REPORT



Infrastructure Macro Economic Outlook to 2022

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SYNOPSIS

Following the encouraging response to the Macro Economic Outlook to 2020, Stirling Infrastructure Partners ("Stirling Infrastructure") has produced another document, giving our in-house view on the macro environment until 2022. In this paper, we shall present our analysis of current trends in infrastructure markets worldwide, and the trends that we predict will persist in the market until 2022 and beyond. The paper begins with an overview of the world infrastructure market, assessing the funding gap that continues to exist, and in which parts of the world this funding gap presents its largest opportunities. We shall discuss PPPs and their uptake. We shall then analyse the markets in which Stirling Infrastructure has recently had a spate of projects, which we expect to continue through to 2022, discussing the changes that we expect in these markets. Following this, we shall present a small selection of markets that we are interested in and are assessing for opportunities.

THE HEADLINES

This short section will present what we consider are the 'headlines' for each region. In the US, Trump's bias towards enterprise and market solutions may provide a boost to roads, while his contradictory protectionism towards coal and other fossil fuels may dampen the growth in renewables we have seen. In Europe, massive decarbonisation is planned, as is the liberalisation of rail passenger markets, and the UK aims to maintain its position as the largest offshore wind market in the world. In China, investments into infrastructure greater than North America and Western Europe combined continue to propel the economy, whilst in India steps are being taken to lower the cost of debt. Russia experiences economic stress from USimposed sanctions and the weaponisation of the dollar - yet Putin remains resilient in his plan for improvements to Russia's infrastructure.

THE FUNDING GAP

Worldwide, infrastructure continues to face a chronic underfunding, the scale of which is startling. The figure of \$3.3 trillion per annum for infrastructure is often given as the amount required in order to meet growth targets.¹ Stirling Infrastructure believes that this number is likely to be larger, and increasing, due to the lethargy shown in G20 economies towards picking up infrastructure investment since this number was first propagated. Stirling Infrastructure recommends the G20 directs greater attention to create policies that will encourage and support diversification of infrastructure investment across a wider range of sectors and geographies at their next meetings under the Saudi presidency.

Indeed, more recently, the Asian Development Bank has estimated that the annual funding gap in Asia is around \$459 billion (excluding social infrastructure), with a requirement of \$1.3 trillion overall.² In Europe a total of EUR 688 billion (\$756 billion³) is required per annum,⁴ and in the US a further \$206 billion is estimated to be required.⁵

While the gap is big, the actual private sector opportunities will be driven by private developers/'financiers' opportunities at a level that is significantly below potential at the moment. The real opportunity arising from the gap is the realisation by governments that they need to accelerate private sector involvement. In this context, many national development banks in key markets of interest (EU, China, Canada, Brazil) have now recognised the need to follow the lead of the multilaterals in setting up project preparation that actually translate identified facilities, infrastructure gaps and needs into bankable projects. In the final analysis, this will generate further bankable/investible opportunities for the private sector.

This is a demand for financing that is not going to go away any time soon. For each of these funding gaps, in each market, an array of possible investments exists: higher risk, lower risk, brownfield, greenfield, IRR driven investment opportunities, or yield driven opportunities. Indeed, the opportunities presented by the infrastructure sector, unlisted infrastructure particularly, are of great interest to institutional investors who wish to obtain high returns with lower risk.



Source: MSCI

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GLOBAL ENERGY TRANSITION



Source: CarbonBrief

Stirling Infrastructure advises government entities, corporations and institutional investors that are stakeholders in energy projects internationally. Our firm's objective assessment identifies a disparity between priorities of stakeholders. The current disparity lies between the need to reduce carbon emissions versus the competitiveness of cheaper cost of fossil fuels, which provides lower cost solutions and offers greater international competitiveness. Carbon Capture Storage (CCS) remains commercially unproven at the time of writing this report. CCS is a viable technology for limiting carbon dioxide emissions, meanwhile the cost of such technology is substantial (US\$600 per metric tonne of carbon dioxide),⁶ and discussions remain on the feasibility of CCS. However, there is an opinion to support that there could be commercial viability by 2030.7

The global map of coal-producing power stations provides a valuable insight into the priorities of governments, people, and policies. Upon examination of the map, it is evident that in western Europe and North America, there is a general trend towards the decommissioning of coal power stations. While towards South-East Asia and more specifically, China and India, coal power stations not only will remain operational but also in India, China and South Africa further coal-burning power stations are due to be built, as shown in the red areas highlighted on the map.

The World Bank warned that it would further limit its future coal finance portfolio, introducing a new policy that will encourage divestment from coal. This change of policy was shown when the World Bank formally announced that a coal-fired power plant in Kosovo, which it had previously considered funding, was now 'off the table'.⁸ Other multilateral banks such as the European Bank of Reconstruction and Development have voted to adopt a "no coal, no caveats" policy.⁹ Stirling Infrastructure considers that more multilateral banks, internationally, will adopt such policies between now and 2022. The energy transition from fossil fuels to greener sources provides a considerable opportunity for governments, corporations and investors — the possibilities exist to innovate and identify new bankable investment opportunities within energy transition. Battery storage, waste to energy, wind, hydrogen and tidal energy are new sources of energy. Additionally, some European passengers are reducing their flight frequency in a quest to minimise their carbon footprints.

The dominance of both gas and LNG as more common sources of energy is an area to watch. Gas will increasingly replace oil as a bridging fuel over the next few decades. Gas produces lower carbon emissions than crude oil. However, gas is still a fossil fuel. Gas is described as a 'bridging fuel' as newer alternative sources of energy will emerge due to the development of new technologies. Which sources of energy will become the most dominant will be dependent on the cost of the energy produced, ease of adoption, government policies and peoples' behaviour in responding to the growing climate crisis. It is anticipated that in certain regions of the globe, neither governments nor the public will change their behaviour until the climate emergency directly impacts their way of life. In other regions of the globe, Stirling Infrastructure forecasts that there will be increasing public unrest unless governments, companies, and fellow citizens act more responsibly towards reducing their carbon footprints. We therefore forecast, progressively, there will be more taxation on carbon emissions. There will also be a rapid growth of carbon trading in international markets. Stirling Infrastructure foresees industries in more forward-thinking markets will begin to implement and respond to the demand from the public for material and rapid change in working practises.

The newer sources of energy production mentioned earlier have required government incentives. What has become proven is that governments that took the early-stage risk in supporting new greener forms of energy through subsidies to encourage innovation have now helped to create new and greener industries which have rapidly scaled up. Moreover, it has now been shown, when the cost of production falls sufficiently through scale and there are social and environmental benefits, the actions of both investors and the public will shift.

There are significant risks and opportunities for allocating capital into a wide spectrum of investments for more and alternative sources of energy. Key issues include local government policies and regulation; understanding the energy mix and aligning investments towards sources of energy that are sustainable; and have the lowest risk from disruption, whilst providing secure returns. Investors that act responsibly, coupled with good analysis and guidance, have not only secured substantial first mover advantage but have become global leaders in new industries.

PUBLIC-PRIVATE PARTNERSHIPS AND THEIR USE

A public-private partnership (PPP) is "a method of procurement used by the public sector with the primary aim of generating efficiency gains compared with conventional methods".¹⁰ PPPs can take several forms, based on the lifecycle of the asset and the engagement between the public and the private entity. For example, in a BOOT model, the private partner Builds, Operates, Owns, and then finally Transfers the asset to the public partner. Deciding which model to use comes down to a multitude of factors, including constraints on risk and financing faced by the private party.

In 2018, 335 projects in 41 low- and middleincome countries received \$90 billion through PPP schemes.¹¹ 67% of this investment was concentrated in 5 countries: China, India, Brazil, Turkey, and Indonesia, with 31% of all PPP investments made in China, quite possibly due to a surge in the construction of roads.¹² Of 155 electricity generation projects, 146 were related to renewable energies, with solar energy being the predominant source.¹³



Source: World Bank Data

In the US, the number of PPPs has increased dramatically since 2015 and, as of 2017, it is ten times higher than the average number from 2006 to 2014. We believe that this is due to a renewed recognition of the need to fill the infrastructure funding gap using private financing.

Desalination and water projects in the PPP market is an opportunity that will continue to grow as water stress and access to clean drinking water are risks to natural life for both developed and emerging economies. By 2050, the UN has predicted that five billion people will live in areas affected by water scarcity.¹⁴ The rise of population, especially in water-stressed regions, has given way to the growth of the desalination industry. Stirling Infrastructure foresees that more opportunities to

invest in water desalination projects and alternative water purification technologies. The market for water desalination is set to grow at 7.8% annually until 2025.¹⁵

SMART INFRASTRUCTURE

Stirling Infrastructure has noticed a trend in increased investment in high-income countries (most notably those in Europe) into digitised, smart infrastructure. This is the application of technologies to the space of physical (also called "economic") infrastructure in order to improve decision making, understanding of customer needs, and efficiency. Almost all other industries have been disrupted by advancements in AI and Machine Learning methods, yet infrastructure awaits this disruption.

The EU is already recognising the significance of smart infrastructure, especially in relation to the development of smart cities - "cities using technological solutions to improve the management and efficiency of the urban environment".¹⁶ Smart infrastructure can be developed with the aim of improving efficiency in the production and distribution of energy, in order to meet the EU's ambitious targets.

Specifically, in transport, Electronic Toll Collection (ETC) can be used to reduce the costs of collecting tolls on roads and to reduce the build-up of traffic at toll collection points. Furthermore, the cost of a toll can be adjusted at peak times to direct the flow of traffic onto ring roads – reducing the congestion in cities. This has been an effective policy in Tokyo since 2016.¹⁷

Automation in transport and shipping is also a very interesting innovation, which will provide for safer and more efficient passenger and cargo transportation. It is estimated that 75% to 96% of marine accidents involve human error – increased automation could lead to a reduction in this figure.¹⁸ Automated shipping would also prevent crews being put in harm's way from piracy with increased vessel security, particularly in the Indian Ocean and the Strait of Hormuz. However, Stirling Infrastructure expects such technologies to emerge in a more commercial capacity beyond 2022.

In energy, sensors located in wind turbines can lead to efficiency improvements. From monitoring metrics as obvious as wind speed, to less obvious metrics such as vibration, tower sway, and the temperature and pressure of gearbox oil – smart innovations can further improve the efficiency and capacity of turbines. When such data is gathered across entire fields of turbines, responsiveness of electricity supply to meet demand in peak times can be enhanced.

We now focus our attention on specific markets, and the expectations we have for these markets until 2022. We will begin with the markets that our clients are typically most engaged in, before we share some insights into higher risk markets that we believe may present exciting opportunities between now and 2022.

US MARKET

The US infrastructure market is one of the largest in the world, with \$299 billion being spent on transportation in 2017, and \$142 billion on water.¹⁹ \$177 billion of this expenditure was on highways, an area of infrastructure investment that President Trump has been keen to see develop.²⁰ Stirling Infrastructure has observed a flow of capital into toll roads in particular, which we believe shall continue. Such investments as the Indiana Toll Road and the Dulles Greenway have taken advantage of busy freight and commuter routes.

Trump's 2020 budget, submitted to Congress in March 2019, contained a plan for \$200 billion of federal spending on infrastructure. He also pushed for bipartisan co-operation on an infrastructure bill in April of the same year – with the aim of investing \$2 trillion into American infrastructure. An agreement is unlikely, however, since the administration would wish to see environmental deregulation in order to speed up the construction process, whereas the Democrats will fight this. Trump has talked about privatising the electricity transmission market in the 2020 budget: "Reducing or eliminating the Federal Government's role in electricity transmission infrastructure ownership, thereby increasing the private sector's role, and introducing more marketbased incentives, including rates, for power sales from Federal dams would encourage a more efficient allocation of economic resources and mitigate risk to taxpayers."²¹

At a state level, spending is much higher than federally: around \$350 billion per annum since 2015 ²² - again mainly in transportation and water. On the Pacific Coast, investment into roads and bridges is the priority – especially in the face of growing populations, increases in GDP (as of 2017 California has a larger GDP than the UK), and an awareness of an increasing backlog of recommended repairs and updates in seismically active states. The Road and Repair Accountability Act, which passed in 2017, promises \$52 billion in additional funds for Californian roads over the next 10 years, although \$130 billion is needed.²³ In our opinion, PPPs will be employed in order to meet this shortfall.

Wind and solar energy have both seen growth on the West Coast as solar projects appear in Southern California, the Bay Area, and Arizona. Further north, in Washington, wind is now the second-largest renewable source after hydroelectric, with more than 1700 turbines providing around 3100 MW of capacity.²⁴

On the East Coast, Stirling Infrastructure sees potential for large investment opportunities until 2022, arising from the need for more resilient infrastructure in the states affected by hurricanes and tropical weather anomalies. We see that the frequency, severity, and financial impact of hurricanes has been increasing over the past two decades, and we do not expect this trend to change. If this trend is looked at alongside the staggering fact that, of the 25 fastest growing metropolitan areas in the US, 7 are in Florida²⁵ – a state synonymous with being one of the worst affected areas during hurricane season - we can expect increased demand for investment in the region. In the North East of the country, we have seen a lot of investment into ports - such as the New York/New Jersey Port and Penn Terminals.

By the end of 2017, over 7000 MW of new wind capacity was added from over \$11 billion in private investment²⁶ across the US. Texas is the state with the most wind power, with more than triple the installed capacity of any other state. Last year, large projects came to completion, such as the 228 MW farm, Bruenning's Breeze, and the 196 MW farm, Bearkat I. Texas is followed in the state rankings by Oklahoma and Iowa. Whilst the growth in wind capacity in Texas is impressive, Stirling Infrastructure sees the need to exercise caution, as lower cost gas and oil projects in Texas make renewable projects less profitable. That said, both construction and maintenance costs are falling in the renewables sector – which may account for the growing market in Texas.

In the transport sector, the US lags behind many other economies with regards to high-speed rail (HSR) development. In fact, there is no HSR in the US (typically defined as railways where train speeds exceed 160mph). Indeed, there is only one under construction in California, linking San Francisco, Los Angeles, and Anaheim.²⁷ Stirling Infrastructure believes that the Acela Express of Amtrak in the North Eastern Corridor (connecting Boston, Philadelphia, and New York City, among others) is due an upgrade to HSR. Furthermore, there have been reports suggesting that certain states are looking to invest into HSR, such as between Houston and Dallas. In fact, we believe that most of the investment into HSR will be intra-state and between relatively close metropolitan areas, in order for such investments to be economically viable. Such links as LA-San Diego and Phoenix-Tuscon could be beneficial intra-state links. In terms of crossing borders (both state and country borders) an HSR connecting Portland, Seattle, and Vancouver, could be very interesting indeed. Further investment into HSR networks face two main problems. Firstly, the US has a focus on automobile transport rather than public transport, and many metropolitan areas have infrastructure in place to accommodate this.²⁸ Secondly, the US has stronger property rights than other countries, meaning that it is more challenging for governments to acquire the land on which to build such rail networks.²⁹

The risks associated with investing in the US are primarily political and regulatory. Firstly, Trump's ongoing trade war with China threatens to push the costs of construction even higher, eating into return on investment (ROI) figures on infrastructure projects – especially those with larger construction costs as a proportion of overall costs. Secondly, the United States submitted formal notification of its withdrawal from the Paris Agreement on the 4th of November 2019.³⁰ This was a major step back for federal-level support of renewables, although private sector investment does not seem to have fallen. Thirdly, the supply of quality labour remains a challenge for construction companies. Finally, there is a great deal of uncertainty, over this paper's time horizon, as surrounds the US election of 2020. If Trump is re-elected, we can expect more of what we have already seen.

MAINLAND EUROPE

Europe aims to be carbon neutral by 2050 and to rely on renewables to a far greater extent. This is important not only for the environment but also for energy security as Russia's presence continues to be felt in Crimea and Georgia – threatening the supply of oil and gas to Europe. Indeed, the EU has set the target of reducing dependence on imported oil and cutting carbon emissions from transport by 60% by 2050.³¹

From 2011 to 2016, the European Investment Bank (EIB) invested EUR 42.4 billion in energy infrastructure alone and financed roughly two thirds of offshore wind capacity.³² We believe that there is still a need for greater private sector involvement in the push for decarbonisation and energy security in Europe. In addition, around 10% of the EIB's annual lending supports investment outside the European Union and accession countries. EIB shareholders are solely the members of the European Union. Therefore, the UK will no longer be an eligible member post-Brexit and the future relationship with the EIB is to be further negotiated in the second phase of negotiations between the UK and the European Union.

In Germany, a government paper outlined the potential for increased investment in solar and wind power (due to the falling costs associated with these technologies) compared to the limited potential for hydropower and biomass (such as conflicts of use for food and for materials).³³ We have seen investment into German North Sea offshore wind farms (Gode 1 with 330 MW installed capacity and Borkum Riffgrund 2 with 465 MW installed capacity), including projects that shall benefit from German government-backed feedin-tariffs until 2026. Though it is Europe's largest producer of renewable energy, Germany also consumes more coal than any other EU country: 45.4 GW of installed capacity in 2018, while generation in 2018 was 228.7 TWh – more than all renewables combined.³⁴

In France (the fifth-largest generator of renewable energy in Europe³⁵), similar targets have been in place since 2015, such as: cutting consumption of fossil fuels by 30% to 2030, increasing the share of renewables to 40% of electricity generation, and, as is the same in Germany, halving energy consumption by 2050.³⁶ Though this last point sounds like it describes a shrinking market, one has to remember two key points: firstly, the overall generation of renewable energy is growing; secondly, much of this change will have to arise from investment in technologies making generation and distribution much more efficient. This may include innovation at the point of generation (such as data-driven and technological solutions in smart infrastructure mentioned earlier), improvements in, for example, insulation at the point of consumption, and improvements to grid efficiency at the point of distribution.

In Greece we see potential for investment into wind power. Greece has many uninhabited islands off its coast (particularly in the Aegean Sea), which are prime territory for wind farms with wind speeds around 8-10 m/s at hub height.³⁷ For example, the project on Aghios Georgios Island has a capacity of 73.2 MW. The risks in Greece are, of course, the weak government finances. Greece's finance minister, Christos Staikouras, said in July 2019 that there are "bombs" in the economy – referring to the problems of debt at the Public Power Corporation, which is Greece's primary energy supplier.³⁸ The change of party in power following the 2019 elections may have ramifications for investors, yet to become apparent.

Turbulent market conditions in Turkey – following the volatility in the lira, which has been exacerbated by Erdogan sacking the central bank governor Murat Cetinkaya – make investments more challenging than other economies mentioned in this paper. That said, Turkey has strong legislation around PPPs and is keen to implement them further to meet the infrastructure investment targets.³⁹ Furthermore, these targets, such as an increase of around 12,000 km of high-speed rail, or a 35% increase in installed power capacity (compared to 2018), are set to coincide with Turkey's 100-year anniversary in 2023.⁴⁰

With regards to transport, regulation introduced in 2013 has obliged all EU members to develop the Trans-European Transport Network (TEN-T). Many EU members are behind on their obligations. Furthermore, the rail passenger market across Europe is uncompetitive. In all but 4 EU countries, incumbent rail companies have control over 80% of the market.⁴¹ This is set to change with the 4th Railway Package, which aims to dismantle legal monopolies and introduce the principle of competitive tendering for Public Service Contracts (PSCs).⁴² Some countries have already begun to get ahead in the market liberalisation process, such as Germany, Italy, Austria, the UK, Sweden, and the Czech Republic.⁴³ And in those countries, we have noticed investors are already beginning to position themselves. The sale in early 2018 of Italian rail company Italo for EUR 2 billion is a clear sign of this.44

The use of competitive tendering to award PSCs is expected to be taken up fully by 2023.⁴⁵ Stirling Infrastructure believes that this liberalisation of the rail passenger market presents a significant opportunity for investment up to 2022.

In most European economies discussed in this paper, we see that interest rates have remained low since around May 2015. We do not expect this to change too soon. We are particularly interested in the fall in yields on Spanish 10-year government bonds, to lower than the yield on the UK gilts. A point of concern, as evident in the chart, is the increase in the yield on Italian bonds in May 2018 (as a result of uncertainty caused by the elections), which has not fully returned to be in line with the yield on its European peers.



Source: ECB, Bank of England

UK

Effective from the 31st of January 2020 to the 31st of December, the UK exited the European Union and has begun a transitionary period. Through this transitional period, the UK will maintain benefits and still be subject to the EU rules. In this regard, the UK will seek to protect its jobs market and attract new inward investment through an ambitious infrastructure programme, as it seeks new trade agreements with the EU and non-EU countries. The UK government is very keen to support private investment into low-carbon electricity generation, especially in offshore wind farms. The government's Contract for Difference scheme (CfD) protects investors against volatile wholesale prices of energy, while the Private Finance Initiative (PFI) continues to be used as the UK's PPP mechanism. Based on previous rounds of CfD allocation, Stirling Infrastructure expects the fourth round to take place over the summer of 2021 - if this remains government policy.

Further, the UK has the largest installed capacity of offshore wind turbines anywhere in the world. Per a government report on industrial strategy, "offshore wind's share of annual UK generation increased from 0.8% in 2010 to 6.2% in 2017 and will have reached around 10% by 2020".46 The UK can expect to see an increase in installed capacity to 30 GW by 2030, which could account for £40 billion in infrastructure spending over the next decade.47 The scale of some of these projects is substantial: such as the £1.9 billion Beatrice Wind Farm off the Scottish coast – which was part financed by the EIB.⁴⁸ More recently, we have seen the construction of the Galloper wind farm off the coast of Suffolk completed in Spring of 2018, and around the same time the completion of the Race Bank offshore wind farm. Galloper has an installed capacity of 353 MW while Race Bank has a capacity of 573 MW making it one of the UK's largest.

In regards to transport, more than £48 billion will have to be spent on maintaining and upgrading the UK railways over the next five years to deal with the increase in rail passengers - which has doubled in the last 25 years.⁴⁹ Key projects of national interests include the high-speed railway (HSR) from the South to the North, the expansion of the digital economy through capitalising on high-speed networks as Huawei was awarded part of the UK programme to upgrade to 5G. There is also sustained interest in UK airports. London Luton Airport found a new stakeholder in 2018 as the fifth largest, and fastest growing airport in the UK – serving the London market, which is the largest aviation market in the world.⁵⁰ Other prominent investors maintain stakes in Gatwick, Glasgow, and Southampton airports, among others.

Stirling Infrastructure's institutional clients that finance private infrastructure projects had reduced their allocation of capital into the UK pending the outcome of the 2019 UK election and its negotiations with the EU. This firm foresees progressive tranches of capital into the private infrastructure market on a risk management basis over the next 24 months as greater clarity of the UK's progress and position with its trading partners becomes more evident.

MAINLAND CHINA

Investment into China via the PPP mechanism has been huge in recent years. At Stirling Infrastructure, we do not expect this trend to change, despite the ongoing trade war with the US. China spends more annually on infrastructure than North America and Western Europe combined, with a spending of \$28 trillion expected by 2040.⁵¹ There are two main themes to discuss: The Belt and Road Initiative (BRI), and domestic investment.

The BRI is an initiative aimed at improving the infrastructure of trade routes between China and the rest of the world. The scale of it, the diversity of markets it incorporates, and the positive externalities associated with the current investment, all make the BRI worthy of investigation for potential investment opportunities. The estimated value of total investments so far is \$575 billion, while transport investments in the 70 'corridor' economies (excluding China) is in the range of \$144 billion to \$304 billion.⁵² This gives a good indication of the tremendous scale of the initiative, but the uncertainty implied by such a large range shows how a lack of transparency is pervasive to the BRI. Furthermore, many of these projects are financed by debt, increasing the risk of default in these corridor economies. A World Bank report has claimed that 12 out of 43 economies (for which, there were sufficient data) would experience a deterioration of debt sustainability as a result of the BRI and that this could be exacerbated by the opaqueness of the projects.⁵³ Thus, investments around the BRI present a higher risk than other opportunities discussed so far. Furthermore, investors must be cautious of the effects of crowding out by Chinese investment. The capital deployed by the state into the BRI does not necessarily seek a financial return but may seek 'political return'. Political and diplomatic ties can be strengthened under state investment, in ways that private capital cannot achieve. Thus, the state may be prepared to offer more competitive terms than private investors could.

The domestic market presents further opportunities as the uptake in PPPs has increased at a tremendous pace. From 2000 to 2017, PPPs in energy and transport went from a value of \$374 million to \$16 billion.⁵⁴ Furthermore, cost of debt is reasonable at 5-8% with an average syndicated loan spread across sectors of 229 bps over hard currencies (USD, EUR, GBP, JPY).⁵⁵ At Stirling Infrastructure, we believe that the prevalence of PPPs, alongside very promising growth in fundamental macro variables, presents a good case to invest in Chinese domestic infrastructure.

A particularly interesting opportunity that we see is investment into airports. Passengers carried (both domestically and internationally) have increased at a startling pace since around 2002 (see chart). Furthermore, the Civil Aviation Authority of China (CAAC) said at the end of 2018, that they aim to have 450 airports by 2035 – adding around 200 to the existing number.⁵⁶



Source: World Bank Data

OTHER APAC MARKETS

In Australia, the Asset Recycling Fund has been an effective tool at promoting private investment into Australian infrastructure. Asset recycling is where state governments sell or lease infrastructure assets to private parties, who then reinvest the revenue in further infrastructure projects, with a commitment of 15% of the asset value from the federal government's Asset Recycling Fund. This model was utilised in the 2016 sale of the Port of Melbourne for approximately AUS\$9.7 billion (US\$6.6 billion⁵⁷). This round of asset recycling is coming to an end in 2019 - whether it is renewed for another five years is not yet known. However, there have been comments by the current US administration suggesting that asset recycling may be an innovative way to increase engagements in PPPs.58

In Hong Kong, Stirling Infrastructure sees the unrest in the relationship with Mainland China, and specifically the attempted changes to extradition laws to be problematic. Indeed, these problems seem to be symptoms of an overall trend in rising anti-China sentiment in Hong Kong. Thus, we believe that a reassessment of risk in Hong Kong investments is required.

In South Korea, an ailing economy and restrictions in trade with Japan have seen the central bank begin monetary easing by lowering interest rates. The 10-year government bond is also close to its lowest yield in 10 years at around 1.45%. The current environment favours borrowers. In terms of sectors, we have seen investment into toll roads – as the number of registered cars has increased around 3.5% pa in the last 5 years.⁵⁹

INDIA

India is another Asian powerhouse for which the potential for infrastructure investment is high. The level of PPP engagement is high in India – though it is not as promising as in China, and the pace seems to have slowed since the highs of 2014. That said, the government has been innovative in developing newer PPP models to attract investors.⁶⁰ The Hybrid Annuity Model (HAM) sees the government contribute 40% of the project cost for the first 5 years in the form of annuities, while the remaining 60% is paid as a variable annuity after the 5-year mark and is dependent on the value of the assets created. The Toll-Operate-Transfer Model (TOT) allows funds (e.g. PE funds and pension funds) to lease government owned highways for up to 30 years by making an upfront payment. In return, the fund collects toll payments, whilst being responsible for the management and maintenance of the highway.

The 10-year government bond yield in India, although it has been falling for about a year, is currently around 6.9% - well above China's approx. 3.2%. And, although syndicated loan spreads are tighter than in China, at 149 bps,⁶¹ overall cost of debt in infrastructure investments is around 8-11%.⁶² Furthermore, the share of nonperforming loans (NPLs) on the balance sheets of (primarily) public sector banks has been growing at an alarming rate, following a cavalier use of debt in corporate financing of infrastructure investments. This build-up of NPLs has led to some high-profile events - culminating most recently in the default of IL&FS (Infrastructure Leasing and Financial Services Ltd), a triple A-rated infrastructure development and finance group, which had become one of the largest non-bank lenders in the country. That a triple A-rated company could default on its loans perhaps says something worrying about the approach to default risk taken by ratings agencies in India.



Source: Reserve Bank of India, CEIC Data

That said, in the 2019 budget, we saw efforts to address the issue of NPLs and lower the cost of debt. Also, more responsibility has been given to the Reserve Bank of India to lower rates, in order to provide a monetary stimulus to the economy as the government reduces spending.

In terms of sectors, India has made vast improvements in transport, and in the aviation space, Indian airlines have seen passenger numbers increase 8-fold in the last 20 years – overtaking the large economies of Germany and Japan in the process.⁶³ This year, also, India announced the monumental achievement of connecting all villages across India to the electricity grid. Stirling Infrastructure believes that this is another sector in which there is potential for investment into India. Improvements to grid stability and the provision of electricity as more people come online will be essential for India's continued development.

RUSSIA

The Russian economy presents a mixed bag, a sometimes exciting, sometimes unpredictable place, where economic policies are very often linked to political policies. Unfortunately for Russia, this has meant that the rouble has been very volatile against the dollar in recent years, as Trump's sanctions, and use of exchange rate as a weapon, have led to large movements in the dollar-rouble price. Inflation, too, has been volatile and high over the last few years.



Source: Eikon

That said, the population of Russia is large, with around 145 million inhabitants predicted for 2019.⁶⁴ Furthermore, the geographical size of Russia is unparalleled, and, at Stirling Infrastructure, we believe that this presents large opportunities in the development of transport networks and distribution of energy.

The rail passenger market is vast in Russia approximately 123 billion passenger-km in 2017.65 Such usage is pushing the rail network to the limits of its capacity and, in 2018, a presidential decree was issued, which mandated the expansion of the Baikal-Amur and Trans-Siberian railways by 50%, the development of a railway line between Kazan and Ekaterinberg, and other infrastructure projects⁶⁶ (nine in the transport sector and two in the energy sector, at the federal level⁶⁷). The 2018 'May Decrees', as they are known, incorporate more changes to the economy than just infrastructure improvements, but this seems to be the main theme. The estimated cost of Putin's goals is approximately \$391 billion by 2024, of which \$114 billion will come from "extrabudgetary sources".⁶⁸

With regards to financing in Russia, most debt is denominated in roubles, which carries significant currency risk. The ten-year government bond, which, similar to India and China, is falling, is still relatively high at around 7.4% currently. Add to this an average syndicated loan spread across sectors of 219 bps,⁶⁹ then we see an overall cost of debt in the range 9-11%.⁷⁰

ALTERNATIVE ECONOMIES

Stirling Infrastructure takes an agnostic approach to sectors and geographies – taking interest in projects where the potential returns balance favourably against the potential risks. To this end, we have conducted analysis on markets that are less typical grounds for investment, but for which we see opportunities arising in the approach to 2022. We shall present five here. The following markets have been selected by looking at a number of variables including but not limited to: GDP (and growth), population (and growth), geography, currency risk, political risk, legal framework, government policies, capital markets innovation, and interest from our clients.

SAUDI ARABIA

Saudi Arabia has a much larger GDP than other economies in the region, which Stirling Infrastructure expects to be around \$720 billion in 2019. Currency risk is close to nil since the Saudi Riyal is pegged against the dollar. This does, however, induce a high volatility in inflation – with several instances of deflation over the past decade. Geographically, Saudi Arabia has the advantage of being a 'central hub' in the middle of three continents – Europe, Africa, and Asia. In 2016 the Saudi government initiated their "Vision 2030" strategy with the aim of improving both Saudi society and the Saudi economy. The main themes of this are: a reduced reliance on the public sector (both in terms of financing projects and managing them), increased privatisation, increased renewable energy in the energy mix of the country,⁷¹ and reduced reliance on oil revenues.

Several renewable technologies will be tested in areas of water desalination and electricity generation, which will be conducted with an increased contribution from the private sector.⁷² Stirling Infrastructure observes a large capacity in the market for renewables. In fact, the government has targeted 3.45 GW in renewable power generation by 2020 and 9.5 GW by 2023,⁷³ primarily from solar power.⁷⁴ To hit these goals, the Saudi government is really pushing for increased private sector engagement, especially in light of the 6.5% budget deficit forecast by the IMF for 2019.75 Saudi legislation is undergoing changes to allow for, among others: "full/partial assets sale, IPO, management buy-out, PPP (BOT), and concessions or outsourcing".⁷⁶

Another opportunity that Stirling Infrastructure sees within the Vision 2030 documentation is Saudi Arabia's aim to better support the pilgrims of Hajj and Umrah. Hajj attracts around 2.5 million Muslims to the cities of Mecca and Medina, for which infrastructure investment is needed according to the Vision 2030 strategy (that is more people than visited London for the 2012 Olympic Games). Already, Hajj and Umrah are the second-largest contributors to Saudi GDP after hydrocarbons,⁷⁷ and, at Stirling Infrastructure, we expect this aspect of the economy and of society to remain very important - as increased numbers of pilgrims are expected. There are significant limitations to this, as current Saudi legislation puts a lot of restrictions on where and how foreign investors can invest in both Mecca and Medina.⁷⁸

BRAZIL

It is estimated that over the period 2019 to 2024, at least 3.2% of GDP will need to be invested in infrastructure (around \$50 billion annually) half of which will come from private sources.⁷⁹ Brazil's currency too, the Real, is more volatile against the USD than some other Latin American counterparts, which could be problematic for investors over longer horizons. One interesting solution to this, which has been adopted by Chile and Peru, is for the provision of PPAs denominated in USD.⁸⁰



Source: Eikon

Traditionally, a lot of infrastructure funding came from concessions granted by the National Bank for Economic and Social Development (BNDES).⁸¹ This is changing however, given a string of high-profile corruption scandals culminating in the Operação Lava Jato (Car Wash Operation) and Brazilian construction company, Odebrecht, admitting to paying \$780 million of bribes in 12 Latin American countries.⁸² This has undermined the current funding model. Stirling Infrastructure believes that there will have to be an increase in PPPs in Brazil in order to meet the infrastructure investment requirements. We also believe that capital markets in Brazil will improve as the demand for both equity and debt financing increases.

Opportunities exist in transport, energy, and water treatment. In June 2019, the infrastructure minister announced that Brazil will seek to raise \$45 billion in investments for transport over the next 4 years, with auctions of concessions targeting: 44 airports, 24 seaports, 16,000 kilometres (9,900 miles) of highways and 8,700 kilometres (5,400 miles) of train lines.⁸³ In terms of water treatment, we have seen investment in the sector gain traction, with high profile acquisitions – such as the purchase of BRK Ambiental, Brazil's largest private water company serving 15 million people, in 2017.

NIGERIA

Nigeria has seen a massive population increase in the last 50 years, and at Stirling Infrastructure, we forecast the population to double to around 400 million by 2046. Alongside this massive growth, we are seeing a rapid urbanisation. By 2022 Stirling Infrastructure expects that around 55% of the population will live in urban areas and cities. The official Nigerian naira rate against the dollar has been fairly stable since 2016 (at which point the peg against the dollar was removed). Confusingly though, this official rate is different to another, managed, rate, which is in turn different to the black market rate, all of which have different functions. The IMF has called for consolidation of these rates, yet Nigerian central bankers seem less keen to make the change as inflation is down and reserves are up.

At Stirling Infrastructure, we believe that electricity generation and a reliable grid is what is most needed in Nigeria now. Currently, Nigeria has the capacity to produce 13,000 MW of power but has a grid that is able to deliver only 4,000 MW.⁸⁴ With the World Bank and African Development Bank providing funding for development of rural electricity supply, we believe that private investment will be sought for electricity provision in the large, and growing, urban areas.

MOZAMBIQUE

Mozambique has a positive economic outlook for inward investment out of the Sub-Saharan economies. The reason behind this is that the annual GDP growth of Mozambique is forecasted to be between 4% to 6% by the African Development Bank.⁸⁵ A comparatively stable inflation rate is forecasted to be within a range of 5.5% to 6%.86 The Mozambique economy appeals to investor's interest given its upward growth trajectory inlarge due to the large reserves of gas fields identified which will be producing LNG for international exports effective from 2022 (Eni-led Coral-South FLNG),⁸⁷ followed by production of the Area 1 Mozambique LNG project in 2024 with oil majors: Total, (Anadarko, a former shareholder), and Mitsui;⁸⁸ making significant financial commitments to this economy. The gas sector could enhance the country's macroeconomic stability with its new revenue streams.

ETHIOPIA

Where Nigeria and South Africa have the size, Ethiopia has the growth. It has had GDP growth of around 10% per annum since 2005 and population growth of around 2.6% per annum since 2000⁸⁹. Though the currency has remained mostly stable over the last 5 years (a managed floating exchange rate system, which saw a pre-announced devaluation of 15% in 2017), inflation has been problematic in the past.



Source: World Bank Data

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Politically and economically, Stirling Infrastructure predicts a great liberalisation through the country. Since Abiy Ahmed was elected as Prime Minister in 2018, several changes have already occurred. Firstly, there have been massive steps towards peace between Ethiopia and Eritrea. This has allowed for more stability in the whole Horn of Africa region, and will allow Ethiopia to access ports in Djibouti and Eritrea. Abiy has also pursued an agreement concerning the Port of Sudan⁹⁰. All of this will grant Ethiopia access to trade on the Red Sea, Gulf of Aden, and, ultimately, the Indian Ocean. Naturally, increased trade will have to be accommodated by more developed infrastructure. To this end, Ethiopia announced PPP contracts for 3 road and 13 power projects last year – worth a total of \$7 billion⁹¹. Further to this, Abiy has lined up many successful state-owned infrastructure companies for privatisation - the big headliner being Ethiopian Airlines, the largest airline in Africa. Also for privatisation are Ethiopian Shipping & Logistics Services Enterprise and Ethiopian Electric Power.

There are, of course, risks. Primarily, the democratisation and liberalisation of the economy brought in by Abiy have experienced growing pains, with regional nationalism flaring up – even resulting in one attempted minor coup when the head of security in Amhara, one of Ethiopia's regions, led a group of men to kill the regional president and other officials. Furthermore, there is still the risk that tensions could, once again, flare up between Ethiopia and Eritrea. Finally, further instability in the region, provided by Somalia on one side and Sudan on the other, may cause problems into the future.

SOUTH AFRICA

South Africa is the second-largest economy in Africa (after Nigeria) and yet appears to fall short of leading the way in infrastructure on the continent. In terms of quality of roads, South Africa ranks 50th in the world according to the World Economic Forum, and only the 6th in Africa⁹². From the same report, South Africa is ranked 97th in the world for the quality of electricity supply. Stirling Infrastructure believes that this is perhaps the most pressing need for South Africa's infrastructure investment. There is currently a state-owned power monopoly in the form of 'Eskom' – which is prone to blackouts as it struggles to repair outdated power plants relying on coal. Furthermore, Eskom is troubled with around \$30bn of debt – most of which the state has guaranteed and, indeed, the government have already committed to a circa \$5bn bailout plan over the next three years93. However, with other stateowned companies struggling to maintain the cash flow to pay employees⁹⁴, and South Africa's credit rating already downgraded to BB+/BB by S&P and Fitch respectively, Stirling Infrastructure believes that privatisation, or at least increased private sector engagement, will be required to alleviate financial pressure on the government. The current president, Cyril Ramaphosa, could score a win with the electorate by preventing the blackouts, but he may wish to distance himself from the corruption scandals of the previous government. A transparent private sector procurement, in a strong legal framework is what is needed.

CONCLUSION

In this final section, Stirling Infrastructure summarises the key dates and areas that investors should, in our opinion, monitor between the date of writing this paper and 2022 as part of their total portfolio allocation and divestment strategy.

The US presidential election in November 2020 will have significant impact internationally on many cross-border treaties and intergovernmental policies. The Trump presidency so far has created seismic international repercussions which have impacted international governmental institutions and attitudes towards international trade and political alignment. Stirling Infrastructure's assessment is that if Donald Trump is re-elected, his Presidency will likely conserve the status quo of the current policy agenda albeit with continued dynamic and erratic behaviour within both domestic and international US policies. Investors will need to place a greater weighting on political and regulatory risk of all the factors that need to be considered prior to making capital allocations.

Furthermore, the new political and economic relationship between the EU and the UK after Brexit should be another key focal point in how capital will flow between both economies for capital allocators. Investors should assess and monitor the UK's alignment with the EU in a post Brexit Britain. More crucially, how will the UK align itself as an economy with other major international economies and the EU? Moreover, will the EU find itself stronger and more unified without the UK or will the EU suffer from further disaggregation of other members seeking to leave? Germany, France and the UK have, since the 1970s, been the most influential decision-makers shaping policies within the single market. However, with the UK leaving the EU there may be a reconfiguration of the political order and alignment of the EU member states. The way in which southern countries such as Spain or Italy may gain influence and bargaining power in the EU, filling the vacuum left by the UK,

is a further area of interest to monitor. Another key watershed is that, for the first time in over 15 years, Angela Merkel will not run in the next German general election, expected to take place in late 2021. Pressures on the future executive to increase public spending will be monitored as this will contribute to informing decisions over capital allocation by investors.

In the Asia Pacific market, the stability of Hong Kong and China's management and influence over this territory pose uncertainty for investors. Issues to watch are whether Hong Kong's economy progressively worsens and which rules of law will prevail on the people of Hong Kong, both of which will impact investor confidence. As far as India is concerned, due to political stability and pro- business initiatives from the government, the country is expected to continue to attract inward investment but the financial reliability of the economy in light of the burden of NPLs on balance sheets of financial institutions and corruption poses structural concerns for the Indian economy. Recent incidents like the IL&FS crisis underline this point. Despite the government's actions like recapitalisation and merging of banks, the effectiveness of the measures adopted and the scope for improvement will only become clearer as India becomes more progressive and a more influential global economy.

The prospect for growth and market confidence recovery amid expansive monetary policy in Brazil will continue to affect the volatility of the Brazilian currency, the Real. Meanwhile, Africa comprises a complex matrix of economies. However, Stirling Infrastructure's clients have reported that the allocation of capital into certain African economies has in fact provided more predictable and stable returns and lower unforeseen risks than in the presence of the increased political uncertainty and trade wars between the larger global economies.

Finally businesses will have to adopt new practises on topics related to Climate Change. In doing so, Environmental Social Governance (ESG) board members of all organisations internationally will progressively become more accountable towards justifying how they protect the interests of the environment and society. It will become incumbent to have in place clearer procedures for the accountability of companies and their senior decision makers in order to satisfy stakeholders. As the impacts of climate change become progressively clearer and intensified, the public will place new pressures on governments to adopt greener policies and this will pose significant risks to current investments in terms of how they are operated, regulated and taxed. A notable development in air passenger numbers showed at Sweden's largest airport in May 2019, with a 6% year-on-year fall⁹⁵. This has been attributed to the Swedish child activist Greta Thunberg, a high-profile climate activist. Whether this becomes a wider and enduring trend, however, remains to be seen. Stirling Infrastructure advises its clients to undertake a review of their total portfolio holdings from a regulatory and environmental risk perspective. This firm's opinion is that the valuation of companies and their assets will experience material change to their cash flows. Stirling Infrastructure forecasts that there will be a flow of new regulations which will relate to carbon reduction as the public, governments and international institutions adapt their policies and attitudes in the context of assets that harm the environment. However, for countries and companies that seek to be part of the green revolution, new opportunities for investors will emerge. Ultimately, Climate Change will impact all geographies at a different pace. Each government will respond individually to their industries in requiring them to change current practises. Advising on the financing, acquisition and disposal of companies and their assets is an area of expertise for Stirling Infrastructure. The firm also supports its clients in identifying the risks and opportunities in economies in infrastructure and associated sectors. In doing so, we advise and execute on behalf of our clients on the selection of sustainable, responsible and bankable investments.

The impact of COVID-19 on the global economy across the energy and infrastructure sectors analysed in this report remains unclear. This report was written during the early period of the COVID-19 breakout. A separate paper will be produced in due course assessing the energy and infrastructure sectors.

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Stirling Infrastructure Partners advises institutional investors on the due diligence and selection of infrastructure assets. The firm has expertise in the acquisition and disposal of both infrastructure, energy assets and funds. The firm is experienced in project finance and raising capital for direct investment and infrastructure funds. With a global network of over 1200 institutional investors and market participants, the firm is well placed to advise on fund manager selection, asset valuations and M&A transactions.

FOR FURTHER INFORMATION

A full report is available to the clients of Stirling Infrastructure. This report is a summary paper that sets out some of the key themes and data sets that our analysts have assessed to be relevant for institutional investors. If this report is of interest in relation to any M&A transaction services or for debt or equity capital raises for projects globally, please contact Stirling Infrastructure.

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For further information please contact:

Stirling Infrastructure Partners Limited 84 Brook Street London W1K 5EH

Tel: +44 (0)20 7629 3030

www.stirlinginfrastructure.com



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