CHAPTER 1

Principles and Application of Project Finance

ORIGINS AND HISTORY OF PROJECT FINANCE

Project finance is a highly versatile, if often misunderstood and misapplied, financing paradigm. There is no one single definition that succinctly captures project finance. Ostensibly, it is the long-term financing of infrastructure and industrial projects based upon the projected cash flows of the underlying project rather than the balance sheet of the project sponsors. Project finance refers to the financing of long asset life infrastructure, industrial and public assets, and services using non- or limited-recourse financing raised by an enterprise with a single line of business/finite asset life in accordance with contractual agreements.

Project finance is a tried and tested financial discipline that has been around for many centuries. The history and origins of project finance can be traced back to the 13th century when Italian banks financed a silver mine in Devon, England, with the loan repayment source being a lease over physical silver production from the mine. It has been used to finance maritime voyages to the new world in the 17th and 18th centuries with the merchant investors dividing the cargo spoils from returning ships. Project finance's application to infrastructure can be traced to the original construction of the Panama Canal and was key to financing wildcat upstream oil and gas investments in the early 19th century in the US along with the development of the North Sea oil fields in the 1970s and 1980s. The seminal market development that

established the modern version of long-term contract-based project financing was the oil crisis in the US in the early 1970s. The fears and concerns over energy dependence forged the passage of the Public Utilities Regulatory Policy Act (PURPA) in the US in 1978. PURPA served to open the US electricity market to non-utility generators (NUGs) in an effort to increase energy supply, which heralded the origins of deregulation of the US electricity sector. PURPA essentially required vertically integrated monopoly utilities to purchase power from NUGs at their "avoided cost," which is the cost a utility would pay to generate power itself. This opened the energy market up to what became known globally as the Independent Power Producer (IPP) market and created the ability to raise project financing on the back of long-term power purchase agreements with creditworthy electricity purchaser utilities.

WHY SPONSORS USE PROJECT FINANCE

Project finance is both a financing and a governance structure. It is based on the notion that project risks are identified upfront, allocated to those best able to bear them, and mitigated such that the residual risks are acceptable to lenders. While project finance risk analysis and mitigation is not unique to this asset class, the process of contractual allocation of risk is unique to project finance. Project finance is sometimes referred to as "contract financing." The scope of the project along with the financing and security arrangements granted to lenders are set out in a comprehensive set of contractual documents entered into by the project company—and identified project risks are effectively allocated to those parties best able to bear them via these project contracts.

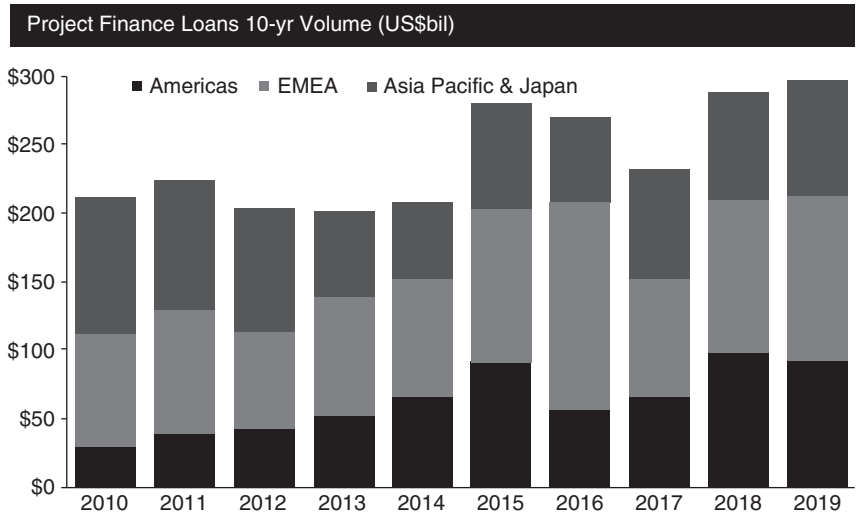
While there are many and varied reasons why project sponsors choose to use project financing versus on balance sheet corporate financing, according to Benjamin Esty it is to reduce capital markets imperfections or the net costs associated with the following:[1]

- ***Transaction Costs:*** Project finance deals generally take anywhere from 6 to 12 months to structure, negotiate, and execute the financing. The incremental legal, financial, and other costs associated with execution of the project financing can represent, on average, anywhere from 3% to 5% of total project costs. As such, transaction costs for project finance deals exceed comparable costs for corporate-financed deals.

- ***Asymmetric Information:*** Project finance capital providers to a greenfield infrastructure project—which is highly leveraged, thinly capitalized, and typically a single-asset special purpose company with no cash flows—require extra due diligence (independent consultants, insurance/legal advisors, and financial modeling), reporting, and controls (cash flow waterfall, financial and non-financial covenants, step-in rights, pledge of security/contracts, etc.). This reduces asymmetric information between lenders and owners/sponsors. The robust due diligence process that project finance lenders undertake also ensures that negative net present value (NPV) projects will not be undertaken as would be the case in corporate deals where project cash flows are co-mingled, fungible, and subject to cross-subsidizing between positive and negative NPV projects.
- ***Incentive/Agency Conflicts:*** Project finance helps reduce incentive/agency conflicts due to higher leverage/risk of default and assignment of most of the project cash flows toward servicing debt. This dissuades stakeholders (shareholders, governments, construction companies, operators, etc.) from cash flow diversion actions that would negatively affect the project. The high risk and high leverage typical of project finance deals would normally mean investors and creditors would require higher risk adjusted returns (as measured by the internal rate of return, or IRR) and a higher risk premium on debt, which in turn requires larger project cash flows and heightens the risk of stakeholder interference and adverse actions. The contract structuring and associated risk allocation, which is the essence of project finance, serves to mitigate and reduce risk and therefore reduce required project returns by investors and creditors, which in turn lowers incentive conflict.
- ***Financial Distress:*** Project finance reduces or eliminates project sponsor risk contamination as the legally independent special purpose vehicle (SPV) project borrower ensures the project debt is "off balance sheet" to the sponsor from an accounting treatment perspective. It is more difficult to achieve full "off credit risk" treatment as credit rating agencies typically take the view that the debt and the underlying project is an intrinsic and strategically core part part of the sponsor company's business operations. The sponsor would be viewed as never exercising its non-recourse rights ("walking away") should the project default. It is one of the main reasons integrated oil and gas majors such as Xon and Chevron typically do not use project financing

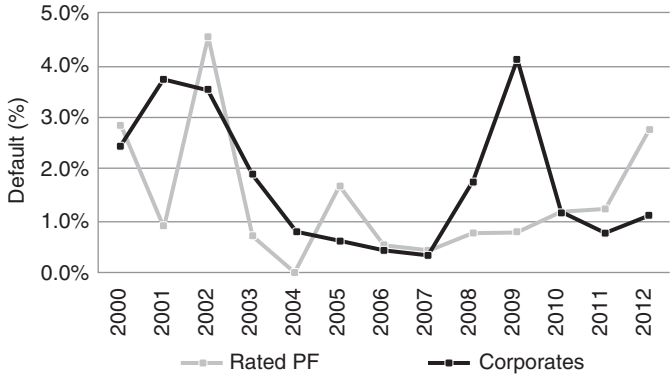
unless they need to accommodate a financially weaker joint venture partner or are seeking to mitigate country risk. However, it is exactly why a company like US IPP Calpine Corp with 95% debt-to-equity and a sub-investment grade rating was able to successfully raise $5 billion in project finance loans to construct 25 new power generation plants in the early 2000s.

PROJECT FINANCE—ASSET CLASS PERFORMANCE



Source: Refinitiv 2019 Global Project Finance Review.

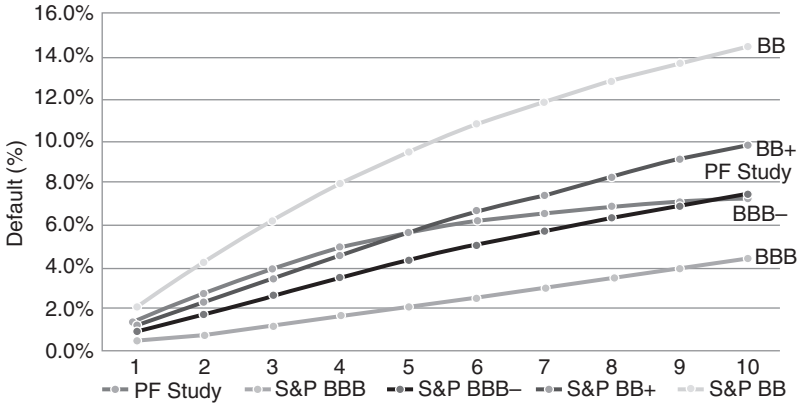
The global project finance market is relatively small—the total project finance loan market amounted to $297 billion in 2019—relative to the US leveraged loan market ($1.6 trillion) or the US capital markets ($3 trillion).[2] That said, project finance is a critical lynchpin for catalyzing and crowding in other forms of private sector capital (insurance companies, pension funds, infrastructure funds, sovereign wealth funds, private equity, etc.) along with development financial institutions (DFIs) such as multilateral and bilateral development banks and export credit agencies.



Source: S&P Global Market Intelligence, Annual Global Project Finance Default and Recovery Study, 1980-2014 (S&P Global Market Intelligence, 2016).

Notwithstanding that project finance involves financing a thinly capitalized, high leveraged single asset with no cash flows and material construction risks, it has proven to be a resilient asset class able to withstand adverse, unexpected external events. A Standard & Poor's (S&P) 2016 study analyzed project finance default rates and recovery from 1980 to 2014.[3] The study covered over 8,000 projects across all industries and geographies. The S&P study revealed that the project finance annual default rate peaked in 2002–03 at around 4.8%; however, since then the annual default rate has averaged 1.5% per annum compared to 1.8% annual average default rate for secured corporate lending. The 2002–03 peak in project finance defaults resulted from the following coterminous macroeconomic events:

- The 2001 Argentina sovereign debt default and currency devaluation, which negatively affected natural resource (mainly oil and gas) and power projects;
- The 2002 US energy crisis resulting from the bankruptcy of Enron (at the time the largest corporate bankruptcy in US history), which caused the US and European energy markets to decline, resulting in increased project defaults and the demise of the merchant power sector;
- The 2002 dot-com Internet asset bubble collapse, resulting in telecom corporate defaults (WorldCom, Global Crossing, etc.)



Source: S&P Global Market Intelligence, Annual Global Project Finance Default and Recovery Study, 1980-2014 (S&P Global Market Intelligence, 2016).

The S&P study found that the annual marginal default rate for the project finance deals correlated to a sub-investment grade double B rating in years 1–3 following financial close and trended toward single A investment grade by year 10. The study also confirms that highest project risk is in the first 3–5 years during the construction period and initial operational ramp-up. Default rates fall dramatically after year 5 as an operational track record is achieved and stable cash flows are established such that the 10-year cumulative default rate equates to triple B investment grade rating. Approximately 75% of all project finance loan defaults occur in the first 5 years. Annual marginal default rates decline dramatically after year 3–5, and by year 10 they are close to single A-rated corporate issuers. Not surprisingly the majority of project finance loan defaults occurred in the power sector (36%) due to the historic collapse of the US merchant power sector and effect of the Enron default as well as renewable energy loan defaults in Europe due to reduction/elimination of subsidies and feed-in-tariffs arising from fiscal austerity measures implemented by Spain and Italy and other countries in the aftermath of the 2008 financial crisis. Infrastructure project defaults were 24% due mainly to the spike in toll road loan defaults in European countries (Greece, Portugal, Italy, Spain) following the 2008 financial crisis. Despite thin capitalization, high gearing, and long loan tenors, project finance loans are structured to be very robust and resilient to a wide range of potential risk events and to minimize any post-default economic losses. The S&P study demonstrates that risk allocation, structural features, underwriting disciplines, and

incentive allignments have proved effective. The key structural features of project finance loans that serve to reduce default risk include:

Effective Contractual Risk Allocation: Construction risk is typically mitigated via fixed price, date-certain turnkey Engineering, Procurement, and Construction (EPC) contracts with performance guarantees and liquidated damages (LDs) or penalties for delay and performance shortfalls. Revenue risk is typically addressed via predictable, resilient cash flow streams based on long-term offtake contracts with firm take or pay obligations provided by strong, creditworthy offtakers. Demand/volume risk and price risks are typically risk transferred to the offtaker. Project finance lenders do not finance against the full term of the offtake contract and usually require a 2–3 year "contract tail" between the loan maturity date and the offtake contract termination date.

Covenant Structure: Serves to control the project scope and constrains the project company against deviating from its core business activity. Protective forward-looking covenants, reserve accounts, cash traps/cash sweeps, dividends distributions tests, and other structural features mitigate liquidity risk. These measures serve to insulate the project from unexpected cash flow stress scenarios.

Project Due Diligence: Lenders' advisors (independent technical consultant, market consultant, legal advisor, insurance consultant, etc.) produce due diligence reports identifying all risks and recommend risk allocation/mitigation. Effective risk allocation is materially achieved in large part via detailed due diligence and appraisal of project life cycle operational and maintenance costs. Detailed financial models are developed using lenders base case assumptions and stress test sensitivity analysis derived from the various due diligence reports. The third-party due diligence also ensures that negative NPV projects are not undertaken.

Detailed Terms Sheet and Negotiation of Financial Terms: The rigorous and robust term sheet negotiations between lenders and project sponsors ensures that all risks are identified/allocated/mitigated such that residual risk is within acceptable parameters (i.e., bankable). The integration of the due diligence risk identification and the underlying project finance model provides a comprehensive basis for detailed

negotiations and agreement on lending terms and conditions between project sponsors and lenders. This serves to ensure that all critical risks are clearly allocated and assigned such that residual risks that remain with the project borrower are acceptable to lenders.

Proactive Monitoring by Agents: The scope of information reporting/monitoring in project finance is much greater compared to corporate lending. During the construction period, for example, project finance borrowers are typically required to furnish monthly construction reports to lenders, and in some cases the loan distributions during construction are subject to "cost to complete" tests by the lenders' independent engineer to ensure there are sufficient debt and equity proceeds available to complete the project. Physical and financial completion tests (typically 90 days) may also be required by lenders and subject to the independent engineer's sign off. Monitoring and reporting requirements during the operational period include quarterly financial reports, notice of any material changes or developments, compliance with negative and positive covenants, as well as financial covenant tests when the cash flow waterfall is run every quarter or semi-annually (minimum Debt Service Coverage Ratio, or DSCR, maintenance of a Debt Service Reserve Account, dividend distrubution tests, etc.).

The S&P study indicates that post-default project finance loans achieve a high loan recovery rate—averaging 79.5%, or almost 80 cents on the dollar—with ultimate loan recovery rates much higher for restructuring/workouts versus distressed loan asset sales. The loan recovery rates for project finance loans are almost twice the loan recovery rates of comparable secured corporate loans, which average 45%. Over 50% of project finance loan recoveries are in the 90–100% range with a median of 92%, so it is effectively a barbell distribution with some lenders recovering close to 100% while other lenders recover minimal amounts.

Project finance characteristics that mitigate loss given default (LGD) and result in higher post-default loan recovery rates include:

Covenant and Security Package: Project finance lenders have a first-priority security interest in all project assets, shares, contracts, insurance policies, and cash flows. Allied to this, they also have a "step-in" regime (remedy, cure rights) pre-agreed with the project

company's key project contract counterparties. This provides lenders with sufficient time to remedy a default (for example, replacing the project operator) and as a result, threshold covenants may be triggered before lenders incur any economic loss. Pre-agreed inter-creditor rights covering decision-making and voting rights in respect to enforcement and acceleration actions also serve to make the process more efficient.

Structural Mitigation: The legal sanctity of the senior secured preferred creditor status of project finance lenders—and the ringfenced/bankruptcy remote nature of the project SPV—helps to ensure that other creditors cannot emerge during bankruptcy proceedings, or the administrative process of project shareholders or related project parties, and attach claims against the project assets and contracts.

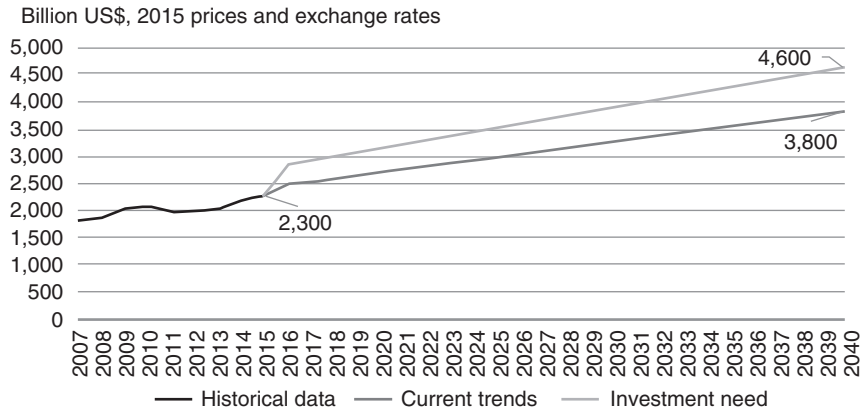
Strategic or Essential Nature of the Project: The robust nature of project finance structuring negotiations serves to achieve optimum stakeholder alignment and a balanced sharing of risk-adjusted returns across all stakeholders. The underlying philosophy that determines project success or not is essentially "If it's not fair, it's not sustainable." There are many examples of failed projects that can be traced back to an unequal or imbalanced sharing of the project economics among shareholders. Many people think that the financing is concluded at financial close when the reality is that financial close is just the beginning. For any project to overcome the unexpected economic events that will inevitably happen, there needs to be strong stakeholder interest alignment and a mutual incentive to find ways to ensure the project overcomes these external shocks. The commercial, economic, and strategic alignment that underpins the importance of a project ensures that project structures have built-in incentives for project stakeholders to mitigate economic loss.

GLOBAL INFRASTRUCTURE OUTLOOK

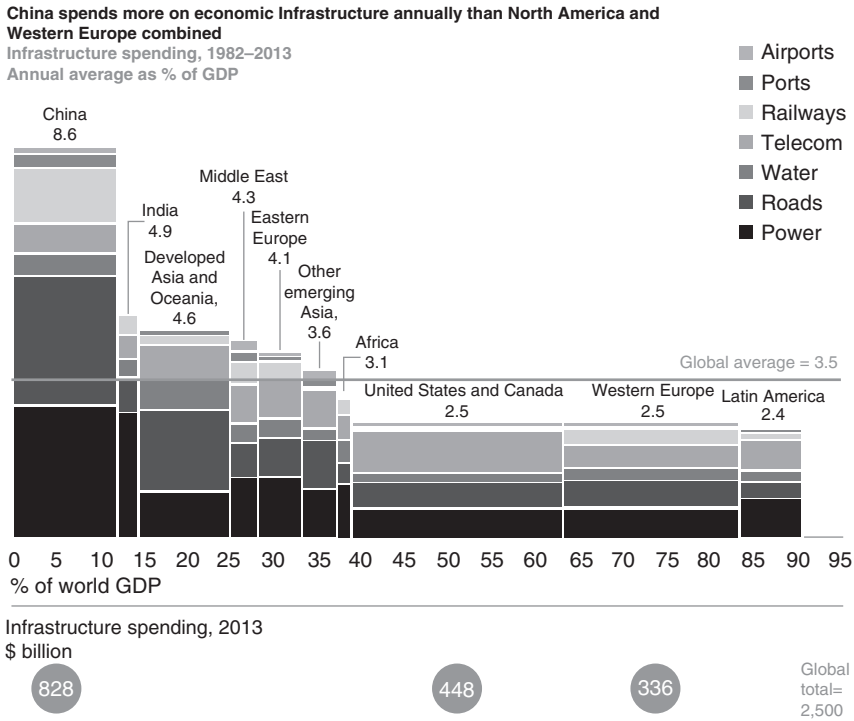
Infrastructure investment is a critical enabler of social and economic progress and development. The socioeconomic return on infrastructure investment is approximately 20% according to a June 2016 study by McKinsey Global Institute.[4] Thus, in effect, $1 of extra infrastructure investment increases gross domestic product (GDP) by 20 cents. The Asian Development Bank (ADB)

arrived at a similar conclusion, determining that the elasticity of total output to infrastructure investment is 0.20–0.40.[5] Yet despite the overwhelming evidence that infrastructure investment is a positive catalyst for improved capital and labor mobility, as well as increased productivity and knowledge transfer within and across economies, emerging market countries in Asia and Latin America—as well as the developed economies of the US and Europe—show a widening gap between actual, current infrastructure spending and infrastructure needs. Several industry estimates suggest that the global investment spend on infrastructure is approximately $2.5 billion per annum versus the $3.5–3.7 billion per annum estimated to be required to support and underpin current and projected economic growth.

The Global Infrastructure Hub estimates infrastructure needs at $94 trillion between 2016 and 2040, or $3.7 trillion per year, equivalent to the annual GDP of Germany.[6] This is 19% or about $18 trillion higher than current infrastructure spending trends. Globally, we are currently allocating about 2.5–3% of GDP toward infrastructure spending when we need to be allocating 3.4–3.7% of GDP to meet future economic growth. Meeting the UN's Sustainable Development Goals (SDG's) for drinking water, sanitation, and access to electricity will require a further $3.5 trillion of infrastructure investment by 2030.[7] Asian economies represent the greatest infrastructure investment requirements from 2016–2040 at over 54%, of which China is 30% or $28 trillion of the total.



Source: Global Infrastructure Hub, Global Infrastructure Outlook, Global Infrastructure Hub, Global Infrastructure Outlook, (Global Infrastructure Hub and Oxford Economics 2017).



1. Percentage of world GDP generated by the 75 countries in our analysis for 2013.
2. Includes Australia, Hong Kong, Japan, New Zealand, and Singapore.
3. Includes Bangladesh, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand, and Vietnam.

Source: McKinsey Global Institute, Bridging Global Infrastructure Gaps.

While Asia and particularly China have the largest infrastructure needs, these economies are outspending the rest of the world; Asia is investing on average about 5% of GDP on infrastructure compared to 2.5% in the case of US, Europe, and Latin America. In fact, China spends more on infrastructure as a percent of GDP than the United States, Canada, and Western Europe combined.[8]

A major cause for the widening infrastructure gap in emerging markets is increases in public debt to GDP, which constrains public financing options, while many Western economies have significantly reduced infrastructure spending due to fiscal austerity following the 2008 financial crisis. Measures that could increase the flow of private sector institutional investor capital

toward infrastructure investment and unlock part of the estimated $120 trillion of institutional capital across banks, pension and insurance companies, infrastrucure funds, and private equity along with sovereign wealth funds include:

- Accounting treatment—changing the way that governments account for infrastructure spending by depreciating the cost over the project life cycle versus incurring as an upfront budget expense;
- Better pipeline of well developed/bankable projects—more effective and efficient project selection/management, land acquisition/permits in place along with a one-stop shop national infrastructure agency that prioritizes which projects will proceed;
- Improved risk-adjusted returns for investors—many projects are awarded based on lowest construction cost bids versus total life cycle costs. Ultimately cost overruns are passed on to, and borne by, taxpayers;
- Bundling infrastructure assets to address transaction costs and illiquidity. There is pent-up demand on the part of pension funds and insurance companies for infrastrucure investment assets as they provide optimal alignment and matching of assets and liabilities; and
- Better cross-border coordination and real market transperancy and standarization.

THE INFRASTRUCTURE GAP IN EMERGING MARKETS

Emerging markets will constitute an increasingly larger share of the global infrastructure market as economic growth shifts from slower growth developed markets to faster growing emerging markets. Global challenges such as population growth, urbanization, and climate change are accelerating the critical need for infrastructure investment in emerging markets. Two-thirds of the estimated $69 trillion of global infrastructure investment needs from 2017–2035 will come from emerging markets with Asia constituting 54% and China and India combined representing 42%.[9] McKinsey notes that at the current rate of infrastructure investment spending, the shortfall or gap in infrastructure spending will be 11% or $350 billion per year.

Government debt has increased over the last ten years, with average debt-to-GDP levels for developing countries approaching and exceeding 50%—debt levels not seen since the 1980s. These fiscal constraints on

government spending have led to declining public spending on infrastructure and exacerbated the infrastructure spending gap.

FOCUS—ASIA INFRASTRUCTURE NEEDS

Infrastructure is a critical catalyst for reducing poverty, driving economic growth, and improving quality of life. Despite significant infrastructure investment in Asia, the continent still has over 400 million people with no access to electricity, 300 million with no access to safe drinking water, and 1.5 billion people lacking basic sanitation. In 2009, the Asia Development Bank (ADB) produced a report analyzing infrastructure investment (defined as transport, power, telecommunications, and sanitation) requirements for developing Asia in 2010–2020.[10] The study covered 35 of the 45 Asian developing member countries (DMCs) and covered four sectors: electricity, transportation, telecommunications, and water and sanitation. The report estimated that total infrastructure investment needs (the gap between current infrastructure investment spend and projected needs) between 2009 and 2020 would be slightly less than $8 trillion or about $750 billion per year.

In 2016, the ADB updated its 2009 report for the period 2016–2030 and significantly increased the estimation of infrastructure needs in Asia to $22 trillion or $1.5 trillion per year—effectively a 100% increase from the $750 billion per year estimate in 2009.[11] This was based on an assumption that economic growth would range from 3% to 7% across Asia. In terms of GDP spend, the $22 trillion of projected infrastructure needs represents 2.4% per annum of Asia's annual GDP—5% when China is excluded. The ADB also studied the cost impact of climate change (cost of climate mitigation primarily related to greenhouse gas reduction in the power sector and climate-proofing transport infrastructure). The ADB estimated the incremental climate change investment costs were $4 trillion between 2016 and 2030, bringing the total infrastructure investment needs for Asia to a staggering $26 trillion or $1.7 trillion per year for the region. East Asia (primarily China) accounts for 60% of the $26 trillion investment need while power and transporation represent over 80%. Asia currently invests $880 billion per year on infrastrcuture, resulting in an infrastructure gap of 50% or 2.4% of annual GDP (5% when China is excluded). While China has been one of the largest infrastructure investors in the world (spending around 8–10% of annual GDP over the last decade), it still has a long way to go to close the gap with developed countries in terms of the level or stock and quality of infrastructure. For example, the stock of

road transport infrastructure in China is $283 million per square km. This compares with $1.275 billion per square km in OECD countries.

The ADB report highlights the escalating challenge of meeting the growing infrastrucuture needs of the 45 countries comprising developing Asia, which will reach $22 trillion (factoring in climate change mitigation increases the infrastructure gap to over $26 trillion) over the next 15 years according to the ADB. The scale of the numbers should serve as a rallying call to mobilize and prioritize both private and public sector support for infrastructure investment solutions. The solutions required to close the infrastructure gap in Asia will be many and varied, from unlocking private sector finance and investment in infrastructure to public sector tax and spending reforms while maintaining public debt sustainability. Equally important, the public sector needs to establish robust regulatory frameworks to encourage private sector investment and participation in infrastructure.

ENDNOTES

1. Benjamin Esty, *The Economic Motivations for Using Project Finance* (Harvard Business School, 2002).
2. Refinitiv, *Global Project Finance Review* (Full Year 2019), 2.
3. S&P Global Market Intelligence, *Annual Global Project Finance Default and Recovery Study, 1980–2014* (S&P Global Market Intelligence, 2016).
4. McKinsey Global Institute, *Bridging Global Infrastructure Gaps* (McKinsey & Company 2016).
5. Asian Development Bank, *Meeting Asia's Infrastructure Needs* (ADB 2017) Manila. © ADB. https://www.adb.org/publications/asia-infrastructure-needs.
6. Global Infrastructure Hub, *Global Infrastructure Outlook* (Global Infrastructure Hub and Oxford Economics 2017). Licensed from the Global Infrastructure Hub Ltd under a Creative Commons Attribution 3.0 Australia License. To the extent permitted by law, the GI Hub disclaims liability to any person or organization in respect of anything done, or omitted to be done, in reliance upon information contained in this publication.
7. Global Infrastructure Hub, *Global Infrastructure Outlook* (Global Infrastructure Hub and Oxford Economics 2017).
8. McKinsey Global Institute, *Bridging Global Infrastructure Gaps*.

9. McKinsey Global Institute, *Bridging Global Infrastructure Gaps: Has the World Made Progress* (McKinsey & Company 2017).
10. Asian Development Bank, "Infrastructure for a Seamless Asia" (ADB 2009) Manila. © ADB. https://www.adb.org/sites/default/files/publication/159348/adbi-infrastructure-seamless-asia.pdf.
11. Asian Development Bank, *Meeting Asia's Infrastructure Needs* (ADB 2017) Manila. © ADB. https://www.adb.org/publications/asia-infrastructure-needs.