

Global Infrastructure Report 2016

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GLOBAL MARKET OVERVIEW

Over USD \$57.0 trillion of global infrastructure projects to be constructed over the next 15 years (according to the McKinsey Global Institute). With global financial liquidity at its highest level in history, global institutional investors (“**Investors**”) are scrambling to determine the best infrastructure projects (“**Projects**”) to invest. Since many Projects issuing bonds that are guaranteed by sovereign guarantees or international quasi-governmental/NGA financial institutions, Investors see lower risk than other cross border private equity investments. Returns are being pushed down as the demand for projects exceed supply for those with AA- AAA credit rated financial guarantees.

According to Preqin’s recent survey, 2015 finalized with 661 projects completed at an estimated cost of \$349 billion or \$527 million per project average while 2014 saw 914 projects completed for an estimated \$444 billion or \$485 million per project average. Projects continue to grow larger and more concentrated.

After the 2008 market collapse, many projects were stalled until 2012 and just commenced again in 2013, finishing a backlog of numerous projects at lower costs in 2014 and 2015 which may also be a part of the disparities shown. 2015 was a stabilization year and it is anticipated that 2016 will see an increase in projects generated and completed over an average cost above \$550 million per project.

Of the new infrastructure funds closed in 2015, over 2/3 have met or exceeded their initial target raises showing excess demand. In 2015, over 75% of respondents stated performance of their existing infrastructure fund investments exceeded their expectations in performance and returns. These large scale projects allow large institutional investors a much lower risk profile especially when World Bank and/or sovereign guarantees are in place.

Though, early stage economies (formerly known as emerging or developing economies) are highly targeted for Projects worldwide, a new emergence for the mature markets like Europe, the United States, and Japan are seeing a growth in non-governmental financed projects in power generation, general roadway infrastructure, plus growing telecommunication networks. The BRICs continue developing Projects through traditional PPP, World Bank and IMF funding mechanisms, and sovereign guarantee issuances.

The early stage economies, most countries in Africa, parts of Asia, and parts of Mexico and Latin America and more specifically, Ghana, South Africa, Ethiopia, and Kenya in Africa, Mongolia, Vietnam, Sri Lanka, Thailand, and Cambodia, and lastly, Mexico, Columbia, Haiti, Chile, and Peru, are all entertaining creating a positive capital market environment to attract foreign direct investment (“**FDI**”) for new Projects to enhance transportation networks, telecommunications, power generation, water supply and treatment, and tackling rapid urban growth issues.

Just in the next two years alone, new Projects just announced (and financed) in 2015 exceed \$406 billion total value.

These Projects include:

- i) North America has twelve (12) Projects at a cost of \$77 billion, ii) Latin America has nineteen (19) Projects at a cost of \$35 billion, iii) Eurasia has nine (9) Projects at a cost of \$37 billion, iv) MENA (Middle East North Africa) has twenty (20) Projects at a cost of \$94 billion, v) Sub-Saharan Africa has eight (8) projects at cost of \$13 billion, plus vi) Asia/Oceania has thirty-two (32) projects at cost of \$150 billion.

EMERGING TRENDS

Trends 1. Governments take action to unclog the pipeline

At the G20 Summit in Brisbane in November 2014, infrastructure became one of the hottest topics in global agenda, governments around the world committing themselves to helping narrow the infrastructure gap by implementing more efficient approval processes and reducing barriers to private foreign direct investment (FDI).

The chart to the right shows the difference in attitude towards greater allocations for infrastructure development. New Projects create immediate jobs but enhance the fabric of the economic community especially when spent on telecom, roadway, and passenger rail projects that enhance everyday life by decreasing the delivery time for the information and physical goods and services in burgeoning economies.

Trends 2. Investment becomes more competitive

Increased large scale equity flows into the industry drive up competition for projects by equity sources which, in turn, pushes down the yields on low-risk transparent infrastructure investments across the globe. From KPMG Global Infrastructure's perspective, over the long term, this shift may well be the tipping point that ushers in 50 years (or more) of prosperity (assuming a stable world economy) as capital starts to match up with projects which, in turn, will drive economic growth in their local markets. Infrastructure investment is one of the rare asset classes that has long term stability in returns, typically with monopoly power such as utilities, and somewhat inelastic pricing structure for their service or product.

Trends 3. Political and Regulatory risks rise up the agenda

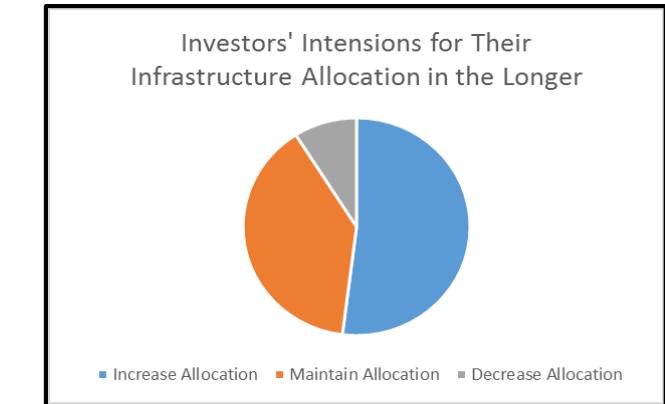
Politics always drive public infrastructure projects. Public debate pushes whether the costs justify the investment from the community and from FDI and local private capital investors. Especially, on power generation projects, local politics often define additional risks for execution and delay. As the world economy approaches stabilization, infrastructure projects become more reliable for current income and large scale investments can be made.

Trends 4. Asset Management gets sophisticated

Recent years see a new trend in infrastructure area, the owners prefer more on maximizing the performance of the assets other than buying new assets. Meanwhile, advances in technology provide method for sophistication of asset management. Given the development of technology in Internet of Things, robotics and data/analytics, it's obviously that application of advanced technology stimulate more sophisticated approach to asset management. Through better management of operational efficiency, the assets arrive better management of demand and capacity, reduction of maintenance costs and delivery of improved customer service, then stimulate full potential of investments.

Trend 5. Investors prefer long-term Infrastructure Allocation

In terms of the survey by preqin, the outlook still seems positive for the continued growth of the asset class, most of respondents stated that they intend to increase allocation over the long term. Given the fact that current allocation to infrastructure is only 4.3% of total assets under management, but as investors become more experienced and comfortable with the risks related to infrastructure, we may see an increase in infrastructure. The investors who stated would maintain their current allocation occupies 39%.



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Trend 6. Multilaterals and development banks change their roles

Even though some developing markets, such as Asia, Africa and South America, are still lacking in long-term capital, there is now a growing pool of debt and equity available for investment into infrastructure. Open the door for long-term capital for infrastructure investments and renewal is an irresistible trend. Now there is a significant shift in operating model and performance targets of the world's multilateral and development banks. The trend is that development banks and multilateral institutions are moving towards targets related to the amount of private sector capital. For instant, the Asia Development Bank changes its engagement model and focuses on development stage of a project.

Trend 7. Technology align with infrastructure

50 years ago, infrastructure almost has no relationship with innovation and technology and no fundamental change in the type of infrastructure built 50 years ago. The combination between technology and infrastructure fundamentally disrupting the way we plan, design, develop and operate our infrastructure. Also, demand for technology is catalyzed by growing alignment between "macro" infrastructure requirements and "micro" consumer decisions. At same time, demand from customers accelerate growing of technology and innovation. To some degree, increasing demand decrease cost of technology.

Trend 8. The gap between public and private narrows

Public-Private Partnership (PPP) has become a popular model in infrastructure investment since 1980s. Usually, private sector been seen more professional than public sector at procuring and delivering infrastructure. While public sector capability and capacity have significantly improved, through investing experience and compensated resources. Even though in the last a few years, government still leverage the specialized expertise of private sector in key segments, such as ports, airports and transportation, gap between private sectors and public sectors is narrowing. In the future, investors expect the private and public sectors cooperate to achieve ever-high level standard and no "ideological" rounds in the future.

Trend 9. Security becomes a mainstream issue

As the size and frequency of physical attacks, natural disasters, and cyber-attacks are increasing in recent years, governments, regulator and owners worry about the security of their infrastructure. For instance, terrorism attacks happened in Syria, France and U.S, bringing devastating and far-reaching consequences. And as geopolitical tensions grow, cyber-attackers become more sophisticated, the threat of cyber-attacks on infrastructure is increasing. Most of governments escalate national security level, in order to protect valuable data, assets, economy and their citizens. While, few of the investors and executives of infrastructure realize main elements of cyber-attack risk. In the future, enhancing cyber protection should be considered larger portion of infrastructure budgets, in order to protect both physical and cyber security.

Trend 10. Cities focus more on urban mobility

No one denies that urban core areas remain the engine of economic growth in most countries, especially early stage economies converting from rural to industrial and post-industrial societies. Urban mobility in conjunction with advanced social and telecommunications technologies have caused rapid commuter congestion, logistics concerns, increased concentration of pollutants, and greater disparity of resource allocation between the well-educated technocrats and bureaucrats and untrained labor. Rapid urbanization while creating fast wealth and a sense of great opportunity, does create stress on the social and economic fabric that requires strong institution building. Though increased urban mobility and urbanization may bring increased productivity and land values, other institutions for social services especially education and welfare must match the scale of the new infrastructure Projects set in place.

PROJECT BENEFITS

- 1. Competitiveness.** Even though, we should avoid “ideological” rounds on private and public decisions being made, a Project should fit overall development of economic needs/requirements within a country, region, or a state. The Project should have a clear purpose and estimated contributor to a region’s prosperity.
- 2. Productivity.** A Project brings efficiencies or value to the prosperity of a region. For example, the ITS program in Singapore increases efficiency capacity and manage traffic cash flow, as increasing population and limited land. In some developing countries, PPPs are focusing more on clean energy. Westmill Solar Park, located at Oxfordshire, is the UK’s first and world’s largest cooperatively run, community-owned solar farm. The project consists of 30 acres of over 20,000 panels, reducing CO2 emission by 1800 tons per year and generating enough clean electricity to power 1,400 homes.
- 3. Multiplier Economic Effect.** There are clear economic benefits to G20 countries’ increased public spending on infrastructure Projects, especially the “multiplier effect” of an increase in spending of 1% of real GDP running as high as 2.5% in a three-year period. Usually, the multiplier effect is much greater in early stage economies than for more developed countries.
- 4. Job Creation.** According to Okun’s Law, unemployment falls by 1% when GDP rises by 3% in early stage economies while mature markets, general equilibrium modeling is useful. However, in the US economy, an increase of 1% of real GDP will add far in excess as 730,000 jobs to the U.S economy.

Effects of Infrastructure on GDP and Jobs		
(Ranked by multiplier effect, highest to lowest)		
Country	Multiplier effect (2015~2017)	Projected job (Maximum above baseline)
U.K	2.5	343,000
Brazil	2.5	418,000
China	2.2	2,400,000
India	2.0	1,360,000
Argentina	1.8	68,000
U.S	1.7	730,000
Japan	1.5	211,000
Canada	1.4	61,000
Italy	1.4	136,000
France	1.3	109,000
Mexico	1.3	193,000
South Korea	1.3	95,400
Germany	1.2	157,000
Indonesia	1.0	320,000
Australia	1.0	38,680
Eurozone	1.4	627,000

GLOBAL INFRASTRUCTURE PROJECTS

Global Transportation	Value USD MM	Country/Region
Ghana Railway System	30,000	Ghana
Etihad Rail Projects	15,400	United Arab Emirates
SE Asia Rail project	10,000	China/Laos/Thailand
North-South Railway Project-Hanoi to Vanh	2,300	Vietnam
Jordan National Railway Project	1,390	Jordam
The Copper Railway Tbilisi Railway Bypass Projects	989	Angola
	450	Geogia
Texas Central Railway	10,000	United States
Alexandria -Cairo High Speed Train	9,800	Egypt
North-South Railway Project	3,700	Philippines
All Aboard Florida Hi-Speed Rail Project	2,000	Unite States
Gateway Tunnel	2,000	United States
Beijing International Mega-Airport	11,200	China
Nigeria High Speed Rail	13,000	Nigeria
Rail Baltica	5,100	Europe
Transcontinental Railroad	2,900	Brazil
Mombasa-Kigali Railway	13,500	Mombasa
Zagreb Airport	387	Croatia
Yamuna Expressway	1,900	India

Urban Mobility	Value USD MM	Country/Region
Delhi Metro	2,300	India
Eglinton Crosstown		
Light Rail Transit	5,850	Canda
Garden Bridge	253	British
Liefkenshoek Railway Connection	1,000	Belguims
Moscow Central Ring Road	4,200	Russia
North West Rail Link	7,700	Australia
Ohio River Bridges	2,300	United States
Panama City Metro	2,000	United States
Qatar Orbital Highway Project	1,700	Qatar
Queensferry Crossing	1,300	British
Riyadh Metro	2,250	Saudi Arabia
Stockholm Metro Expansion	3,900	Sweden
Valley Line Light Rail Transit Stage 1	1,600	Canada
WestConnex	10,700	Australia
Cross Island Line	23,000	Singapore
Cario Metro Line 4	3,600	Egypt
City Rail Link	2,800	New Zealand
Sao Paulo Metro Lihna 6 PPP	2,600	Brazil
Soekarno-Hatta International Airport		
Manggarai Railway	2,600	Pakistan

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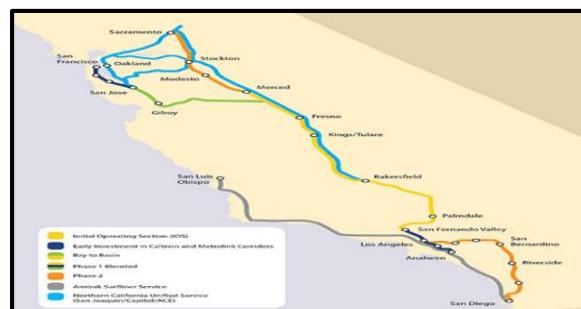
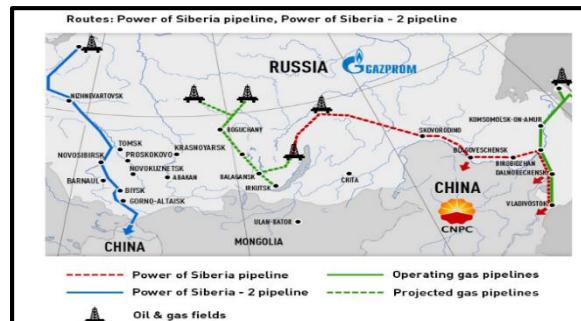
Energy & Natural Resources	Value USD MM	Country/Region
Alaska LNG Project	4,500	United States
Chaglla Hydroelectric Power Plant	1,200	Peru
IceLink (Iceland Subsea Electricity Cable)	5,000	British
Jiuquan Wind Power Base	17,500	China
Khi Solar One	445	South Africa
KivuWatt	92	Rwanda
Kudu Gas Field and Combined Cycle Gas Turbine (CCGT) Project	1,100	South Africa
Mundra Ultra Mega Power Project	4,400	India
Penon nome Wind Farm	134	America
Ring Of Fire Mining Project	2,000	Ontario
Russia-China Gas Pipeline	400,000	Russia/China
Site C Clean Energy	7,200	Canada
TAPI Gas Pipeline	7,900	Turkmensitan to Afghanistan, Pakistan and India
Trans-Saharan Natural Gas Project	20,000	North Africa to Western Europe
UHV Power Transmission Project	160,000	China

Recycling & Waste Management	Value USD MM	Country/Region
Amager Bakke Incinerator	400	Denmark
Interceptor Sewage System	323	India
Recife Metropolitan Region Sewage Treatment Project	2,280	Brazil

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TOP 10 INFRASTRUCTURE PROJECTS

1. **Russia-China Gas Pipeline.** In May 2014, Russia's Gazprom and the China National Petroleum Corporation (CNPC) signed a 30-year framework deal to deliver 38 billion cubic meters of gas to China annually using the eastern route. This project will start in 2018, up to 68 bcm of Russian gas to be delivered to China annually. Assuming the overall price of the contract includes only the cost of supplies of Russia gas, then the \$400 billion price tag means China will pay about \$350 per 1,000 cubic meters. Delivery price for the contract will be tied to market oil prices. This project will be the world's largest construction project, strengths ties between two countries.
 2. **California High-Speed Rail: Phase 1.** The California High-Speed Rail Authority is responsible for planning, designning, building and operation of the first high-speed rail system in the nation. At first phrases, the project will connect the mega-regions of the state, from San Francisco to the Los Angelos basin under three hours at speed capable of over 200 miles/hr. The State of Calfronia, the U.S Department of Transportation, the Federal Railroad Adminisntruation and the Autuority are committed to the Blended System for high-speed rail invisined in 2012 Business Plan. The cost of project is estimated to \$98.5 billion, contribute to economic development of and a cleaner environment, create jobs and preserve agricultrual and protected lands.
 3. **Alaska LNG Project.** As the natural gas on the North Slope has been discovered more than 40 years, the project aims at creating a pipeline running 1,300 meters from north to south across Alaska. Now a consortium of major oil companies is working on initial phrase, the first LNG likely to flow by the early 2020s, the total cost is estimated to be \$45 billion. The proposed plant will cover over 3 billion cubic feet of gas per day and will require 250,000 tons of steel and a footprint of over 200 acres. The project will use advanced technology to reduce the potential impact on the environment and communities.
 4. **Ghana Railway System.** The public of Ghana was planning to develop a high a high speed rail system from Accra to Kumasi and a localized light system in Accra, with adjacent transit oriented developments ("TOD"). The Airport TODs consists of TOD located at Kotoka International Airport, Accra Airport, and Eco-Park. The total cost of this project is estimated to be \$30 billion, will be the largest railway project even largest railway project in Africa.



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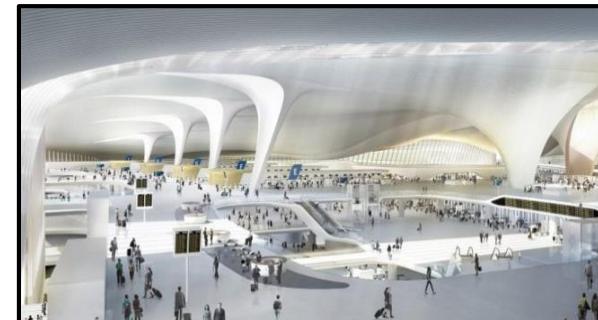
5. Trans-Saharan Natural Gas Project. This project used to be deemed as one of the world's most expensive energy export programs, which provide a link between resource-rich area in Africa and attractive market in Western Europe. The pipeline started from Niger through Algeria and then northwards to Spain and Italy, diversifying the supply of natural gas of Western Europe. The total projects cost \$20 billion, the Nigerian national Petroleum Corporation ("NNPC") and Sonatrach of Algeria will hold 90% shares of the equity of the project and national oil company takes 10% of the shares.



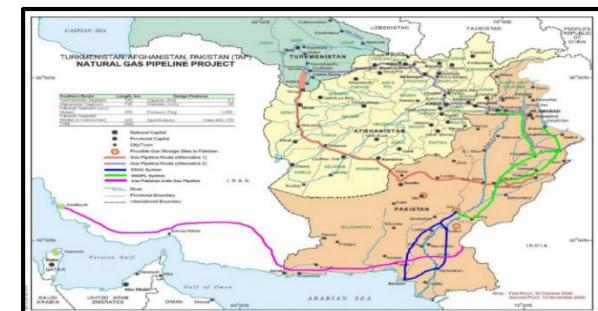
6. Mombasa-Kigali Railway. This railway is estimated to cost \$13.5 billion, linking the port of Mombasa in Kenya with Tanzania and landlocked Rwanda and South Sudan. In Africa, most of countries have poor infrastructure and struggle to global market. This project helps transport coffee, tea, other agriculture products, minerals and machinery. In terms of statistics, transporting a cargo container from Mombasa to Kigali costs about \$5,000 by road, but with the standard gauge railway in place, the costs will reduce to \$2,000. The project will be Standard Gauge Railway (SGR), built by Chinese Engineering and Construction companies, funded by China's Exim Bank, aims at boosting trade in the eastern Africa region.



7. Beijing's New International Airport. Beijing International Airport announced that it is building the world's biggest terminal, one that will cover 7.5 million square feet and handle 125,000 people each day. The new airport is named Daxing Airport, which is slated to be completed in 2018. The cost of new airport is estimated to be \$11.2 billion, the "mega-airport" a collaboration between the French airport design firm ADPI and noted British-Iraqi architect Zaha Hadid. It's located 30 miles outside of Beijing and will serve as the city's hub for international flights. The current airport will be used for domestic operations. Once it's finished, this will be the busiest airport in China and second busiest in the world.



8. TAPI Gas Pipeline. In accordance with the news from Business & Economy, India and Pakistan have joined together with Afghanistan and made a deal with Turkmenistan to build a gas pipeline, which will be 1,735 kilometers, estimated at \$7.9 billion dollars. This pipeline also been called "peace pipeline". This project will strengthen political and economic ties between traditional hostile neighbors. The major concern of this pipeline is security, after the 2014 withdrawal of US forces from Afghanistan.



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9. São Francisco River. There is a lack of water program in Brazil. This project will cost \$6.4 billion and is Brazil's largest water infrastructure project. The project is to divert part of the flow of São Francisco river to the sertão, an area famed for its harsh, dry climate and the toughness of the people who have adapted to it. The minister of national integration declared that the project will change lives of 12 million people without hurting a single Brazilian. The project started at 2007 and still continues.



10. Delhi Metro. The Delhi Metro is a metro system serving Delhi, together with Faridabad, Gurgaon, Noida and Ghaziabad in National Capital Region in India. Delhi Metro is the world's 12th largest metro system, according to both length and number of stations. The construction began at 2002 and lasted more than 10 years. The first phase completed on 2005, followed by delivery of phase II in 2011, with phases III and IV scheduled to be completed in 2016 and 2021 respectively. The project was funded by Delhi government and Japan International Cooperation Agency ("JICA"), estimated at \$2.6 billion.

