, but invariably for both macro-economic and legal policy. Indeed, some interviewees highlighted that many of their investor clients will not even consider investing in the UK whilst the political and economic uncertainty remains so volatile.

Infrastructure UK has sought to demonstrate that infrastructure should be an attractive asset class for institutions seeking to match their liabilities and assets. This is especially the case for UK funds because UK infrastructure offers a means of matching their sterling liabilities with sterling assets and generating long-term, stable returns; matching their investments to the currency in which their deposits are held to avoid exchange rate risk (BAA/KPMG, 2015). Nevertheless, progress in attracting more significant volumes of institutional capital remains inhibited. Firstly, the growing 'green' agenda has channelled investable projects primarily towards greenfield energy schemes and renewable investments, which carry high levels of technology, construction and regulatory risk. Secondly, there remains a somewhat continued mismatch



between liquidity in the debt finance markets and the type of contract on offer by the NIP. This has culminated in a dichotomy between funding and financing, principally the fundamental gap between 'market' product, the lack of deal flow and the extent of liquidity for different assets within the market, particularly in light of recent regulatory reforms. Existing deals on offer to the market are perceived to be unattractive, specifically with regards to the nexus between expected future returns and the public sector's focus on value for money. This deal specific approach necessitates tailored contractual arrangements and specialist lending teams for conducting risk profiling, which ultimately adds time and costs and is preventing the closure of deals. Overall, the interview evidence points to a misalignment between the UK government and the 'market', primarily in deal size, tenor and capacity as well as in the sectors and types of assets of interest.

The UK government has recently attempted to remedy the gap by offering innovative solutions and regulations such as:

- The Contract for Difference (CfD) contractual structure to assist financing of low-carbon energy projects
- The new regulatory regime for Offshore Transmission Owner Assets (OFTOs), to assist with deals that specialist banks are currently looking to finance and project finance opportunities in the NIP.

However, this highlights further disparity between market perception and government offering. The market generally observes that government intervention is only required for the more complex NIP projects and where market liquidity is low. Institutional investors contributing to this investigation suggested that more established projects do not need government underwriting to cover high levels of project debt. Similarly, whilst other debt financing tools furnished by sources such as the EIB have aided investment significantly within UK infrastructure, the high level of senior debt in the UK is perceived to be restricting other debt lenders from investing. Given the scale and diversity of infrastructure projects that need to be delivered over the next 10 years, all of which offer contrasting risk-return profiles, investors contributing to this research inferred that more creative thought needs to be afforded to alignment of capital sources with associated project risks.

The cost of infrastructure private finance has been a source of ongoing debate within the UK, which in the main, stems from the legacy of early generation Private Finance Initiative (PFI) deals. A series of studies including a recent National Audit Office report (2018) detail the scale of PFI deals across the UK but there is a growing body of research depicting the legacy implications of PFI within the UK (in terms of their ability to service the unitary charge mechanism) and how this is impacting front line service provision. Infrastructure UK attempted to reform the private

Finance Initiative (PFI) market in 2012, launching PF2 to try and overcome some of the issues in PFI. Interviews with both policy makers and investors highlighted that despite the fundamental reassessment of the PPP/PFI model, it never fully 'recovered' from the criticism and stigma based on the original approach and this has resulted in the poor level of uptake and interest from the private sector. Although, as investors also highlighted, the relative absence of a project development pipeline meant that opportunities to invest were extremely limited.

The Autumn Budget 2018 signalled the 'end' for PFI and PF2 in the UK with Chancellor Philip Hammond confirming that the model would be abolished (HM Treasury, 2018). Interviewees contributing to this investigation highlighted that while the 'removal' of PF2 was a pragmatic response to public concern over value for money, this invariably left the market without a 'seasoned' vehicle in terms of deal structure and transparency and left the Government needing to create more bespoke deal structures to secure private investment. Indeed, the 2018 Budget inferred that going forward half of the UK's infrastructure development investment needs (circa US\$770 billion) would be financed by the private sector (HM Treasury, 2018). However, interviews suggest that the sources of this private investment (in a post-Brexit context) and how this scale of investment will be facilitated in the absence of the conventional and internationally recognised PPP framework remains unclear.

As we move into 2020 and with the highly anticipated budget statement delayed a viable and credible alternative vehicle to facilitating enhanced levels of private investment into large scale infrastructure projects remains. Despite government intervention, the investment market remains relatively cautious as investment decisions are driven by relative value with political and economic risk serving as key barriers. While the UK has helped create a more diverse and competitive infrastructure finance market, there was a consensus amongst investors contributing to this investigation that the excess capital searching for yields from limited market product had contributed to 'pricing pressures'.

Moreover, interviewees highlight that the diverse financial landscape and disparate bank lending has created an environment which is simultaneously both competing and not competing with long-term lending from institutional investors. For value-driven institutions, the willingness of certain banks to accept lower prices for increased risk and longer tenors is pushing them out of the market for brownfield assets and smaller, lower risk 'greenfield projects' (Haran et al, 2018). In terms of value capture, actors in the investment market contributing to this investigation inferred that they are turning (back) to capital and other markets as they can achieve equivalent return premiums at a lower risk from competing markets (such as

housing, gilts or assets with regulated operating revenues).

The stability of the regulatory environment remains vital for securing private finance, especially for long-term projects. Related to the specialist lending are the developments within bond finance which have witnessed liquidity available at a depth that exceeds available project finance. Nonetheless, as interviewees from the financial sector highlighted, a core barrier to this wider utilisation is the limited number of banks that have specialist bond teams, making capital market solutions more challenging. Existing infrastructure schemes (such as the Thames Tideway project delivery (S&P Global, 2018). Other tailored solutions developed by the UK government offer banks opportunities to work with institutional investors on deals. For example, one pathway is for banks to provide the debt finance for the construction risk and then pass the asset on to institutions, who are the bond market in effect. However, institutional investors contributing to this investigation suggested that they are increasingly prepared and able to finance projects on their own through construction and public bond investors, as long as the underlying credit rating is investment grade. This can be readily achieved subject to appropriate construction support from the contractor and an appropriate level of equity within the transaction. These developments confirm the extent of potential liquidity and competition between various players in the capital markets for infrastructure finance provision.

8.3 Infrastructure pipeline and focus

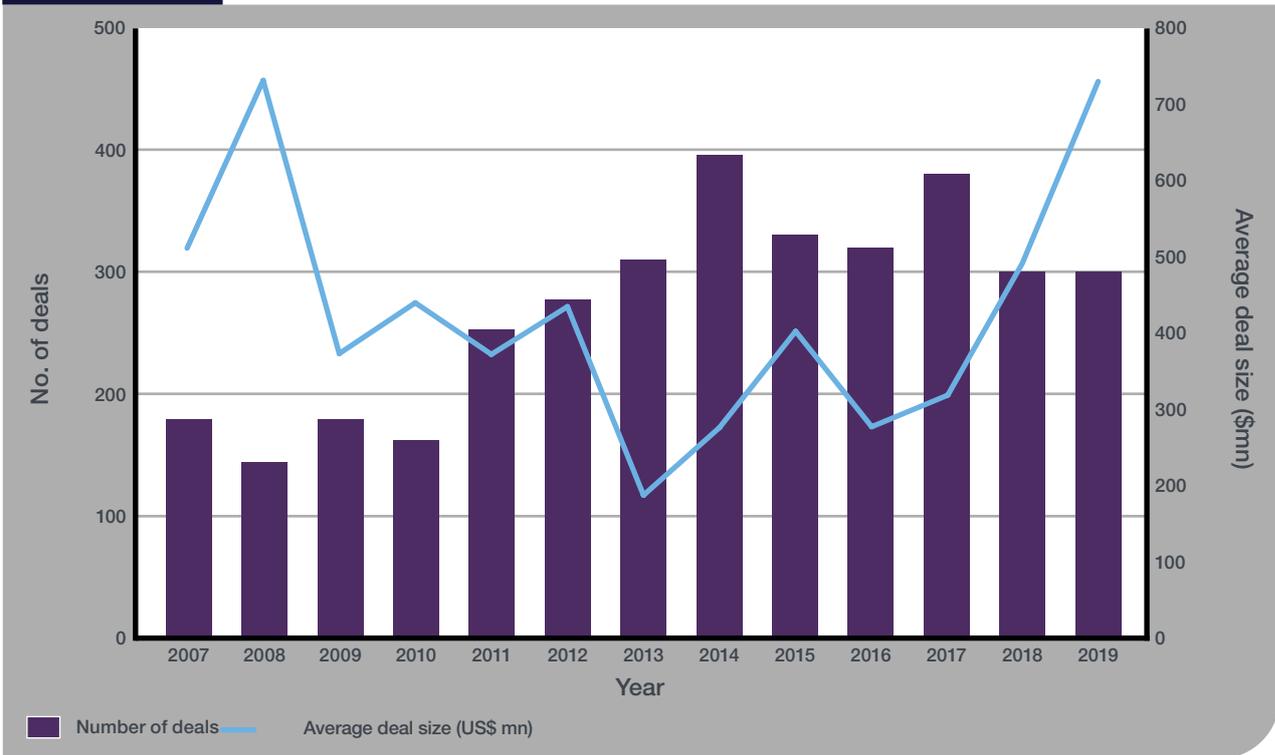
As displayed in Figure 8.1, the number of infrastructure transactions completed in the UK peaked in 2014, with a total of 395 deals. Interestingly, 2008 showed the highest value in deal size which was in part a consequence of an overhang from funding committed pre-GFC. The overall value of deals completing have somewhat diminished since then, arguably reflecting the gradual erosion of the variety of deals transacting in the market and the pronounced uptake in renewable energy projects which tend to be less capital intensive in nature. Since 2014, there has been a relatively stable number of deals and average deal value for infrastructure deals with 379 deals completing in 2017 and a further 299 completing in 2018. The average deal size in 2019 at US\$737 million was the

highest recorded across the thirteen year time series. However, the most noteworthy statistic is undoubtedly the marked decline in deal flow. While investors contributing to this investigation expressed some optimism regarding the political and economic implications of Brexit and the trade discussions to be formalised over the remainder of 2020, without question the decline in the number of deals in 2019 depicts the 'uncertain' and 'non-committal' investment environment at present with as highlighted earlier many international investors maintaining a 'watching brief' rather than committing at present. Project opportunities also remain an issue irrespective of the political landscape.

Over the course of the last decade, three sectors have tended to dominate the deals transacting within the UK infrastructure environment, namely social, transport and renewables. As revealed in Figure 8.2, the UK market exhibited a marked shift towards the renewables sector from 2013 onwards, which accounts for more than 50% of total deal flow, reflecting the increasing government focus on developing this kind of infrastructure allied with the capacity of the private equity funds to access these types of deals. Transportation had been a prominent sector up until 2013 although it is notable that the sectors overall position has steadily waned in the period 2016-19. The last two years 2018-19 have seen a marked decline in Social infrastructure deals – this has largely been at the expense of the growth in renewables.

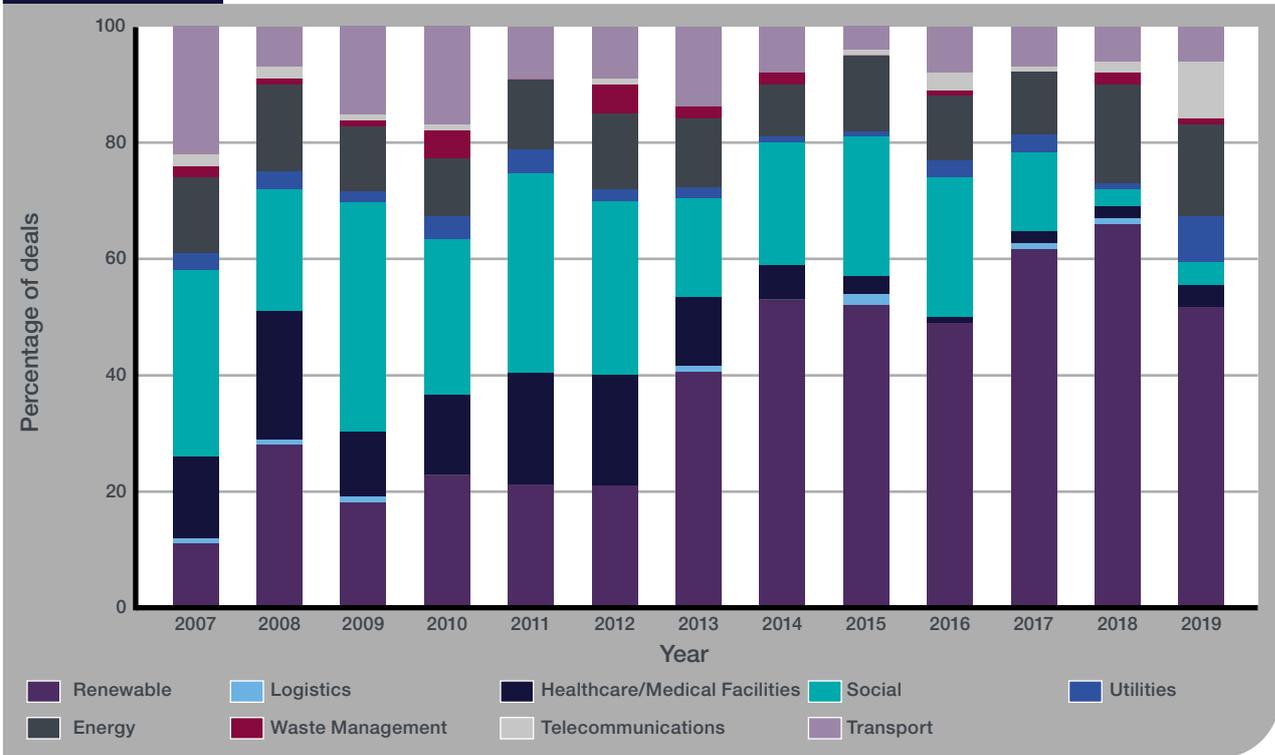
Examination of the allocation of investment per infrastructure sector in the UK shows two dominant sectors (Figure 8.3). Unsurprisingly, given government drive and efforts, the renewable sector is the largest, accounting for 42% in the period 2007-2019. This is followed by social (31%), reflecting government guarantees for key infrastructure priorities such as the National Health Service. Over a third of investment allocation is generally divided between electricity (7%), water supply and sanitation (4%) and transportation deals (railways, 2%; roads and bridges, 5%).

Figure 8.1 Annual number and average value of completed infrastructure deals in the UK



Source: Preqin (2020)

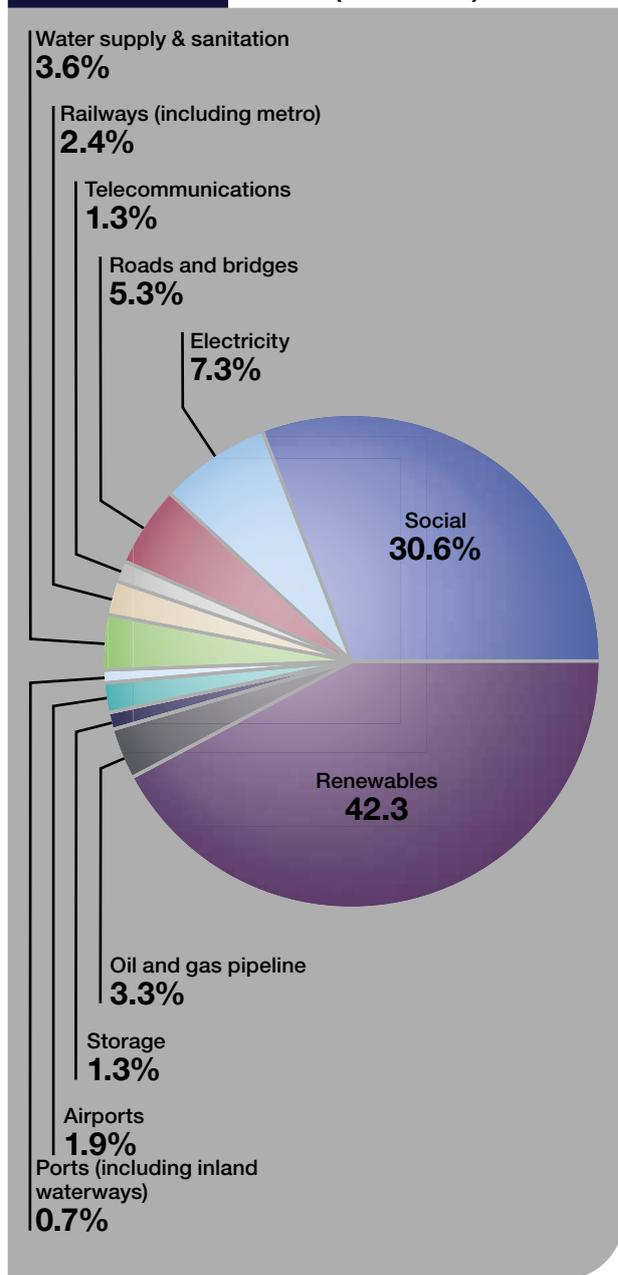
Figure 8.2 Breakdown of completed infrastructure deals in the UK by industry



Source: Preqin (2020)

Figure 8.3

Breakdown of UK investment allocation by infrastructure sector (2007-2019)



Source: Preqin (2020)

8.4 UK market key point summary

- A diverse infrastructure market has emerged post-GFC in the UK. The main impediment to more infrastructure investment cannot be the lack of available financing, given abundant funds in international markets and very low current long-term interest rates.
- The secondary market for brownfield schemes is strong and well financed. Institutional investors are increasingly comfortable with taking on construction risk, where this can provide greater returns. Considerable investment funds have been accumulated and seeking projects to be deployed. Whilst infrastructure concerns have achieved an adequate investor focus and political support platform, the principal issues remain in terms of translating political support into a 'scalable' and 'investable' development project pipelines.
- Delivering adequate project size and appropriate project structure to interest private finance requires specialist expertise which is critically lacking in the infrastructure commissioning departments. The challenge for the Government is to design infrastructure project contracts such that the risks and returns are distributed in an incentive-compatible manner.
- Brexit remains a viable issue of concern in terms of macro-economic uncertainty, primarily currency risk. Whilst government commitment has added some element of security in terms of UK infrastructure requirement moving forward, banks and institutions have responded differently to Brexit planning and ongoing trade negotiations, and political risk remains a core concern to the point that it is inhibiting international investment.
- In terms of the UK infrastructure finance market, the foremost barriers relate to the nature of projects offered through the NIP. This is compounded by the abolition of the much criticised but ultimately tried and tested PPP model, creating a vacuum in terms of deal structuring and finance.
- The classic bank to bond structure remains difficult to implement in many sectors and the Government has been clear that taking interest rate risk to facilitate institutional refinancing is considered poor value for money for the taxpayer.
- UK and non-UK banks are looking to lend, but only some are offering long terms, while others now favour capital market solutions where competition from institutions is picking up. Institutional investors have continued to be active in the market but remain cautious and driven by relative value of asset classes. Competition is intense for smaller, less risky deals but the market is less liquid for riskier, more complex energy projects.



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9.0 Infrastructure investment in the United States (US)

Over the last decade, the need for infrastructure investment and modernisation in the US has become acute (S&P Global, 2018). Pressure, exacerbated by constrained fiscal investment and outdated infrastructure, has been mounting on all levels of government to close the ever-widening infrastructure investment gap, with many municipalities struggling to maintain the arterial transportation networks vital to the US economy. The latest World Economic Forum global competitiveness report ranks the US 13th in overall infrastructure quality (WEF, 2019). This latest ranking indicates a drop of one place from the 2018 report but overall represents marked improvements have been realised in recent years. Nonetheless, economic prosperity continues to be inhibited by poorer quality surface transportation, aviation and electricity supply (relative to other developed nations). The American Society of Civil Engineers (ASCE) highlights the consistent poor condition of infrastructure in the US and the continued failure to ‘close’ the infrastructure investment gap merely maintains the status quo. Consequently, in economic terms it is estimated that there is a staggering US\$2 trillion infrastructure deficit, equating to US\$206 billion of additional investment per annum (ASCE, 2016).

Although there have been limited signs of infrastructure upgrading in some sectors, the investment gap is substantial (ASCE, 2016). In this context, Schanzenbach et al. (2017) estimate that the road infrastructure network remains underfunded to the tune of US\$1.1 trillion, with the U.S. Department of Transportation (USDOT) estimating that transit operators face a repair and replacement backlog of US\$86 billion. The Federal Highway Administration (FHWA) suggests half of the federal highway system requires upgrading and there are 58,791 structurally deficient bridges. Accordingly, the FHWA estimates that all levels of government must invest US\$146 billion annually to improve the overall condition and performance of the highway network (Schanzenbach et al., 2017). Major upgrades to the water network are also required. The Environmental Protection Agency (EPA) estimate that public drinking water utilities require US\$384 billion in capital investment over the next two decades, including upgrading, replacing, installing new treatment technologies and facilities. Of the estimated 1m miles of water distribution piping in the US, the federal government approximates that water utilities only have capacity to replace 0.5 percent of this each year (Schanzenbach et al., 2017).

9.1 Government approach to infrastructure

Infrastructure delivery in the US has been primarily provided and financed through federal government at state and municipal levels. The US has had a long past of infrastructure provision, primarily initiated in the 1920s with Congress using the federal government to support infrastructure procurement and funding. Despite this rich history, the last two decades have witnessed a decline in both infrastructure procurement and investment. In light of this, the traditional vehicles funding US infrastructure, have, by and large, undergone reform in a bid to close the existing infrastructure gap. In recent years there have been varied attempts to expand federal support for infrastructure. The US government has attempted to introduce programmes and subsidies to channel funds towards the various infrastructure sectors, with direct federal funding, revolving loan programmes, tax-based financing and PPP models have all been initiated to provide viable (new) funding solutions.

Financial instruments, such as Private Activity Bonds (PABs) and Transportation Infrastructure Financing and Innovation Act (TIFIA) loans, were created to encourage private investment in infrastructure through direct federal loans for financing infrastructure. Private Activity Bonds have been structured to permit private sector project sponsors to issue tax-exempt bonds when financing public-beneficial infrastructure projects. In January 2015, the Obama administration expanded the PAB concept to urge the creation of Qualified Public Infrastructure Bonds (QPIBs). Recent federal funding for surface transportation (Fixing America's Surface Transportation Act; hereafter FAST act) has authorised on average US\$56.5 billion per annum of federal funds on highway and transport programmes from 2016-2020, an increase of circa of US\$3.7 billion from the previous federal programme (ASCE, 2017). Other changes in federal funding have witnessed reforms to existing programmes. The TIFIA credit subsidy programme has been reduced by 70% (ASCE, 2017), nonetheless the FAST act has provided new streams of funding to prioritise nationally significant infrastructure projects.

Between 2010 and 2016, twenty-three states increased tax rates for gas with others also introducing enabling legislation for indexing gas tax (inflation). According to the ASCE (2016) report, state actions coupled with federal funding initiatives have stabilised the downward trend in surface transport investment. With regards to water and wastewater investment, reformations such as the American Recovery and Reinvestment Act have had a positive impact, reducing the investment gap. Nonetheless, infrastructure provision remains decentralised, and whilst moving in the right direction, remains extremely strained and the scale of the gap persists. Other new sources of funding have been introduced for ports and waterways under the FAST Act of 2015 such as the United States Army Corps of Engineers (USACE), Harbour Maintenance Trust

Fund (under the Water Resources Reform Development Act of 2014) and Fostering Advancements in Shipping and Transportation for The Long-Term Achievement of National Efficiencies (FASTLANE) grants. These vehicles are designed to prioritise projects and align revolving revenue to targeted projects.

There has been a slow but active push towards adopting the PPP model. There is widespread agreement that PPPs can add value, and policies have been adopted at both the state and federal levels to encourage their use. More than half the US states have adopted PPP-enabling laws designed to create the stable legal and institutional framework necessary to attract the long-term investment required to deliver infrastructure services. Moreover, in July 2016 the Transportation Secretary announced the creation of the Build America Bureau within the US Department of Transportation (USDOT). This bureau is envisaged to combine several major PPP-related programs, including TIFIA, the Railroad Rehabilitation & Improvement Financing (RRIF), the PAB program, the Build America Transportation Investment Centre, and the new US\$800 million FASTLANE grant program under one large umbrella framework (USDOT, 2016).

Concomitantly, various state programmes and joint ventures have emerged, albeit it at municipal and state level only. For example, within the state of Illinois, the Chicago Metropolitan Agency for Planning, the Chicago Department of Transportation, the US Department of Transportation, and rail operators have formed a unique partnership and developed a long-term plan to reduce at-grade crossings and expand overall capacity. This is the Chicago Region Environmental and Transportation Efficiency or CREATE program. This comprises 70 projects, including six rail-rail grade separations, 25 road-rail grade separations, and 36 other improvements to signal systems, tracks, and switches.

While there has been advances in infrastructure investment policy across the different government tiers, no legislation to fundamentally reform the national infrastructure financing system has advanced through any legislative committee (DeGood et al., 2016). In this regard, the infrastructure investment system in the US appears to remain highly decentralised. States and localities continue to play a major role in selecting, funding, financing, and operating infrastructure. Interviews suggested that the legislative autonomy within the US state governance structure actually serves as an inhibitor to private investment. The legislative frameworks across many of the states contain subtle differences, which in essence means that prospective development opportunity needs to be considered relative to state enacted legislation, as there is no overarching legal framework which serves to heighten investor due diligence. Further to this, capacity at state level has mixed-reviews among those interviewed in terms of creating a viable (in the eyes of prospective investors) project development pipeline.

9.2 US infrastructure investment challenges

Historically, the US has largely utilised municipal bond finance (federally subsidised bonds) to fund transportation and social infrastructure using federal taxes and levies. Such funding has been used to construct and finance repairs for publicly owned social infrastructure and assets. The NGA (2017) estimate that tax-exempt municipal bonds have financed more than US\$2 trillion of new infrastructure investment over the last decade, representing approximately 75% of public infrastructure financing, with more than US\$3.7 trillion in outstanding municipal debt. Despite the well-developed bond market, there remains a core gap within infrastructure investment which is compounded by the increasingly constrained municipal balance sheets and federal laws prohibiting revenue raising flexibility and tax increases (S&P Global, 2018). States typically rely on the bond market to finance long-term projects, and whilst the benign interest rate milieu has aided this source of finance, state government borrowing in capital markets is hindered by debt caps and weak credit ratings.

The most pertinent barrier to investment in infrastructure within the US pertains to 'finding' a politically viable solution. A number of interviewees contributing to this study highlighted that ambiguity surrounds the implementation of the President Trump's much lauded infrastructure plan – with the lack of clarity and progress serving to undermine market confidence. Questions also pertain about the extent to which the proposal constitutes the 'repackaging' of existing programmes rather than any obvious increase in capital commitment.

In the opinion of Kirk et al. (2017) Federal governments are unreliable partners for private investment, for the following reasons:

- Antiquated government processes induce delays in project development, resulting in sub-optimal risk allocation and discouraging private sector engagement.
- Regulatory frameworks at all levels remain an issue, especially when assessing the creditworthiness of capital intense infrastructure projects. Counterparty risk⁴⁵ remains a fundamental issue in terms of investment choice and the degree of risk that investors will accept for funding infrastructure assets.
- There is a distinct lack of public sector expertise and capacity underpinning procurement practices and negotiation. Inefficiencies in procurement and contracting practices, project management, coupled with inefficient regulation are blocking viable channels of private investment.

Kirk et al. (2017) also highlight that federal finance policy also has a number of problems that limit its effectiveness including:

- Metropolitan regions lack sufficient funding and decision-making in allocating a modest share of the funding programmes. The sub-allocation of finance particularly the direction of funds according to priorities is poor.
- The federal program fails to hold states and metropolitan regions accountable for how they spend federal funds.

Significantly, Kirk et al. (2017) highlight that the majority of current spending (including 92 percent of highway spending through FY2020) is allocated by formula. Although this reduces political influence on project selection, formula funding is considered to favour older transit systems over newer ones in the allocation of funding. In addition, Kirk et al. (2017) declare that formulas for the highway trust fund were written to favour small and rural states over larger states (US Government Accountability Office (GAO), 2010). As a result, funds are not necessarily directed to where the best projects are located and there is a significant difference between the share of GDP produced by each state and the share of funding. The current approach to infrastructure decision-making appears to systematically disadvantage investments that are relatively productive (like airports, transit, and the electrical grid) in favour of investments in roads, which are likely less productive (Pereira, 2001) but provide direct benefits to constituents (Kirk et al., 2017).

Previous RICS research (Haran et al., 2013) detailed that PPP remains relatively underused in the US and that assessment continues to be relevant. Whilst PPPs have arguably made some headway in recent years within the road infrastructure domain, nonetheless, challenges pertain to their wholesale adoption (Melton et al., 2017). The challenge for a more holistic PPP approach is the 'level' and 'scale' of PPP projects on offer. While state level PPPs would result in many relatively small units with minimal PPP deal flow that fail to capture economies in size and scope, a single large federal PPP unit could create problems. Contributors to our research highlighted a lack of trust in the ability of Federal Government to initiate actionable outcomes pertaining to the development of PPP pipelines. There is also the potential for misalignment between Federal Level priorities and the localised infrastructure need with the propensity for imbalance across states also viewed as problematic and would in essence serve to undermine state level autonomy. Casady and Geddes (2016) argue that greater reliance on PPPs would refocus US infrastructure investment towards asset

⁴⁵ Risk that the project partner will default on their obligations under a contractual agreement

performance, rigorous project evaluation, and enhanced public-sector procurement capacity. In this regard, a PPP approach would also allow state and local governments to improve their infrastructure project development and delivery, whilst more effectively managing risk. The US multi-jurisdictional structure requires adopting a basic two-tiered institutional framework of PPP units, similar to that employed in Canada, which would facilitate private investment in infrastructure at multiple levels (Casady and Geddes, 2016).

There have been some instances of successful PPPs in the US. Newer forms of PPP in some states such as California have introduced 'bundling' of infrastructure assets (offering a new alternative form of financing approach) into larger infrastructure entities which attract private capital. These innovative approaches have served to meet scale requirements and improve credit strengths and lead to the opening of new forms of capital for infrastructure (S&P Global Rating report, June 2017). However, interview based discussions highlight that federal infrastructure programmes urgently need reform in order to increase accountability and ensure that each dollar produces the greatest possible social, environmental and economic return on investment. At present there is no overarching national body for infrastructure in the US and this serves as a barrier to international investment. Indeed, as argued by DeGood et al. (2016), the creation of such a body would have a variety of positive impacts on infrastructure financing and development in the US, including:

- Expedited environmental review and permitting for infrastructure projects of regional or national significance.
- Amalgamating the federal programs that are currently fragmented among multiple agencies
- Providing a location for a dedicated revolving infrastructure fund.
- Providing a location for the US Treasury to return the credit risk premium once an infrastructure project sponsor has completed repayment of the Treasury loan.
- Providing each project sponsor with the unique mix of support necessary to ensure completion while lowering the risk of non-performance of the loan. For example, in the case of insolvency the federal government would only have a claim to whatever project revenues remained after senior and mezzanine investors received their full payment.
- Coordinating major investments for large projects and groups of interrelated projects that span state lines.

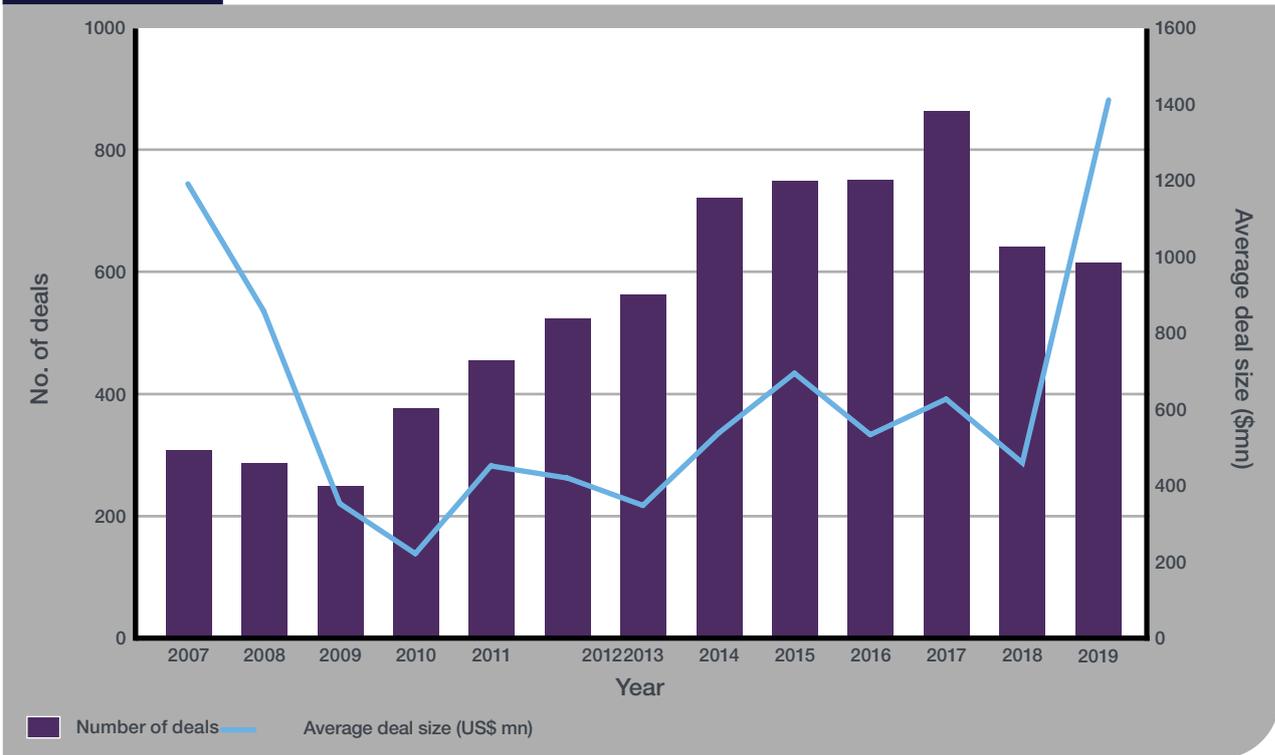
9.3 Infrastructure pipeline and focus

The number of infrastructure transactions completed in the US peaked in 2017, with a total of 861 deals (Figure 9.1). The average deal size in the US market has exhibited pronounced volatility attributable to a number of 'mega-deals' being delivered over the course of the last three years with the average deal size in 2019 the highest recorded in the thirteen year tie series. The 12-month period to the end of December 2019 witnessed 615 deals complete with an average deal size of US\$1.4 billion.

Over the course of the last decade three sectors have tended to dominate the deals transacting, namely oil and gas, renewables and energy. The US market has exhibited a marked shift towards the renewables sector from 2010 onwards (Figure 9.2). The renewables sector has exhibited continued growth in deal flow terms over the last four years and in 2019 constituting 50% of all deals transacted within the Prequin unlisted infrastructure funds universe. Over the 10-year period, transportation has been consistent (albeit only equating to 2-6% of market deals), however its significance has diminished over the past 2-year period. Oil and gas has been the other dominant sector within the US market over the time series constituting 19% of all deals across the time series although prominence has waned somewhat in the last two years as the shift in investor focus towards renewables was apparent in the number of completed deals

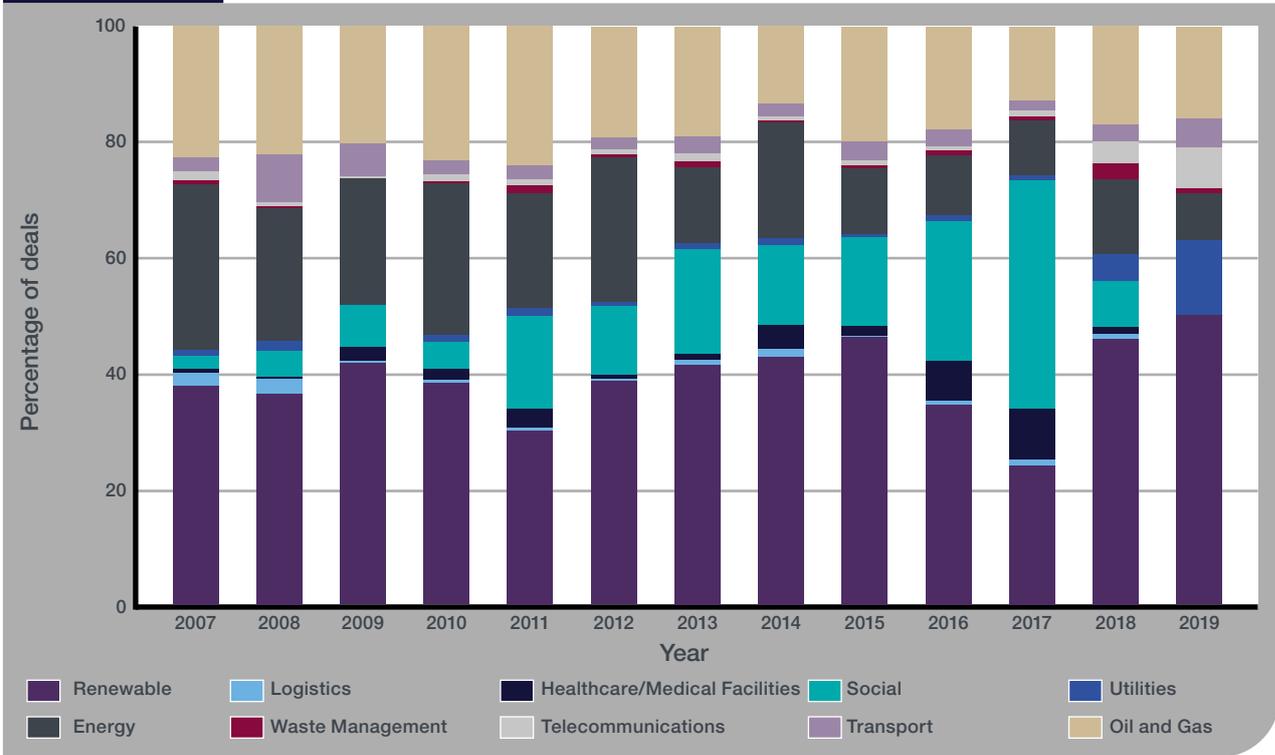
Examination of the allocation of investment per infrastructure sector in the US (Figure 9.3) shows two core sectors to dominate. Unsurprisingly, given government drive and efforts, the renewable sector is the largest, accounting for 39%, followed by social (20%) and electricity (157%). Over a third of investment allocation is generally divided equally between ports, airports, storage, oil and gas and transportation deals (railways, 1%; roads and bridges, 1%).

Figure 9.1 Annual number and average value of completed US infrastructure deals



Source: Prequin (2020)

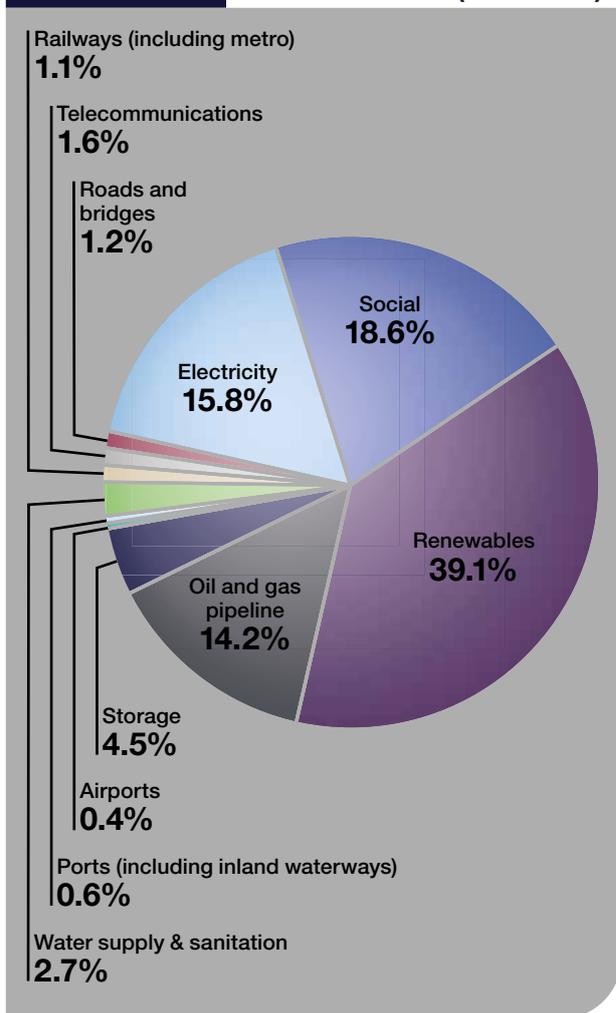
Figure 9.2 Industry distribution of completed infrastructure deals in the US



Source: Prequin (2020)

Figure 9.3

Breakdown of investment allocation by infrastructure sector in the US (2007-2019)



Source: Prequin (2020)

9.4 US market key point summary

- In recent years there have been varied attempts to expand federal support for infrastructure. The US government has attempted to introduce programmes and subsidies to direct funds towards the various infrastructure sectors, with direct federal funding, revolving loan programmes, tax-based financing and PPP models have all been initiated to provide viable (new) funding solutions which have stabilised the downward trend in investment comprising a positive impact, reducing the investment gap.
- There has been a slow but active push towards adopting the PPP model. There is widespread agreement that PPPs can add value, and policies have been adopted at both the state and federal levels to encourage their use. Overall, 34 US states have adopted PPP-enabling laws designed to create the stable legal and institutional framework necessary to attract the long-term investment required to deliver infrastructure services. The creation of the Build America Bureau in 2016 is a step-change for integrating PPP-related programs, under one large programme of works.
- While there have been advances in infrastructure investment policy across the different government tiers, no legislation to fundamentally reform the national infrastructure financing system has successfully passed through any legislative committee. Infrastructure investment therefore appears to remain highly decentralised. This legislative autonomy within the US state governance structure actually serves as an inhibitor to private investment as no overarching legal framework is in situ which ensures the appropriate level of investor due diligence.
- Historically, the US has largely utilised municipal bond finance with tax-exempt municipal bonds financing public infrastructure financing. Despite the well-developed bond market, there remains a core gap within infrastructure investment which is compounded by the increasingly constrained municipal balance sheets and federal laws prohibiting revenue raising flexibility and tax increases.
- The most pertinent barrier to investment in infrastructure within the US pertains to ‘finding’ a politically viable solution. Federal governments are perceived by those interviewed as unreliable partners for private investment due to antiquated government processes inducing delays in project development.

10.0 Drivers and barriers to private infrastructure investment



This chapter draws upon interview-based evidence collated across the six case study countries. Section 10.1 highlights the key themes that enhanced private infrastructure investment over the course of the last decade. Section 10.2 examines issues which interviewees identified as barriers to investment. This discussion is not exhaustive, and it is apparent that some issues are more pertinent in some jurisdictions than others. The objective of this chapter is to depict the ‘global’ nature of infrastructure investment and examine the evidence for private investors to further expand their investments across both developed and emerging economies.

10.1 Drivers of private infrastructure investment

10.1.1 Performance characteristics: the perceived stability of infrastructure as an asset class

The key driver of the growth in private sector investment has been the reputed performance of the infrastructure asset class. The perceived stability of infrastructure returns, and the relative underperformance of the bond markets have encouraged new investors in infrastructure and have stimulated expanded allocation strategies among existing investors. The long-term liability matching obligations of investors (most notably pension funds) are very much aligned with infrastructure investment time horizons and income profiles. The Preqin Unlisted Infrastructure Index demonstrates the long-term strength

of the asset class. Over the past 12 years (a typical infrastructure fund life span), Preqin infrastructure has risen from 100 to 255 basis points – on par with the S&P 500 TR (Preqin, 2020). The extent to which the asset class provides ‘stable’ returns is nonetheless very much premised on the form of exposure to the asset class. Whilst the listed infrastructure sector offers investors liquidity and easy access to the market, the extent to which listed infrastructure mirrors the underlying asset class remains contentious due to the potential impact of stock market volatility. Equally, cash flows are infrequent in the unlisted funds sector– nonetheless, the strong overall performance of infrastructure funds relative to other forms of private equity investment in this period has added to their appeal.

10.1.2 ESG, decarbonisation and a growing interest in renewables

The scale of the infrastructure challenge ensures considerable scope for private investment. This, in combination with diminishing public resources, ensures the role of the private sector in the financing and provision of infrastructure will continue to evolve and expand. With many institutional investors paying more attention to Environmental, Social and Governance (ESG) factors, many infrastructure subsectors, including renewable energy, housing and healthcare facilities, can provide meaningful and tangible alignment to corporate visions at local, national and international scale – without compromising investment performance. The Paris Agreement on climate change detailed clear targets, meanwhile in the Energy Roadmap 2050, the European

Commission (EC) advocates the view that a secure, competitive and decarbonised energy system in 2050 is possible⁴⁶. Decarbonisation targets and pathways across key industry sectors of industry require a radical reform of infrastructure provision, including the design of carbon neutral assets and the decarbonisation of existing assets. National government commitments to address carbon emissions on the back of the Paris Agreement will serve to further extenuate infrastructure funding need

10.1.3 Technical innovation and societal evolution

Technological innovation will continue to fuel productivity and economic growth and reshape people's lives. The underpinning infrastructure necessary to enable and support innovation will, in many respects, always be playing 'catch-up'. Innovation in technology are a fast-paced and in a continuous cycle of evolution. By contrast, the provision of new infrastructure is a protracted process from planning and design through to operationalisation. From the perspective of an infrastructure investor, for example, innovation in sensor technologies has improved the effectiveness of asset management and (in conjunction with robust asset life-cycle management plans) has the propensity to prolong the economic life of infrastructure assets. However, as detailed in previous RICS research, the value and benefits of technology are not fully realised within the confines of planning, designing, constructing and managing the lifecycle of the asset. Moreover, the capacity of technology to foster integration across multi-disciplinary teams and collaboration between the public and private sectors has not been fully optimised (RICS, 2017a).

10.1.4 The expansion and innovation in investment vehicles

Specialist debt and equity infrastructure fund provision has culminated in an expanded and increasingly diverse range of investment opportunities within the infrastructure sector. Such is the nature and range of private sector investment products (which occupy all dimensions of the risk-return curve) that the mis-alignment between investment vehicles and greenfield asset development opportunities has been somewhat mitigated. Concerted progress towards addressing the infrastructure investment gap by governments will create further infrastructure investment opportunities for the private sector. The key challenge will be to adequately 'match' investor risk-return profiles and expectations with suitable infrastructure opportunities. The most significant challenge remains the mobilisation of the infrastructure project development pipeline.

10.1.5 More sophisticated deal structures

As the infrastructure market matures, deal structures have become increasingly sophisticated. Financial engineering is more prominent, depicting a 'new-found' confidence in the asset class. Bespoke debt and equity funds compliment the more conventional infrastructure investment fund models, whilst the increased integration of short-term and long-term finance serves to enhance the financial flexibility afforded to investors in infrastructure funds, even complex greenfield projects. For investors seeking long-term, income-producing opportunities, greenfield projects provide early access to projects that will ultimately mature into such assets. For those investors who can effectively manage construction and commission risk, developing new assets ensures access to long-term investments (and their associated yields) at a much lower price than acquiring assets through secondary market transactions. For investors with shorter time horizons, the highly active and competitive secondary market affords liquidity as well as compelling risk-return dynamics.

10.1.6 Investors more willing to assume greenfield infrastructure risk

Historically, greenfield investment has been the domain of a small number of sector specialists. While a small number of investors continue to dominate the greenfield landscape, the need to develop new assets to contribute to social, economic and environmental development requires new and alternative sources of investment. Indeed, the categorisation between brownfield and greenfield investors has become increasingly blurred in recent years, as a combination of increased competition and familiarity with the sector has served to extend investors' horizons. A series of recent deals highlight the increased willingness of investors (including institutional investors and Sovereign Wealth Funds) to assume risk associated with greenfield infrastructure investment, most notably construction-related risk. To minimise this risk, investors are assembling in-house teams with appropriate sector expertise. In this regard, investors are increasingly evaluating infrastructure opportunities in 'lifecycle terms', acknowledging that each stage of an asset's lifecycle affords value creation opportunities. By examining infrastructure investment opportunities from a lifecycle perspective, the greenfield phase of an asset is not distinct and removed, rather it should be interpreted as an integral stage in the project lifecycle.

⁴⁶ European Commission (2012) – Energy Roadmap 2050

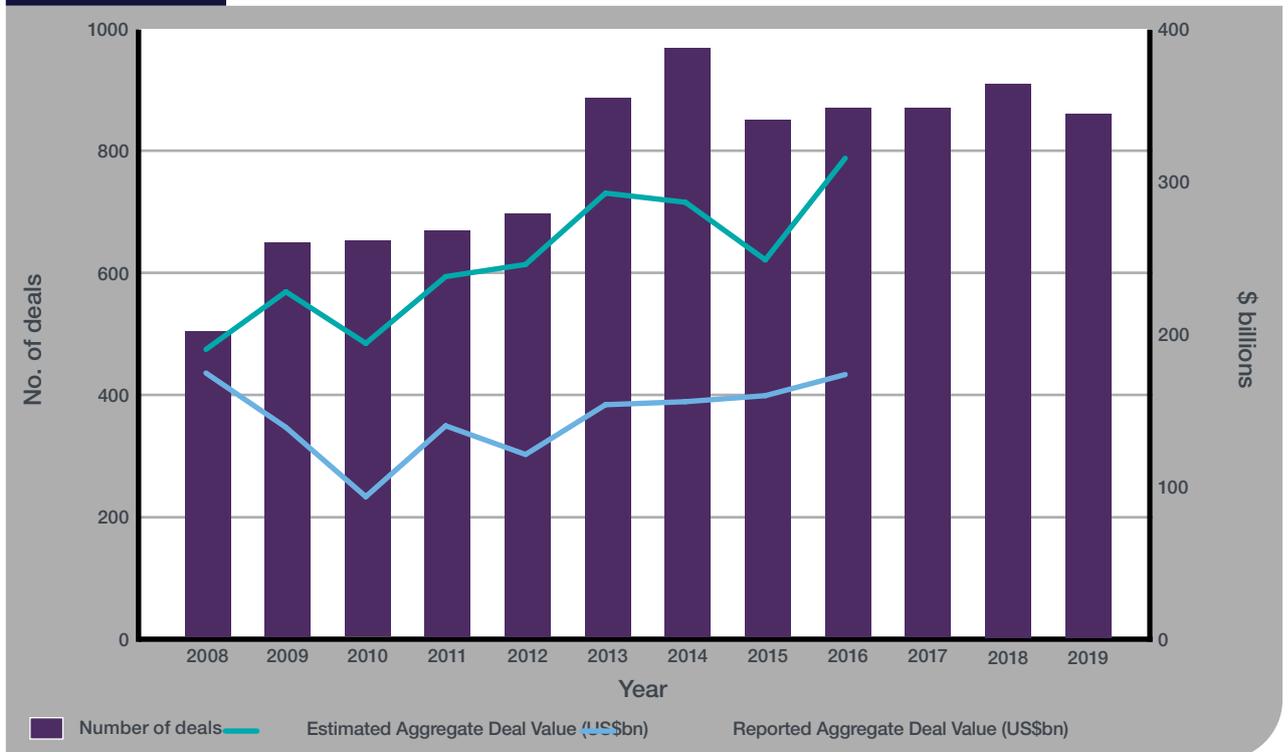
Figures compiled by Preqin detail the increased popularity of greenfield investment opportunities within the unlisted infrastructure funds universe. Figure 10.1 details the marked increase in the number of greenfield project deals completed since 2013 – a time line consistent with the increased willingness of investors to expand investment horizons in pursuit of yield. This trend was maintained over the course of 2018 and 2019 with greenfield projects accounting for 33% and 34% respectively of all deals completed (Preqin, 2020). In the five year period 2015-2019 a total of 4,782 greenfield deals were completed globally across unlisted funds which accounts for 33% of completed deals by volume over this period.

The demand to explore greenfield investment opportunities is further demonstrated by the recent financial close of Infracapital's maiden greenfield investment fund. The fund has targeted returns in the mid-high teen range and closed in November 2017 after securing commitments of £1.2 billion, reaching the vehicles hard-cap and exceeding its initial £1 billion target. The fund combines a proven track record in new asset development with requisite financial competence.

The most noteworthy feature of the fund is the composition of investors which includes several UK local authority pension schemes. In a landscape characterised by burgeoning volumes of dry powder and asset price inflation, it is noteworthy that Infracapital's greenfield fund has already managed to acquire five assets, constituting 43% of its investment capacity.

As investors' appreciation and understanding of the infrastructure sector continues to develop, there is likely to be greater awareness of the complementarity afforded by integrating both brownfield and greenfield assets within an investment portfolio. A number of institutional investors contributing to this study suggested that greenfield projects (particularly those in the later stages of conceptualisation and with pre-contracts in place) have a lower risk profile than some brownfield opportunities. The growth in popularity of co-investment models, which serve to mitigate the risks associated with greenfield projects and align investor interests with infrastructure delivery pipelines, enhances the impact of the private sector in the provision of new assets.

Figure 10.1 Number and aggregate value of global greenfield infrastructure deals



Source: Preqin (2020)

10.2 Barriers to private infrastructure investment

10.2.1 Absence of infrastructure development pipelines

Investors contributing to this investigation cited the lack of 'investible' project pipelines as one of the key constraints within the infrastructure market. There are a lot of investors chasing what is essentially a very limited 'product offering' currently. This has culminated in a hardening in yields over the course of the last two years, leading many investors to question the 'value' attainable in the current global infrastructure market. Given the increased appetite for green infrastructure investment opportunities, the relative absence of active project pipelines in many countries continues to serve as the major constraint to private investment. To remedy this situation, governments need to demonstrate sustained commitment to infrastructure delivery in the form of tangible outcomes and to mobilise development pipelines beyond design and planning stages, in order to create 'shovel-ready' investable projects. This research identified political risk and lack of 'active' commitment to project delivery as the biggest single barrier to private investment.

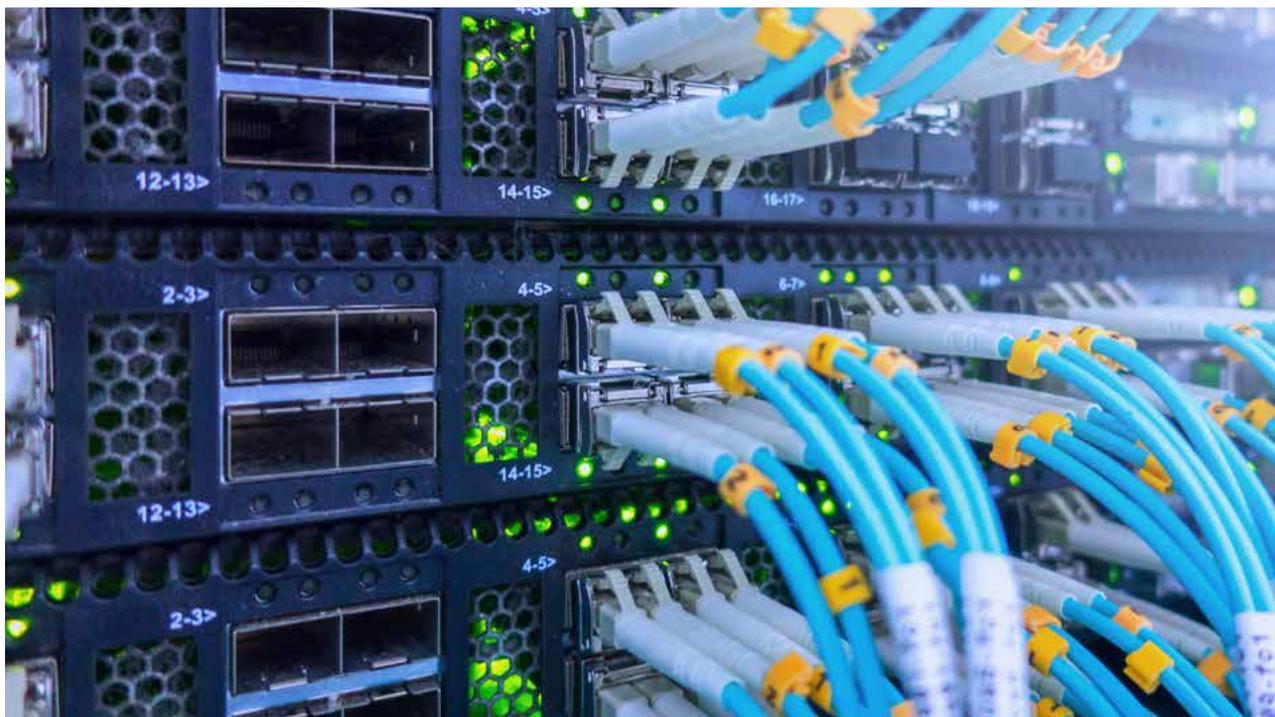
10.2.2 Technological innovation

As well as providing new opportunities, technological innovation has the propensity to curtail the economic life of existing assets, with early obsolescence becoming an increasingly important risk consideration. From an

investor viewpoint, it would be remiss not to acknowledge the potential 'downside' risks associated with technological innovation. This research found that many deals transacting in the market over the last five years have failed to adequately account for the risks posed by technological innovation. Even in cases where the threat of asset obsolescence has been acknowledged, the risk of obsolescence is rarely appropriately priced into deals. This is testament, perhaps, to the current frenzied state of the market and the pressures being placed on fund managers to 'get deals completed'.

10.2.3 Constrained supply of 'investable projects', increased competition and lack of sector expertise

The wealth of new infrastructure funds launched in the last five years has afforded a much more expansive range of routes to market for prospective investors. It is noteworthy however that not all the newly-launched funds have appointed managers with a proven track record in the infrastructure sector, and it is these funds that are struggling the most to place money. In essence, whilst these managers have a credible track record in managing private equity funds, infrastructure funds are much more deal focused, with successful fund managers commanding higher fees as a consequence of their networks, which facilitate access to deals and contribute to outperformance. Interviewees inferred that such was the pressure to secure assets that many fund managers without the established infrastructure networks had 'overpaid' for deals that had transacted over the last 18 months in order to assemble



their portfolios. A number of fund managers interviewed accepted that in some instances, investors with longer time horizons are able to adopt a long-term view on the assets they invest in. However, over paying for assets will put considerable pressure on some funds to deliver their projected returns – particularly those managing closed ended funds that have a defined time window – typically 10-13 years in which to acquire, add value and ultimately liquidate their assets.

Figure 10.2 depicts the performance of the unlisted infrastructure funds sector by vintage (year of inception). The immediately apparent observation from the analysis is the extent of the spread in fund performance. Newer funds, including those launched in 2014 and 2016, exhibit the highest divergence between the top quartile and the minimum quartile risk and return attainment. The unlisted infrastructure funds universe delivered median IRRs averaging 10% across vintages from 2007 to 2016 (Preqin, 2020).

10.2.4 Performance persistence

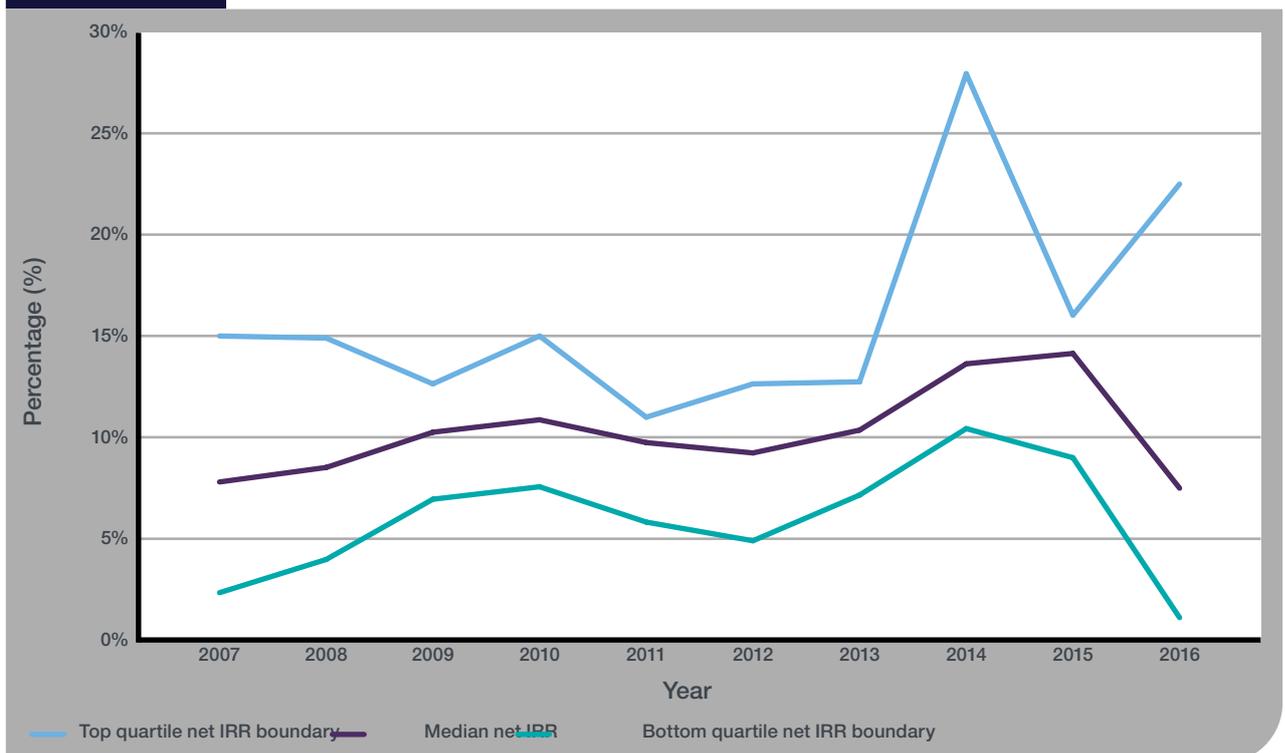
Interview-based evidence collated in the course of this investigation inferred that there was an element of ‘first-mover advantage’ when it came to investing in the real estate sector post-GFC. Those that entered the market early realised significant returns on their investment. Given the influx of investors now entering the asset class and the competition for assets, maintaining levels of performance

in the future will prove to be more challenging – particularly for investors unwilling to take on the risks of new build construction. Interviews with investors highlighted that there has been a marked hardening of yields, and the competition for brownfield income-producing assets resulted in pronounced price hikes, with many assets currently transacting well in excess of market valuations. The secondary market for infrastructure projects, that is the trading of existing assets between investors, is continuing to mature. However, with many investors adopting long-term perspectives, transaction levels in the secondary infrastructure market remain constrained. Investors contributing to this study highlighted a noticeable increase in the capital values of assets transacting within the secondary market over the last five years. The growing intensity of competition led many experienced investors to question the ‘value’ available in the secondary market. Indeed, a number of investors cited in this study have capitalised on strong market conditions to liquidate assets and reinvest the profits into greenfield projects.

10.2.5 Political risk and lack of enabling environment

Investment continues to be inhibited by political uncertainty and bureaucracy, disjointed decision making as well as procurement inefficiencies. Some national governments, most notably in the US, have stated their unfettered commitment to infrastructure provision. However, from the

Figure 10.2 Net IRRs for unlisted infrastructure funds by vintage year



Source: Preqin (2020)

investor viewpoint, these ‘words’ and ‘manifestos’ must be swiftly translated into actions. By initiating viable project pipelines, governments can demonstrate the political will to move beyond declarations and towards creating projects and assets which facilitate investor participation.

This issue of misalignment was prominent across the interviews with investors and prospective investors. The consensus amongst investors was that national governments needed to do more to involve the private sector in the delivery of key strategic or high impact projects. As highlighted by RICS (2016), the ability of the state to gain benefit and capture value from private sector property investment generated on the back of public sector infrastructure provision could serve as a significant income stream to facilitate the provision of strategic projects which are otherwise not financially viable. Further work is needed to unpack the land value uplift resulting from major infrastructure investment, and how the uplifts can be most effectively harnessed (either as capital receipts or as an income base) to enable capital market borrowing for infrastructure.

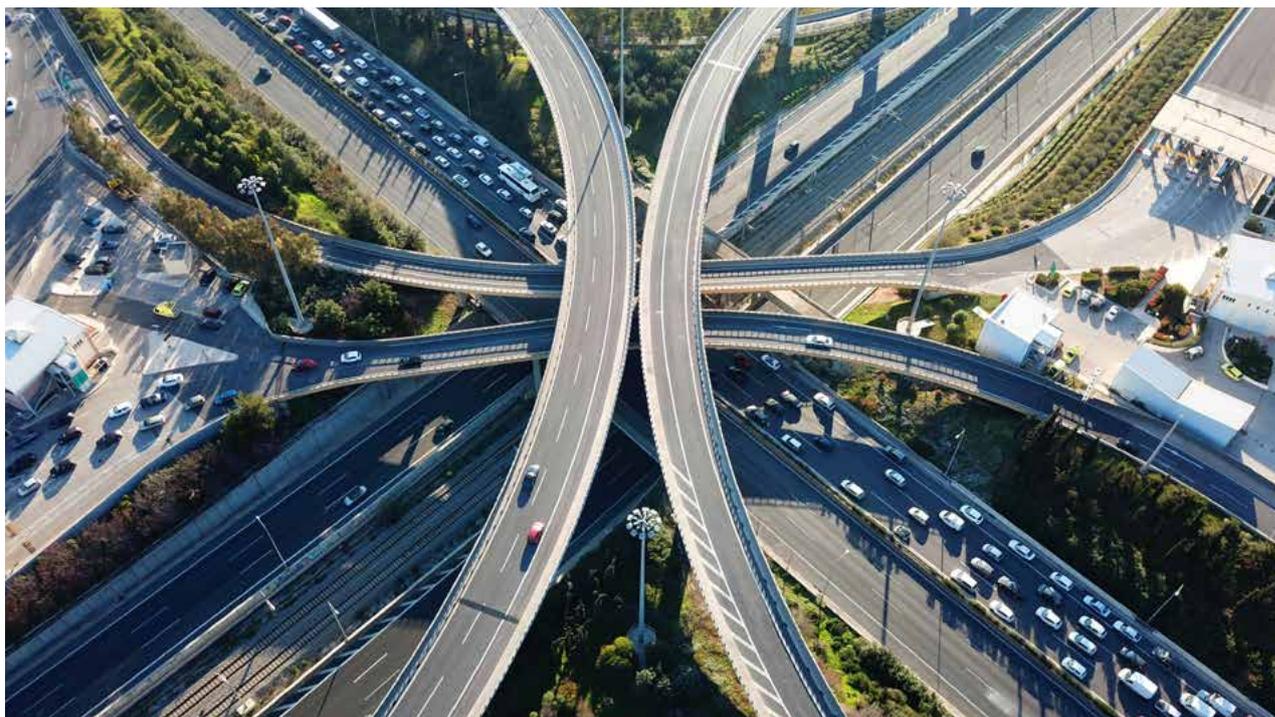
10.2.6 Lack of investment performance data

With the exception of the listed infrastructure sector, the asset class lacks transparency in terms of key performance characteristics. There is a dearth of information on performance at asset level, which culminates in an information vacuum within the listed and unlisted sectors of infrastructure investment. Performance reporting is inconsistent in terms of both regularity and

frequency whilst there is disparity in the performance metrics being communicated. In particular, mid-fund reporting across the private equity funds have come in for criticism for overstating performance, something that was particularly noteworthy in instances where a firm has a follow-on fund raising capital in the market (Haran et al., 2019). The lack of uniformity in terms of metrics creates ambiguity around the ‘true’ performance of the asset class, and reduces the extent to which meaningful comparisons can be drawn against other investment asset classes. In an environment increasingly demanding transparency, consistency and robustness in reporting standards, the lack of performance data culminates in an opaqueness which inhibits investments, particularly from institutional investors.

10.3 Chapter summary

As new market entrants continue to seek exposure to the asset class, their desire is nonetheless often curtailed by the lack of brownfield/income-producing assets coming to the market within developed economies. Moreover, investors already in the infrastructure market have an overwhelming desire to increase their portfolios. The record build-up in dry-powder over the last five years depicts the challenging market conditions and lack of opportunities met by fund managers seeking to place money. Investment levels are nonetheless projected to continue to grow in response to the burgeoning investment need as well as the enhanced routes to market. Realising such growth will nonetheless require many investors to become more creative in



40 63% of active institutional investors are currently below their target allocations to the infrastructure asset class (Preqin, 2017).

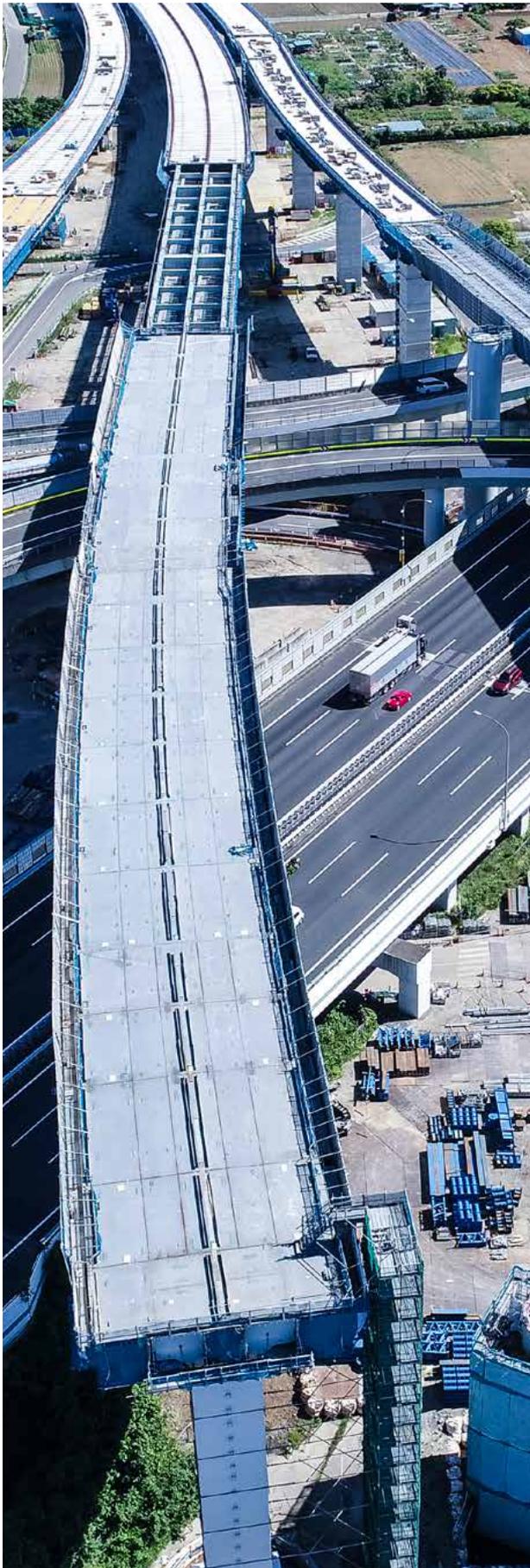
the construction of their portfolios, expanding their investment horizons geographically to include emerging markets and/or exploring different infrastructure subsectors in order to 'capture value' and attain yields consistent with performance expectations.

Figures compiled by Preqin suggest that whilst there has been a marked increase in the level of institutional investment over the last five years, this constitutes a very modest percentage of the institutional investment capacity. It is also noteworthy that only 36% of the institutional investors tracked by the Preqin capital markets survey include infrastructure within their investment portfolios (Preqin, 2018). The dynamic between 'experienced' investors and those seeking to enter the market is an interesting annotation of this investigation. While some established investors seek to protect their position, others are welcoming the expansion of the market – citing that the scale of the global infrastructure challenge ensures there will be plenty of opportunities for everyone. In fact, it was suggested by those interviewed that the increased investors had added 'depth' to the market and heightening the potential for asset trading. One fund manager with a considered track record in the delivery of greenfield projects highlighted that many of the new entrants are 'mainstream' or large institutional investors who are unwilling to take on development risk – "so in this respect we are not always in direct competition". The new markets entrants are nonetheless committed to adding to infrastructure to their portfolios and thus they have made a significant contribution to the development of the secondary market.

Investor's outlook for the infrastructure sector(s) on the whole remains positive, with many contributors to this study expressing a desire to expand their portfolios over the course of 2019-20. For institutional investors seeking to gain a foothold in the asset class, 'traditional' infrastructure sectors such as roads, bridges and ports – with well-defined income profiles – remain attractive, given the prevailing low interest rate environment. More established investors however expressed a desire to expand their portfolios through the exploration of new market subsectors. Of these, renewable energy featured prominently on investors' future horizons. This demonstrates willingness from investors to explore more complex infrastructure financing models and to assume higher levels of risk in pursuit of yield return. As such, providing the conditions and enabling environment that can more effectively align private and public sector interests is crucial. Greater collaboration is needed to develop mutually advantageous outcomes. Thus, the global infrastructure investment challenge is as much about governance and facilitation as about the magnitude of investment needed.



41 This compares to 61% for real estate and 57% for private equity.



11.0 Conclusion and recommendations

The purpose of this research was to identify the nature and extent of the barriers inhibiting private investment into greenfield infrastructure projects and to devise practical 'market-facing' solutions to transpose infrastructure development plans and pipelines into investable projects. The research was structured around the attainment of four key objectives:

1. To develop understanding of the magnitude and nature of the infrastructure gap within the six case study countries and to evaluate how government approaches to infrastructure provision have evolved relative to the identified need.
2. To identify pertinent global trends in private infrastructure provision and finance and evaluate the extent of implementation within the six case study countries.
3. To examine the demand and supply-side barriers to greenfield infrastructure investment and to assess their impact within the different case study countries.
4. To identify market-facing strategies adopted to overcome these barriers and assess the extent to which these solutions have served to transpose infrastructure development plans into 'investable projects'.

Consistent with objectives 1 and 2 of the research, chapters 4 to 9 afforded detailed overviews of the magnitude and nature of the infrastructure investment challenges within Canada, China, India, Singapore, the UK and the US. Premised on interviews with key stakeholders, chapters 4-9 also contextualised the evolution in infrastructure investment and the role of government in attracting private investment into the market within the six countries. Whilst objectives 1 and 2 focused on the individual market contexts, objectives 3 and 4 (covered in chapter 10 and in this chapter) centre on the strategic context, transposing key learning outcomes from the study and presenting practical recommendations which serve to address barriers and challenges identified over the investigation.

Key learning outcomes

Need to enhance private investment into high-impact greenfield projects in order to realise economic and societal benefits

Interview evidence illustrated the continued appetite of investors to move up the infrastructure risk curve through the exploration of new and emerging markets, embracing new subsectors as well as extending their investment horizons to include greenfield projects. While investors contributing to this research showed a considerable enthusiasm towards greenfield opportunities, this has not translated into firm and tangible commitments.

Interviewees stated that the ability to invest in greenfield infrastructure projects is primarily inhibited by the lack of investable project pipelines. National governments have seemingly failed to effectively align the increased demand for infrastructure investment with the delivery of high-impact (in economic, social and environmental terms) greenfield infrastructure projects. The large volumes of dry powder within unlisted infrastructure funds are in part attributable to the protracted nature of new project pipelines. Importantly, political risk has been identified by investors as one of the principal barriers to greenfield development in both developed and developing countries.



Recommendations:

- Develop more integrated decision-making systems and frameworks within the public sector:** To optimise the potential benefits of private capital there remains a need for more integrated decision-making within the public sector, enabling portfolio-based approaches and better appreciation of the subsector inter-dependencies pertaining to future infrastructure delivery. This would facilitate robust evidence-based project prioritisation and impact evaluations, as well as permitting more effective ‘mapping’ of development pipeline risk and opportunities in order to optimise the impact of investment.
- Improve the transparency and robustness of construction costs:** Instilling greater confidence, improving construction cost transparency and mitigating key risks attributable to the construction phase of the asset lifecycle remains a key challenge for many investors contemplating new asset construction. The International Construction Measurement Standard launched in 2017 is a very welcome development to improve consistency and determine economic viability of greenfield projects in what is a truly global investment asset class.
- Portfolio-based approaches and improved impact assessment:** Financial capacity within the public sector to deliver key infrastructure projects continues to diminish, necessitating greater exploration of co-investment partnerships between public and private sectors. Robust frameworks for these partnerships are needed which can instil confidence whilst simultaneously affording value for money for public sector authorities and proportionate levels of return for the private sector. Moreover, the propensity for collaboration across different infrastructure subsectors needs to be more effectively mapped to better understand potential synergies and improve impact and value for money attained via infrastructure projects.
- Enhanced digitalisation of the construction sector:** More effective integration of digitisation and technical innovation in the construction sector is needed. This will help to mobilise infrastructure project delivery, ensure projects get delivered in line with projected timelines and budgets and increase investor confidence so that the potential social and economic impact of new infrastructure projects is realised sooner. Digitisation and the advent in sensor technologies will also add to life cycle-asset management, prolonging the useful life of the asset and preserving value from an investment perspective. As national governments grapple with environmental policy changes and the transition towards a decarbonised economy the performance monitoring of infrastructure asset will require a more expanded list of key performance indicators.

Alignment of project opportunities with investor profiles and time horizons

There continues to be misalignment in time horizons between investors and those tasked with procuring infrastructure. Investors expressed concerns that governments do not understand the investor's perspective with regards to infrastructure as a product and how they evaluate and assess risk. Institutional investors are keen to invest in a financial vehicle that delivers a steady income stream, which serves to align with their long-term liabilities. In order to attract enhanced volumes of private capital, interviewees identified the need for more infrastructure vehicles which deliver the characteristics demanded by low-risk income-oriented investors. As the infrastructure asset class continues to evolve and mature, it is imperative that valuation techniques and standards are reviewed to remain relevant and maintain investor confidence. Completed transactions over the last five years show the burgeoning gap between valuations and transaction prices. The short-termism of fund manager decisions, reflected in the choice of discount factors for in-house valuation of assets, may explain this difference. More attention needs to be devoted to ensuring consistency in valuation principles and associated accounting standards.

In addition, investors highlighted the need to create financial vehicles that can bridge the short-term nature of decision makers in, for example, close-ended funds to the long-term investment horizon of infrastructure assets. It is noteworthy that many of the funding models and investment vehicles deployed in the infrastructure sector have been transposed from the real estate sector or from the private equities market. Interviews suggest that the success of any given funding model in any of the more mature investment asset class does not mean that it necessarily constitutes a 'best fit' for the infrastructure investment market. It certainly calls into question the effectiveness and levels of inherent innovation across the asset class. Furthermore, such an idea would seem on the surface somewhat counterintuitive, given the considered distinctiveness and diversification benefits investors aspire to attain from infrastructure investment. Further exploration is warranted around the creation of 'bespoke' models and investment vehicles within the infrastructure market which can reflect not only the investor profile and time horizon, but also the nature of the investment opportunity and its characteristics relative to the useful economic life of the asset.

Recommendations:

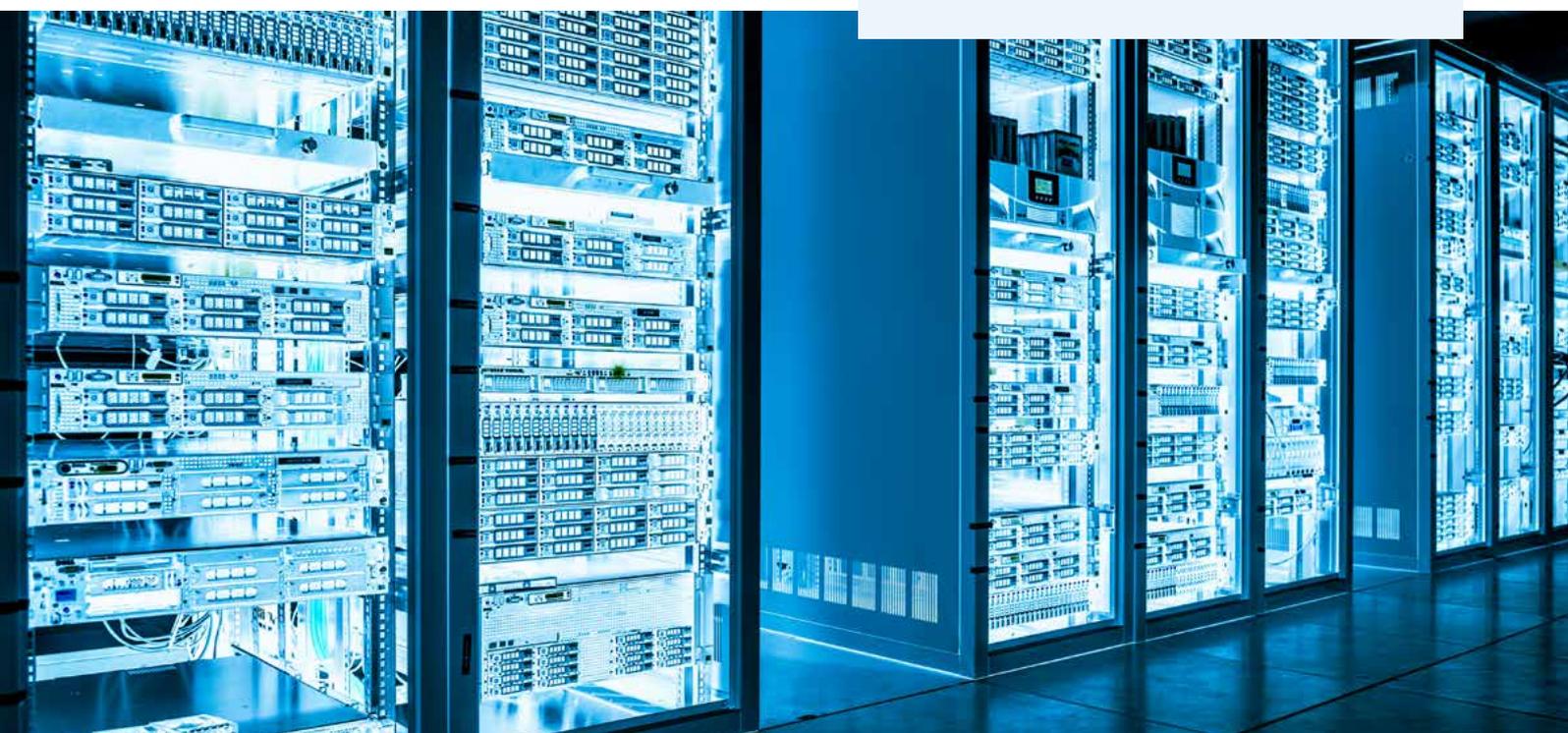
- **Alignment of financial and investment sources:**
The public sector needs to more effectively utilise the expanded range of infrastructure finance possibilities and the increasingly diverse range of investors seeking entry to the market and align these relative to the risk profiles of their development pipelines. By conducting national and regional infrastructure needs assessments and identifying and planning for future needs, the public sector can better align both current and future infrastructure projects with the sources of finance most suited to the risk profiles and nature of the projects – factoring in that not all 'essential' projects will be in a position to attract private investment.
- **Improving the efficiency of procurement, planning, and project delivery frameworks:**
From an investor viewpoint the procurement process seems unduly bureaucratic and elongated with projects taking much too long to transition through into viable investment opportunities. This research has highlighted that large volumes of private capital has been set aside for investment into infrastructure but the protracted procurement timelines means that money often ends up being deployed into other projects. The PPP model continues to occupy a prominent role in the delivery of global infrastructure. It is important that the model continues to afford flexibility and adaptability in order to retain confidence. The model has been subject to criticism with the UK, discontinuing its usage in 2018. Globally, PPPs remain an important vehicle for infrastructure delivery and represent an internationally-accredited framework for investment. It is important that the model continues to evolve and adapt relative to market conditions and societal expectations.

Enhanced performance data provision

A series of recent studies highlighted that institutional investors are seeking to realise the benefits of improved data provision and the opportunities afforded by more robust and sophisticated analytical techniques. Indeed, many investors identify harnessing data as a key driver of performance over the course of the next decade. While the infrastructure investment universe has accomplished marked strides in terms of transparency and performance benchmarking over the course of the last decade, performance assessment for this asset class remains very much in an embryonic state. Access to performance data within listed and unlisted infrastructure markets remains problematic, whilst 'selective' reporting practices undermine analytical rigour. Furthermore, the capacity to assess and present risk-adjusted performance in the same way as for other 'mainstream' asset classes will be critical to the continued growth and enhanced sophistication of the infrastructure asset class. Despite this, the absence of a centralised body or institution to regulate and validate performance data further adds to the fragmentation within the asset class.

Recommendations:

- Improve international valuation standards:** Valuation principles for infrastructure need to reflect the unique characteristics of infrastructure as an asset class and its associated cash flows. Infrastructure is a diverse asset class with very contrasting asset profiles and thus requires valuation standards which can account for this variety and instil investor confidence in the valuation process. RICS has a relevant role to play in developing international standards to reflect the global nature of the asset class and the underpinning characteristics of the various infrastructure subsectors.
- Improve reporting standards and performance analysis:** Industry and academia need to work more collaboratively to improve the transparency and consistency in reporting about the direct and unlisted infrastructure sector. Further work is needed to developing performance metrics that are more accurate and further research is needed to highlight which measures of performance are best suited to analysing infrastructure performance.
- Inception of regulatory data authority/ representative body:** The listed and unlisted infrastructure markets require a governing and regulatory body to improve standards of performance reporting and disclosure. This will enhance the growth and professionalism in the sector as it continues to mature and evolve.



Infrastructure investments exhibit unique risk exposures and value creation opportunities

As the infrastructure investment market matures and the number of investors seeking entry continues to grow, the intensity of competition means that yields have hardened markedly, with opportunities to 'capture value' (particularly in the secondary market) severely constrained. Infrastructure assets are by definition long-term investment options; thus, investors need to recognise and avail of the opportunities to enhance the value of infrastructure assets under management, if they are to achieve the anticipated returns over the longer term. Going forward, the performance attributes of 'real assets' will be to a large extent determined by the capabilities of asset managers across the asset lifecycle; capabilities which successfully integrate human know-how with real asset intelligence systems. Technology will serve to enhance the performance of real assets across all phases of the lifecycle affording greater operational efficiency and adding value.

As institutional investors seek to align their investment portfolios with their long-term liabilities, the potential to manage and add value to real assets under management will be a key dimension by which competing investors seek to differentiate their asset's performance from others. The elongated nature of infrastructure exposes investors to technical as well as political risk which are unique to this asset class. Within these confines it is imperative that present and future generations of asset managers and built environment professionals have the requisite competencies to benefit from real asset intelligent models and digitised operating systems. Equally, it is important to appreciate the downside risks of technical innovation for infrastructure investors that can result in premature obsolescence and/or contractions in demand. Whilst technical innovation will create opportunities for infrastructure investors, the speed of evolution means that many conventional assets may become 'stranded' or obsolete much sooner than anticipated. Meanwhile, policy change at national and international level also has the potential for huge impacts on the life-cycle of an asset. The most pertinent example is climate change and the commitment of G20 leaders to reduce carbon emissions, which will have profound implications for both current and future infrastructure provision.

Recommendations:

- **Risk awareness and appreciation:** Interview-based evidence indicates that the risk posed by technical innovation is not being priced into deals. The preservation of investor confidence in - and stability of - the infrastructure investment market, will depend on investor risk assessments and mitigation measures evolving and adapting in response to technical innovation.
- **Investment in lifecycle maintenance:** In order to protect asset value and prolong the economic life of the asset, there is a need to improve understanding and awareness of the costs and benefits of maintenance over the whole lifecycle of the asset. In the transition towards a more carbon-neutral society asset lifecycle management will assume even greater prominence. It is of increased importance owners, investors and asset managers are able to combine infrastructure know-how with technical innovations which serve to improve asset design, enhance operational efficiency and improve both the operational and financial performance of an asset over its lifecycle. Moreover, the ability to respond and adapt to policy and market demands (for example decarbonisation) will be key to preserving asset value and prolonging the asset lifespan.



12.0 References

ADB (2019) Hybrid Annuity Contracts for Road Projects in India, ADB South Asia Working Paper Series, No.68, December 2019, Available at: <https://www.adb.org/sites/default/files/publication/546641/swp-068-hybrid-annuity-contracts-india-road-projects.pdf>

Advisory Council on Economic Growth (2016) **Unleashing Productivity Through Infrastructure**. Available at: <https://www.budget.gc.ca/aceg-ccce/pdf/infrastructure-eng.pdf>

American Society of Civil Engineers (ASCE) (2016) **Infrastructure Report Card**. Available at: <https://www.infrastructurereportcard.org/>

American Society of Civil Engineers (ASCE) (2017) **Infrastructure Report Card**. Available at: <https://www.infrastructurereportcard.org/>

Ansar, A., Flyvbjerg, B., Budzier, A., and Lunn, D. (2016). Does infrastructure investment lead to economic growth or economic fragility? Evidence from China. *Oxford Review of Economic Policy*, 32, 360–90.

Asian Infrastructure Investment Bank (AIIB) (2020) **AIIB Annual Report and Financials**. Available at: <https://www.aiib.org/en/projects/summary/index.html>

Bai, C., Hsieh, C. and Song, Z. (2016). The long shadow of a fiscal expansion, *Brookings Papers on Economic Activity*, 60, 309–327.

Boston Consulting Group (2017) **15 Things to Know About Canadian Infrastructure**. Available at: https://static1.squarespace.com/static/59c96387268b96752fd6100/t/59d3ee32d7bdcef89793a/ee4/1507061319999/15_things_to_know.pdf

British Banking Association (BBA) /KPMG (2015) **Financing the UK's Infrastructure Needs**. Available at: <https://www.bba.org.uk/news/reports/financing-the-uks-infrastructure-needs/#.XN3KwNh7nX4>

Canadian Council for Public-Private Partnerships (CCPPP) (2020). Response to the Exposure Draft (PSAB 3160). Available at: <http://pppcouncil.ca/web/pdf/psab-ccppp-response-exec-summary-final-01202020.pdf>

Canadian Infrastructure Report Card (CIRC) (2019) **Monitoring the state of Canada's core public Infrastructure**. Available at: <http://canadianinfrastructure.ca/downloads/canadian-infrastructure-report-card-2019.pdf>

Casady, C. and Geddes, R. (2016) **Private Participation in US Infrastructure: The Role of PPP Units**. Available at: <https://www.human.cornell.edu/sites/default/files/PAM/CPIP/papers/Private%20Participation%20in%20US%20Infrastructure-online.pdf>

CMIE (2020) **An Overview of India's Economic Performance in 2017-18**. Available at: https://www.thehinducentre.com/multimedia/archive/03223/Economic_Survey_20_3223794a.pdf

DeGood, K., Weller, C. and Schwartz, A. (2017) **An Infrastructure Plan for America**. Available at: <https://www.americanprogress.org/issues/economy/reports/2016/07/14/1411157/an-infrastructure-plan-for-america/>

Della Croce, R., C. Kaminker, C. and F. Stewart, F. (2011) **The Role of Pension Funds in Financing Green Growth Initiatives**. *OECD Working Papers on Finance, Insurance and Private Pensions*, No. 10, OECD Publishing, Paris. Available at: <https://doi.org/10.1787/5kg58j1lwjld-en>

Della Croce, R. and Gatti, S. (2014) **Financing infrastructure – International trends**. *OECD Journal: Financial Market Trends*, vol. 2014/1. Available at: <https://doi.org/10.1787/fmt-2014-5jxvpb4jfrf1>

Department of Statistics Singapore (2019) **Singapore in Figures**. ISSN 2591-7889. Available at: www.singstat.gov.sg

Ehlers, T. (2014) **BIS Working Papers No 454. Understanding the challenges for infrastructure finance**. August 2014. Available at: <https://www.bis.org/publ/work454.pdf>

Ernest and Young (EY) (2015) **Building and operating the UK's infrastructure**.

European Commission (2012) **'Energy roadmap 2050'**. Available at: https://ec.europa.eu/energy/sites/ener/files/documents/2012_energy_roadmap_2050_en_0.pdf

- Finkenzyler, K., Dechant, T. and Schäfers, W. (2010) Infrastructure: a new dimension of real estate? An asset allocation analysis, *Journal of Property Investment & Finance*, Vol. 28 Issue: 4, pp.263-274, <https://doi.org/10.1108/14635781011058875>
- Friedmann, J. (2005) *China's urban transition*. Minneapolis: University of Minnesota Press.
- Garnder, D., & Wright, J. (2014) *Project Finance*. Available at: <http://www.hsbcnet.com/gbm/attachments/products-services/financing/project-finance.pdf>
- The Global Economy (2018). *Political Stability Index*, Available at: https://www.theglobaleconomy.com/rankings/wb_political_stability/
- Global Infrastructure Hub (2018) *Infracompass Report China*. Available at: https://infracompass.gihub.org/app/dist/static/country_reports/CHN.pdf
- Global Infrastructure Investment Index (GIII) (2014) *Second Global Index: Competing for Private Finance*. Available at: <https://www.arcadis.com/media/1/C/B/%7B1CB6A843-33B9-4738-8091-253FEBBA01AA%7D> Arcadis%20Global%20Infrastructure%20Investment%20Index%202014.pdf
- Global Infrastructure Investment Index (GIII) (2016) *Third Global Index: Bridging the Investment Gap*. Available at: https://www.arcadis.com/media/3/7/E/%7B37E96DF6-82D5-45A6-87D8-5427637E736D%7DAG1015_GIII%202016_ONLINE%20FINAL_SINGLE%20PAGES.pdf
- Haran, M., McCord, M., Hutchion, N., McGreal, S., Adair, A. and Kayshap, A. (2013) *The Global Infrastructure Challenge: The Role of PPP in a New Financial and Economic Paradigm*. Research commissioned by the Royal Institution of Chartered Surveyors (RICS). Available at: <http://www.rics.org/uk/knowledge/research/research-reports/the-global-infrastructure-challenge/>
- Haran, M. Lo, D. and Milcheva, S. (2019) *Performance and Persistence in Private Equity Infrastructure Funds*. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3329234
- HM Treasury. (2015). *Budget 2015*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/416330/47881_Budget_2015_Web_Accessible.pdf
- HM Treasury. (2018). *Budget 2018*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/752202/Budget_2018_red_web.pdf
- Inderst, G. and Stewart, F. (2014) *Institutional Investment in Infrastructure in Developing Countries*, World Bank Policy Research Working Paper, No 6780. Washington D.C.: World Bank.
- Indian Ministry of Finance (2020) *Economic Survey 2019-20*, Department of Economic Affairs, Ministry of Finance, Government of India, New Delhi.
- India Planning Commission (2012) *Twelfth Five Year Plan (2012-2017): Economic Sectors*. Available at: http://planningcommission.gov.in/plans/planrel/12thplan/pdf/12fyp_vol2.pdf
- Infrastructure Canada (2016) *Report on Plans and Priorities*. Available At: <https://www.infrastructure.gc.ca/alt-format/pdf/rpp/2016-2017-RPP-eng-FINAL.pdf>
- Infrastructure Canada (2018) *Investing in Canada: Canada's Long Term Infrastructure Investment Plan*. April 2018. Available at <http://www.infrastructure.gc.ca/pub/index-eng.html>
- Infrastructure Canada (2019) *Building a Better Canada: A progress report on the Investing in Canada plan 2016-2019 Catalogue No.: T94-12/2019E-PDF ISBN: 978-0-660-30777-0*. Available at: <https://www.infrastructure.gc.ca/alt-format/pdf/plan/icp-pic/icp-report-rapport-pic-eng.pdf>
- Infrastructure and Projects Authority (IPA) (2017) *Analysis of the National Infrastructure and Construction Pipeline*. Available at: <https://www.gov.uk/government/publications/national-infrastructure-and-construction-pipeline-2017>
- International Monetary Fund (IMF) (2013) *International Monetary Fund Annual Report 2013: Promoting a More Secure and Stable Global Economy*. (October 2013). Available at: <https://www.imf.org/en/Publications/AREB/Issues/2016/12/31/International-Monetary-Fund-Annual-Report-2013-Promoting-a-More-Secure-and-Stable-Global-40629>
- International Union of Railways (2014). *Railway Statistics 2016*, Synopsis.
- Kin, S.T. and Chen, H.W. (2017) *China's Belt and Road Initiative and What It Means*. Available at: https://www.uobgroup.com/assets/pdfs/research/FN_170518A.pdf
- Kirk, R., Mallett, W. and Peterman, D. 2017. *Transportation Spending Under an Earmark Ban*. Congressional Research Service, Washington, DC.
- KPMG (2017) *Accelerating infrastructure in Canada: a win-win success strategy*. KPMG Foresight: A Canadian infrastructure perspective. February 2017. Available at: <https://assets.kpmg/content/dam/kpmg/ca/pdf/2017/02/infra-bank-foresight-fy17.pdf>
- Lammam, C., MacIntyre, H., Ren, F. and Hasan, S. (2017). *The Cost of Government Debt in Canada, 2017*. Fraser Institute. Available at : <https://www.fraserinstitute.org/studies/cost-of-government-debt-in-canada-2017>
- Liu, M. (2018) *The New Chinese Foreign Investment Law and Its Implication on Foreign Investors*. Available at: <https://scholarlycommons.law.northwestern.edu/njilb/vol38/iss2/3>
- Lu, Y. and Sun, T. (2013) *Local Government Financing Platforms in China: A Fortune or Misfortune?* International Monetary Fund (IMF) Working Paper. Available at: <https://www.imf.org/external/pubs/ft/wp/2013/wp13243.pdf>
- McKinsey (2013a), *Infrastructure productivity: How to save \$1 trillion a year*. McKinsey Global Institute, January 2013. Available at: https://www.mckinsey.com/~media/McKinsey/Industries/Capital%20Projects%20and%20Infrastructure/Our%20Insights/Infrastructure%20productivity/MGI%20Infrastructure_Executive%20summary_Jan%202013.ashx
- McKinsey (2013b) *Chinese Infrastructure: The Big Picture*. Available at: <https://www.mckinsey.com/featured-insights/winning-in-emerging-markets/chinese-infrastructure-the-big-picture>
- McKinsey Global Institute (MGI) (2016) *Bridging Global Infrastructure Gaps*. Available at: <https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/bridging-global-infrastructure-gaps>
- McKinsey Global Institute (MGI) (2016a) *India's Ascent: Five Opportunities for Growth and Transformation*. (August 2016). Available at: <https://www.mckinsey.com/~media/mckinsey/featured%20insights/employment%20and%20growth/indias%20ascent%20five%20opportunities%20for%20growth%20and%20transformation/indias-ascent-executive-briefing.ashx>
- Melton, L. Dille, C., Zuriff, M., Eriksson, C., Cheng, I. and Pitman, K. (2017) *Infrastructure management: current practices and future trends*. (May 2017). RICS Insight.
- Ministry of Finance Singapore (2018) *Budget 2018: Together, A Better Future*. Available at https://www.singaporebudget.gov.sg/data/budget_2018/download/FY2018_Budget_Statement.pdf
- Ministry of National Development (MND) (2020) *Budget 2020*. March 2020. Available at: <https://www.mnd.gov.sg/our-work/budget-2020> (last Accessed 05/03/20).
- Monetary Authority of Singapore (MAS) (2016) *Annual Budget Statement*. Available at http://www.mas.gov.sg/annual_reports/annual20152016/Flipbook/files/basic-html/page49.html
- Murphy, D. (2018) *Infrastructure debt: a global perspective*. February 2018. Article by Aviva Investors. Available at: www.avivainvestors.com/en-gb/views/aig-investment-thinking/2018/02/infrastructure-debt-a-global-perspective/
- Nallathiga, R. and Shah, M. (2014) *Public Private Partnerships in Roads Sector in India in Public Private Partnerships: The Need of the Hour*. Edition: First. Chapter: 21 Edited by: Gangakhedkar, M., Mishra, S. and Sekhar, M. Bloomsbury Publishing New Delhi, India.
- National Assembly of China (2016) *In Pursuit of a "Moderately Prosperous Society": China's 13th Five-Year Plan*. Adapted by People's National Assembly of China (March 2016).
- National Audit Office (2015) *The choice of finance for capital investment*. HM Treasury. Available at: <https://www.nao.org.uk/wp-content/uploads/2015/03/The-choice-of-finance-for-capital-investment.pdf>
- National Development and Reform Commission (2017) *Catalogue of Industries for Guiding Foreign Investment*. Available at: http://www.fdi.gov.cn/1800000121_39_4851_0_7.html

- National Institution for Transforming India (NITI Aayog) (2017) **Vision, Strategy and Action Agenda**. Available at: http://www.niti.gov.in/writereaddata/files/new_initiatives/Revised_Presentation.pdf
- Office of the Parliamentary Budget Officer (PBO) (2019) **Infrastructure Update: Investments in Provinces and Municipalities**. March 2019. Available at: https://www.pbo-dpb.gc.ca/web/default/files/Documents/Reports/2019/Infrastructure%20Investments/Infrastructure_Update_03-20-2019_EN.pdf
- Organisation for Economic Co-operation and Development (OECD) (2015) **Improving Infrastructure in the United Kingdom Economics Department Working Papers No. 1244** (July 2015). Available at: [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ECO/WKP\(2015\)62&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ECO/WKP(2015)62&docLanguage=En)
- Poddar, S. (2014) 'Where there's a will there's not necessarily a way', **PEI Infrastructure Investor**, 2 October 2014.
- Preqin (2016) **Global Infrastructure Report**. Available at: www.preqin.com
- Preqin (2020) **Global Infrastructure Report**. Available at: www.preqin.com
- Preqin (2018) **Investor Outlook: Infrastructure**. (H1 2018). Available At: <https://docs.preqin.com/reports/Preqin-Investor-Outlook-Infrastructure-H1-2018.pdf>
- PwC (2013) **India: A Snapshot**. (Summer 2013). Available at: https://www.pwc.com/gx/en/capital-projects-infrastructure/assets/pwc_gridlnessnapshot-india2013.pdf
- PwC (2014) **Fit for the Future**. Available at: <https://www.pwc.com/gx/en/ceo-survey/2014/assets/pwc-17th-annual-global-ceo-survey-jan-2014.pdf>
- Reuters (2018) **Private Capital Boosts Infrastructure Financing**. Available at: <https://www.reuters.com/sponsored/article/private-capital-boosts-infrastructure-financing>
- Royal Institution of Chartered Surveyors (RICS) (2017) **Attracting infrastructure investment through International Standards**. Available at: http://www.seffrance.fr/images/documents/ru_rics_attractinginfrastructure_inv_09_2017.pdf
- Schanzenbach, D., Ryan Nunn, R. and Greg Nantz, G. (2017). **If You Build It: A Guide to the Economics of Infrastructure Investment**. Available at: http://www.hamiltonproject.org/assets/files/if_you_build_it_guide_economics_infrastructure_investment.pdf
- Silk Road Fund (2020) **Scope of Investment**. Available at: <http://www.silkroadfund.com.cn/enweb/23798/23805/index.html>
- S&P Global (2018) **Infrastructure Finance Outlook**. (Q3 2018). Available at: <https://www.spratings.com/documents/20184/1634005/IFR+Finance+Outlook+Q3+2018+Review/53c313a0-7982-0f1c-ad7d-22226304b303>
- Summers, T. (2016) China's 'New Silk Roads': sub-national regions and networks of global political economy, *Third World Quarterly*, 37:9, 1628-1643, DOI: 10.1080/01436597.2016.1153415
- Suyash, A. (2018) **Five things India Inc needs to do to lift corporate bond market**. Available at: <https://economictimes.indiatimes.com/markets/bonds/5-things-india-inc-needs-to-do-to-lift-corporate-bond-market/articleshow/66862522.cms?from=mdr>
- Tan, W. 2007. **Principle of Project and Infrastructure Finance**, New York: Taylor and Francis.
- The Economist (2011) **Keynes v Hayek in China** (November 17), Hong Kong.
- Transparency International (TI) (2019) **Corruptions Perceptions Index**. Available at <https://www.transparency.org/country>
- US Department of Transportation (USDOT) (2016) **Build America Bureau**. Available at: <https://www.transportation.gov/buildamerica/about>
- Wildua, G (2017) China's reliance on infrastructure stimulus at record high. **Financial Times** 24th August 2017. Available at: <https://www.ft.com/content/1fe4e1e8-88b0-11e7-bf50-e1c239b45787>
- World Bank Group (2017) **PPPs in India – will they regain their former glory?** Available at: <http://blogs.worldbank.org/ppps/ppps-india-will-they-regain-their-former-glory>
- World Bank Group (2019) **Doing Business 2019: Training for Reform. Comparing Business Regulation for Domestic Firms in 190 Economies**. A World Bank Flagship Report, 16th Edition. Available at: http://www.worldbank.org/content/dam/doingBusiness/media/Annual-Reports/English/DB2019-report_web-version.pdf
- World Economic Forum (2017) **Global Competitiveness Report 2017-18**. ISBN-13: 978-1-944835-11-8. Available at www.weforum.org/gcr
- World Economic Forum (2018) **Global Competitiveness Report 2018-19**. ISBN-13: 978-92-95044-76-0. Available at: <http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf>
- World Economic Forum (2020) **Global Competitiveness Report 2019-20**. ISBN-13: 978-2-940631-02-5 Available at: http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

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