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Ratings

INFRASTRUCTURE FINANCE OUTLOOK

Q2 2018 Review

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Disruption ↘

Political and regulatory risk ↘

Infrastructure as an asset class↘

Sustainable finance ↘

Contents

EDITORIAL WELCOME

Mar Beltran and Karl Nietvelt welcome you to this quarter's Infrastructure Finance Outlook by looking back at the sector's past 25 years.

"Our findings were conclusive: rated infrastructure worldwide has a lower risk profile than corporates."

Famed astronomer Carl Sagan once said: "You have to know the past to understand the present." This could well apply to the rated infrastructure universe, too. This quarter, we conducted our most comprehensive study of credit quality, defaults and recoveries yet. This entailed looking back over our portfolio of 25 years of rated infrastructure credits.

Our findings were conclusive: rated infrastructure worldwide, comprising utilities, infrastructure entities and project financings, has a lower risk profile than corporates. In addition, over the past three or so decades, it has grown threefold – and virtually without interruption. Some blips of flat growth aside, lending for project finance and infrastructure corporates has been steadily rising during this timeframe. In 1991, we rated 355 corporate and project finance infrastructure credits; by the end of 2016, this number had risen to 1,440 (see Chart 1).

Infrastructure shows resilience

For the past two decades, S&P Global Ratings' cohort of rated infrastructure credits has predominantly maintained lower peak default rates and greater ratings stability than non-financial corporates (NFCs). Such has been infrastructure's resilience that the sector even navigated the most recent (2008) crisis largely unscathed. During the crisis, not only were defaults and downgrades fewer in the infrastructure sector, but they were also lower in severity than they were for NFCs; the monthly peak default rate remained below 1%, as opposed to just under 6% for NFCs (see Chart 2). Further, in recent years, infrastructure has seen fewer downgrades than NFCs – and this is despite the challenges that have confronted the oil and gas sector since mid-2014.

And even in the worst-case scenario of defaults, over half of infrastructure instruments (compared to 39% for NFC) boasted recovery rates of 80% or higher.

The higher credit quality of infrastructure credits is reflected in its higher share of investment grade ratings at 75% at end 2016, compared with 40% for NFCs. In light of the ratings growth, the trend towards more speculative grade credits is however equally a fact: in 2006 the proportion of non-investment grade infrastructure entities stood at 80%, versus 75% end 2016.

Infrastructure's most severe period of credit degradation, meanwhile, came during the 2000-2003 cycle – amid the Argentine financial crisis and the greater liberalization of America's energy markets. These periods of high rating volatility typically coincide with difficulties in the utilities, power, and oil and gas sectors. In 2001, default rates for project finance peaked at 3.6%. The peak for infrastructure corporate defaults (2.8%) came soon after in 2002. Again this compares to NFC corporate default rates peaking at 6% in 2002. Disregarding these blips, default rates for both Infrastructure corporates and project financings have, in fact, been dropping. And, once we exclude the power market from this latter figure, this default rate falls to 1.5%.

Sector by sector

The power market accounted for 55.7% of infrastructure defaults during the study's timeframe – the sector's highest. Social infrastructure, by comparison, accounted for just 3.3% of all infrastructure defaults, despite having a much higher share of the rated universe (around a third of all rated projects).

Of course, this sector carries many risks: among them are low barriers to entry, merchant pricing risk, unregulated, aggressive leverage, and exposure to lower-than-forecast demand. In addition to the 2002-2003 U.S. energy crisis, merchant energy producers – above all, older baseload coal plants – suffered again over 2009-2012 from falling electricity prices, as gas-fired plants grew in number to exploit the American shale revolution. Renewable energy has played an increasing role, too, as countries around the world spurred their uptake of green energy sources to meet emission-reduction targets.

In 2016, infrastructure downgrades outnumbered upgrades once again, as oil and gas, and consequently power prices, felt the strain. In the NFC segment, the oil and gas sector accounted for around 40% of defaults, which fell to a still-sizeable 26% last year. Nonetheless, this is still the sector's largest share. The worst seems to have passed, however, thanks to a steadying of commodity prices.

By contrast, utilities (typically benefiting from a majority share of regulated assets) have helped to buoy the overall credit quality of the infrastructure

CHART 1: INFRASTRUCTURE ISSUANCE GROWTH OVER THE PAST 25 YEARS

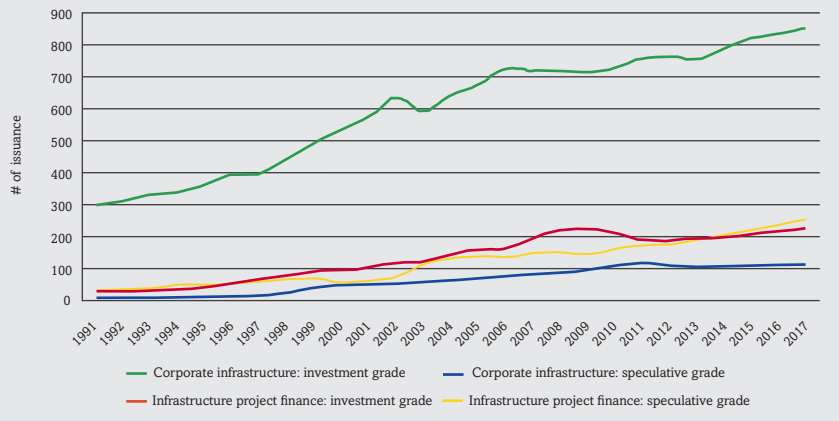


TABLE: YEAR-END 2016 INFRASTRUCTURE RATING DISTRIBUTION (BY SECTOR)

(%)	Utilities	Oil and Gas (mainly midstream)	Power	Transportation	Social Infrastructure	Other
AAA	0.0	0.0	1.5	4.0	0.0	6.7
AA	4.4	0.0	0.5	8.0	6.9	6.7
A	39.8	9.5	7.0	19.4	39.6	13.3
BBB	46.6	44.3	37.2	46.8	38.9	43.3
BB	7.3	25.8	28.1	13.4	12.5	23.3
B	0.7	17.0	21.6	7.0	2.1	6.7
CCC/C	1.2	3.4	4.0	1.5	0.0	0.0

Source: S&P Global Fixed Income Research

corporate subsector. At the end of 2016, 90.8% of utility credits were investment grade, compared to only 46.2% of power and 54% of oil and gas credits (see table).

The next 25 years

What can investors learn from our findings? They can deduce that new markets are opening up. Indeed, the market's expansion is not only in terms of size – but it has also diversified. In 1991, virtually all (96%) of infrastructure credits issued were in North America. By 2016, the landscape had been transformed, with the region accounting for just over half. The emergence of the Infrastructure demand in the Europe, Middle East, and Africa (EMEA) markets, rising to 28% by year-end 2016. Latin America could soon follow though the region accounts for just 3% of the market (128 issues) today.

There are risks, too. Across the sector, the power market continues to show higher risks than elsewhere. All the while, the power market is undergoing various disruptions: from falling electricity prices (thanks to burgeoning natural gas-fired production), to a drive toward renewables in a bid to meet emission reduction targets. Understandably, this negatively impacted baseload coal plants.

Investors' appetite for infrastructure assets seem undeterred, more generally. Project finance bond issuance for instance reached a record $64 billion in 2017 (source: Project Finance International), a hefty 50% increase from US$44 billion in 2016. The amount was split between power (40%), Infrastructure (37%), and oil and gas/natural resources (23%), with most project finance bond issuance in EMEA (#25), followed by North America (#23), Latin America with a strongly recovered count of nine and APAC (#7). The number of speculative-grade credits (rated 'BB+' or lower) in infrastructure portfolios is equally rising, reflecting growth in developing markets as well as appetite for higher risk (merchant) assets.

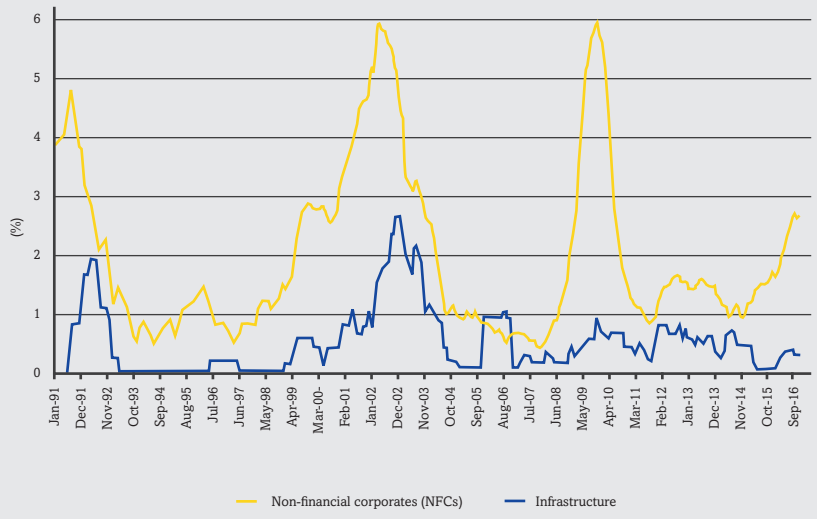
After all, infrastructure assets, by nature, are usually critical and, to an extent, have higher regulatory rigour than other assets. Project financings, for instance, benefit from many in-built protections – including offtake agreements, hedging, reserve accounts and distribution traps – as well as higher barriers to either taking on more debt or selling assets. This helps to boost investor confidence.

And growing confidence helps keep the virtuous cycle of infrastructure upgrades spinning – and not only in North America where most investment found its way in the early 1990s. Instead, we see the market growing worldwide. And this ought to be celebrated. Through our issues of Infrastructure Finance Outlook, we hope to bring alive the infrastructure stories in all corners of the globe. We hope you enjoy the issue.

Further information is available on the Capital IQ portal in the research piece entitled: "Default, Transition, and Recovery: Rated Global Infrastructure Displays Strong Credit Quality And Low Risk"

"Infrastructure's resilience has been such that the sector even navigated the most recent (2008) crisis largely unscathed.""

CHART 2: TRAILING 12-MONTH DEFAULT RATES



Sources: S&P Global Market Intelligence's CreditPro® and S&P Global Fixed Income Research

AUTONOMOUS VEHICLES: AT AN AMBER?

Nishit Madlani believes that autonomous vehicles (AVs) face challenges well beyond the technology itself. Over the coming decades, automakers, insurers and regulators will likely lead advances.

"The trajectory of AV growth is complex and hard to predict: under conservative assumptions AVs may only enjoy a 10% share of light vehicle sales in the U.S. by 2040; under our high disruption scenario, this could be as high as 50%, nothing short of revolutionary."

America's electric industry is not only undergoing the largest fuel switch in history, its autonomous vehicles (AVs) are at a crossroads. Uber's recent self-driving program in Arizona concluded in a pedestrian fatality. While AVs will ultimately yield significantly fewer automotive deaths and injuries, it is clear that public opinion will be defined by incidents and casualties during the testing phase. The tragic incident mounts concern not only about the sophistication of the technology itself but also as to the legal, financial and moral challenges that lie ahead.

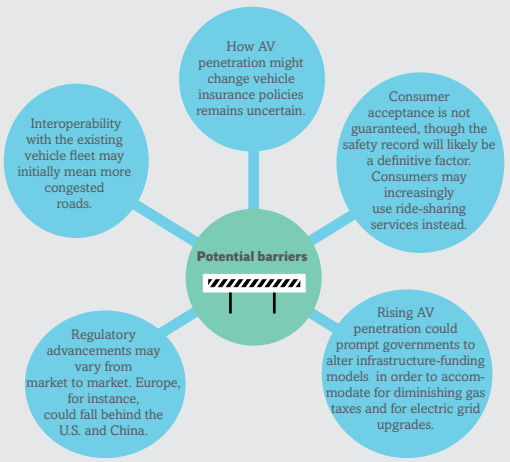
Mass adoption of driverless, autonomous vehicles (AVs), still remains decades away, most likely. Yet demand for semi-automated (SAE levels 1-3) vehicles could become significant by 2020. Indeed, we believe that the advanced safety and convenience features could attract consumers.

Semi-autonomous vehicles on the road today range from active engagement of the driver (SAE level 1 to level 2) to passive engagement in some driving modes for level 3 as seen on a few high-end autos. Full automation (limited or no driver monitoring required, otherwise known as SAE levels 4 and 5) will be a much more challenging phase, as it requires advanced artificial intelligence software, real-time high precision 3D mapping, and frequent and timely communication between vehicles and infrastructures. Governments are highly incentivized to reduce traffic fatalities, but studies show that vehicles approaching level 3 capability can achieve 80% of expected level 5 safety at 20% of the cost.

Our prediction

Given the variables at play, the discrepancy between our disruption scenarios is understandably large. In our low-disruption scenario, high-to-fully autonomous vehicles able to operate independently might comprise a 2% share of U.S. light vehicle sales by 2030, rising to 10% by 2040. Should the industry exceed expectations, however, our highest-disruption scenario predicts AVs enjoying a 30% share of light vehicle sales by 2030, and 50% by 2040. And in this scenario the effects will be nothing short of revolutionary.

WHAT MIGHT HOLD BACK AUTONOMOUS VEHICLE GROWTH?



The barriers

These assumptions largely rely on concurrent advancements in multiple fields. The most obvious is developing the technology itself. Also critical is the establishment of supportive legislative and regulatory frameworks, and not to mention a conclusive assessment of how insurance policies will translate to AVs.

What about infrastructure? Substantial investments will be necessary: from expanding telecommunications networks to serve wireless internet access to every vehicle; to electric vehicle charging infrastructure. Utilities, too, must adapt. They will require lower-voltage transformers to prevent grid surges. Earmarking investment for grid digitalisation and electrification of ground infrastructure and car parks is needed, too.

Of course, this will first be required to usher in the electric vehicle, prompting upgrades to roadways and indeed revisions to how local and central governments fund infrastructure improvements. In the meantime, municipalities will also need to consider how they might replace revenues from gas and sales taxes, car registration fees, fines, parking, and property taxes.

The challenges do not stop there. Consumers must provide their consent. The issue is that public opinion of AVs is limping behind the technology's advancements. Will we ever be truly comfortable delegating our safety to artificial intelligence? There may also be calls for dedicated lanes or roadways to separate AVs and driver-operated vehicles. The behavior of drivers and pedestrians to AVs, which is just beginning to be studied, is difficult to predict. Time will tell.

Though it isn't only about safety; cost is another consideration. Here the conclusions from the market appear ambiguous – with some reports suggesting that consumers are unwilling to pay a premium for electric or even self-driving cars, and others to the contrary. It also remains to say whether the vehicle ownership model will survive, or whether consumers will embrace the transition to a vehicle-sharing culture.

Too early to tell

Predicting how these dilemmas, ongoing in parallel, eventually interact is another consideration. How about automakers? For now, we believe that any investments in autonomous driving carry more risk than upside. What is clear, then, is the industry seems sat at an amber.

Further information is available on the Capital IQ portal in the research piece entitled: "The Road Ahead For Autonomous Vehicles"

THE TRANSITION TO SMART CITIES

Michael Ferguson considers what the emergence of smart cities could mean for the environment, the grid, and the rest of us.

The smart city is coming. The vision is a city where innovation and advances in sustainable power generation, energy efficiency, non-polluting vehicles, and changes in local and regional electricity grids combine for an environmentally friendly metropolis.

What happens, however, when policymakers consider these new disruptive technologies as a whole? Will their development be driven by politics or by economics? Will consumers see adequate and clean power supplies at sustainable prices? And will the collective benefits compound linearly, or exponentially, or not at all?

The corporate credit impact

The comprehensive nature of smart city planning suggests that over the long term the credit quality of many types of issuers, including utilities, independent power producers, and technology firms, could be significantly affected. But the magnitude of these credit implications for corporate issuers, regardless of industry, hinges on several critical and, as yet, unanswered questions.

One of these questions is: how quickly will smart cities proliferate? Our ratings forecasts typically reach out around three or four years for investment grade issuers, so we'd need to understand when key credit metrics (for corporates, the funds from operations-to-debt or debt-to-EBITDA ratios) would begin slipping (or improving, depending on the issuer). In addition we factor long-term trends into our industry risk assessment, so understanding which industries will experience the most disruption is critical.

Another point to consider is whether the changes will be driven more by policies or economics. Secular economic changes may be more enduring, while policy decisions can be more easily reversed based on the changing popularity of the policy or policymaker.

Green policies

Given the large-scale planning responsibilities that U.S. municipal governments and authorities will need to undertake to implement smart cities tactics, we are more likely to see smart city policies implemented in jurisdictions that have already instituted environmentally conscious policies, and are instituting their own carbon regulations in lieu of a firm federal policy.

These jurisdictions are considering everything from mandating the installation of solar panels on new homes, as California has recently done for post-2020 constructions, to favoring the use of electric or natural-gas fueled buses. For example, one of the tactics used by state and local governments to reduce carbon footprints is to improve the efficiency of buildings.

As a result of commitments to energy efficiency, between 1972 and 2015, residential natural gas usage remained essentially flat – despite a soaring population. Moreover, during the latter part of the period, electricity usage also flattened. The International Energy Agency continues to see declines in energy intensity as critical to sustained decarbonization, with global energy intensity dropping by about 1.7% in 2017.

While many of these governments have taken advantage of the opportunities to improve their building efficiencies, the potential for advanced building codes that result in less energy use remains substantial.

Impact on the electric grid

Clearly, the evolution of cities creates a possibility of changing power demand patterns, which could influence power pricing and capacity pricing. To be sure, revisions to our assumptions of demand growth have already adversely affected both capacity and energy pricing outcomes in the U.S., independent of the machinations of cities in changing their own resource consumption.

Over time, we expect this shifting framework to have a disruptive impact on the U.S. generating grid as more cities with more sophisticated energy management tactics are likely to diminish demand and flatten demand curves, potentially eroding profitability for merchant generators.

The big picture

Although the U.S. is reducing its carbon footprint, some parts of the developed world are not, according to the International Energy Agency. This adds an extra level of urgency if green cities are to become a green world. After flatlining for three consecutive years, global greenhouse gas emissions rose by about 1.4% in 2017 while they fell by 0.5% in the U.S., aided by less energy use and more solar power. However, given the likely closure of some large zero-emission U.S. nuclear power plants in response to market pressures, the decline in greenhouse gas emissions could be halted without a more sustainable policy.

In addition, progress toward smarter cities could be slowed without better assurances surrounding data security. This will continue to be an issue, even as investors increase their focus on environmental, social, and governance factors in making their investment decisions. How quickly and how well these issues are resolved will go a long way toward determining the future of the grid, the environment, and clean cities in the U.S.

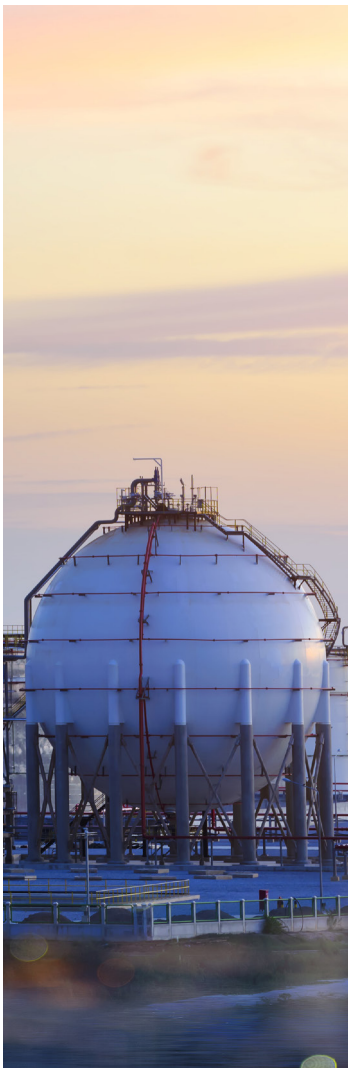
Further information is available on the Capital IQ portal in the research piece entitled: "What The Evolution Of Smart Cities Will Mean For The Environment, The Grid, And The Rest Of Us"

"The evolution of cities creates a possibility of changing power demand patterns, which could influence power pricing and capacity pricing."

THERE AND BACK AGAIN: EVOLVING LNG MARKETS BRING HIGHER VOLATILITY TO PRICES

Aneesh Prabhu believes that LNG spot markets prices are ready for another adventure.

"A window of opportunity appears to have opened because the global supply overhang provides buyers significant leverage in contract negotiations."



The Hobbit – the famous fantasy novel by J.R.R. Tolkien – has a little-known subtitle: There And Back Again. The commodity markets have their own version of "there and back again" moments. The mean reverting nature of commodities (i.e. the tendency of prices to revert to a mean that is driven by demand/supply and the cost of marginal supply) itself often causes volatile swings between highs and lows.

More importantly, actions of incumbent players add to this volatility. We saw that in 2014, when the Organization of the Petroleum Exporting Countries (OPEC) roiled the oil markets by ramping up its production in an oversupplied market to force shale producers to reduce their investments.

Now, as liquefied natural gas (LNG) becomes an increasingly tradable resource, and as this market slips into oversupply, we are right back again in the midst of volatility – and as pipeline gas and LNG deliveries compete for volumes, seeing increasing downside risks to spot LNG prices between 2018 and 2022. After two decades of being a seller's market, the industry has moved into a buyer's market over the past three years. And though increased Chinese demand could aid spot LNG pricing, a Russian pipeline supply response could dampen it.

The rise of liquefied natural gas

Despite having a lower marginal cost of production, lower environmental impact than coal, and potentially larger reserves, natural gas has been slower in emerging as a globally traded commodity.

The key bottleneck has been infrastructure and transportation. While crude oil (or coal) could be loaded on ships and delivered to any destination, the only way to deliver natural gas was to build a pipeline, which required large investments and was not always possible topographically (subsea or trans-mountainous routes are often impractical). As such, energy infrastructure lagged somewhat.

However, while liquefaction units are large investments, with the emergence of LNG, infrastructure bottlenecks need no longer be barriers for transporting natural gas. Countries that have more natural gas than needed domestically can now export it and monetize their reserves.

As a result, over the course of the past 10 years, LNG infrastructure has developed substantially across the globe. With the advance of new technologies and producers having discovered more reserves, the world's supply of natural gas has gone from scarce to abundant. With the latest commercialization of units in the U.S. and Australia, the global LNG market went into oversupply in Q3 2017 and is likely to remain oversupplied until demand catches up again.

"Lots of natural gas"

We believe that the global LNG market is at a pivotal stage in its evolution. After two decades of being a seller's market, the industry has moved into a buyer's market over the past three years.

Qatar to expand its liquefaction capacities

From a credit perspective, there is a need for new final investment decisions (FIDs) now in reply to the expected global LNG supply-demand tightening in the early-to-mid 2020s. We expect many companies to revise or defer (and, in some cases, abandon) potential FIDs. This comes following Qatar Petroleum's announcement last year that it plans to expand production to around 100 million tons (mt)/year, from 77 mt/year by 2023/2024. While we see the significant fall in Qatari long-term contracts during 2023-2025 as an opportunity for new projects looking to contract, we also note that Qatar's decision will affect the likelihood of many new project FIDs because Qatar's LNG has one of the lowest cash costs (pre-shipping) at just US$1.50-US$1.75/million British Thermal Units (mmBTU).

The credit implications

We see only a portion of the proposed additional capacity ever seeing the light of day, let alone achieving a credit agreement or indenture. The successful projects may have to change tact when securing the necessary capital to proceed with construction. In turn, sponsors will negotiate new FIDs in a historically weak sellers' market.

This poses further challenges. First, offtakers are likely to defer signing traditional long-term contracts, or may seek shorter-term contracts, until they gain a better view of the longer-term global supply/demand picture. This would mean a number of proposed transactions will either have recontracting exposure during the term of debt or even contractual rights that weaken the transaction, from a lender's perspective.

We're already hearing of buyers trying to negotiate from quantity flexibility (cargo cancellation rights or back-end ramp down rights), destination flexibility, and seasonal delivery schedules. This can harm a producer's ability to sell under long-term contracts. Yet offtakers seeking security of supply may prefer operators with low geopolitical risk and strong track records of delivery, particularly those with LNG project portfolios.

Second, counterparty exposure could rise. As LNG volumes rise, competition too increases in markets where both pipeline gas and LNG are available. The share of spot trading volumes as a percentage of total consumption is gradually increasing, even reaching 33% in 2016 compared to 3% in 2005. We expect significantly lower spot prices to prompt pressure on producers, especially in Asia, to renegotiate out-of-the-money long-term oil-linked LNG contracts, as Petronet successfully renegotiated with Gorgon last September.

Much like Tolkien's hobbit, LNG spot market prices will have to fight their demons and dragons – but will recover. We merely see overbuild and shortages as the hallmarks of a growing global and tradable commodity. Perhaps it's more a case of: "Here we go again."

Further information is available on the Capital IQ portal in the research piece entitled: "There And Back Again: Evolving LNG Markets Bring Higher Volatility To Spot Prices"

HEATING UP: THE GCC SEES OPPORTUNITIES FOR RENEWABLE ENERGY

GCC countries enjoy very high solar radiation levels and a large number of sunlight hours throughout the year. Rachel Goult considers the opportunities for growth of the social industry in the region.

The sun is starting to rise on the solar power industry in the countries of the Gulf Cooperation Council. Most of these nations – Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates – are well placed to benefit from solar power, given their extremely favorable climate and the ample amount of land at their disposal, especially in the sparsely settled desert.

The GCC is increasing solar generation capacity at a time when the global renewable energy industry is growing strongly – supported by key developments such as the push by world governments and policymakers to combat climate change, a steady decline in renewable generation costs over the past decade, and continued technological advancements. We expect most GCC countries to continue to invest in solar efforts in the years to come.

Declining costs spur global investment

Renewable power installation costs have been declining sharply over the past decade and technological improvements have increased efficiencies. Together, these developments are driving down renewable generation costs, creating a viable alternative to traditional carbon-based electricity generation.

The cost of solar photovoltaic (PV) modules has decreased at an average annual rate of about 10% since 1980, according to Oxford University. Meanwhile, the International Renewable Energy Agency (IRENA) states that in 2017 the modules were more than 80% cheaper relative to their 2009 levels.

A major opportunity

While rich in hydrocarbon reserves, GCC countries also enjoy two key prerequisites for renewables – and for solar specifically.

First, GCC countries enjoy very high solar radiation levels and a large number of sunlight hours throughout the year – two factors crucial for efficient and economically viable solar electricity generation.

Second, the land use requirement for solar power farms is significant as the solar panels deployed to catch sunlight take up very large surface areas. For many countries, using land for solar installation typically represents a big opportunity cost in terms of economically valuable land that otherwise could be used for farming, industry, and cities. However, given the size of available, barren land in most GCC countries – particularly in Saudi Arabia and the UAE – the opportunity costs are low. Close to 60% of the GCC's land surface area has excellent suitability for solar PV deployment, according to IRENA.

One key hurdle in building solar, of course, is dust – especially in the GCC region. Accumulating on the surface of panels, dust can reduce their performance, boost cleaning costs and generally create challenges in the operation and maintenance of plants. Yet various solutions are gradually emerging, such as self-cleaning nanotechnology panels, which are forecast to further increase the efficiency of solar PV.

Policy initiatives are onside

Signaling that renewables are an important strategic area for investment, GCC member nations and policy leaders have announced major initiatives and large-scale projects over the past few years. For example, under the "Dubai Clean Energy Strategy 2050", the emirate plans to gradually increase the relative weight of clean energy sources to 75% by 2050.

Moreover, in March 2018, the Saudi government announced that it signed a memorandum of understanding with Japan's SoftBank Group Corp. to build a solar project that, once complete, will have an annual capacity of 200,000 MW, which is several times larger than any other such project.

The role of the capital markets

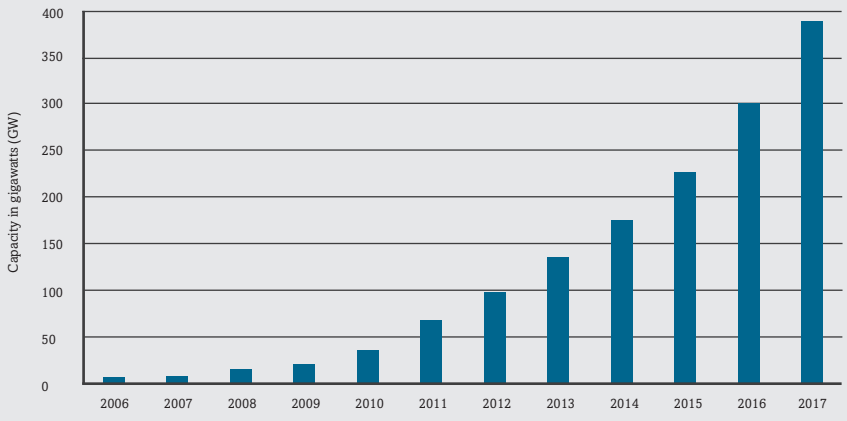
The full list of projects to be built is ambitious and it is hard to tell how many will actually be developed. Regardless, it is clear that the GCC will see massive investments in the renewable space, particularly in the solar PV sector.

While none of the projects announced to date has been funded via the capital markets, we might still see some bank-funded deals refinanced via the capital markets once they are operational. And, looking at the size of more recently announced projects, we believe the capital markets can play a more important role in funding some of these projects in the near future, as solar becomes increasingly prevalent in the region.

Further information is available on the Capital IQ portal in the research piece entitled: "Heating Up: The GCC Is Jumping Into Renewable Energy In A Big Way"

"Signaling that renewables are an important strategic area for investment, GCC member nations and policy leaders have announced major initiatives and large-scale projects over the past few years."

GLOBAL SOLAR PHOTOVOLTAIC CAPACITY IS GROWING FAST



Source: Renewables 2017 Global Status Report

DEFERRING AMERICA'S INFRASTRUCTURE MAINTENANCE CARRIES RISK

As America aims to address its aging infrastructure, Anne Selting makes the case for a better measurement of deferred infrastructure maintenance.

There's no shortage of evidence highlighting America's substantial infrastructure financing gap. But many discussions overlook one important point: responsibility for operations and maintenance falls to the local level, rather than the federal.

This can create issues: there's no consistent approach for measuring and reporting deferred maintenance of projects. In turn, nobody can say with any certainty which municipalities are successfully managing the required upgrades.

If left to grow, deferred maintenance can impact creditworthiness: significant underspending and spiralling backlogs can reduce asset life and increase capital costs, eventually pressuring a government's future financial flexibility, and harming growth. In this respect, deferred maintenance will likely become an area of growing interest in our credit analyses.

"We believe that deferred maintenance is more an emerging challenge for state and local governments – not a crisis."

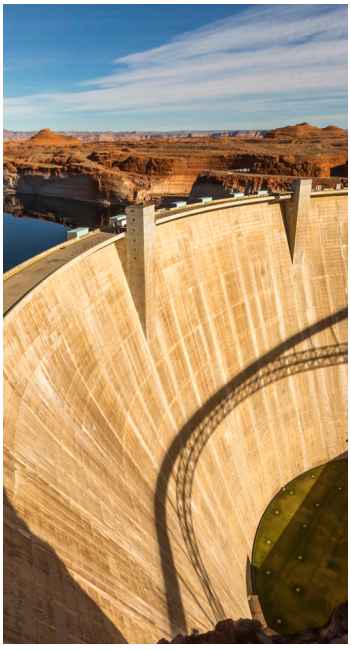
Moving toward better disclosure

Take California as an example of why disclosure matters: earlier this year, the world's fifth-largest economy issued US$2.1 billion in new debt. Though quickly snapped up by investors, the state carries a backlog of deferred maintenance that even the governor's budget summary calls "staggering". We consider this a significant credit weakness. As part of its 2018-2019 Governor's budget, California pegged the backlog of funding needed to maintain its existing infrastructure at some US$67 billion (US$47 billion of which is attributed to the state highway system).

California is not alone, either. In April, a warning from the Federal Highway Authority prompted the state governor of Mississippi to declare a state emergency, prompting the closure of over 100 city and county bridges.

State and local governments across the country acknowledge that, in tight fiscal times, deferring maintenance can help close budget shortfalls – but this is supposed to be a temporary tool. Instead, California's budget acknowledges that "the state has not consistently funded either the cost of maintaining its new capital investments or the deferred maintenance on existing infrastructure."

We rate the debt issuances of thousands of infrastructure owners and view high deferred maintenance levels as a credit weakness. But given the lack of standardized information, it is difficult to measure how much state and local governments across the country would have to spend to catch up on their deferred maintenance obligations. This is an important issue for bond investors, who currently hold some US$3.7 trillion in U.S. municipal debt outstanding.



COMING UP WITH THE MONEY...

"Declaring a budget balanced while omitting the long-term costs of maintaining infrastructure is not unlike a failure to fund promised pensions. Unless a state ends up closing its roads and bridges, it eventually will be forced to come up with the money to maintain its assets."

-The Volcker Alliance

Far from crisis

The problem? There is no standardized process for estimating the annual spending requirements needed to keep infrastructure in good repair and accounting for deferred maintenance. According to the Volcker Alliance, California is one of two states (the other being Alaska) that reports the estimated cost of deferred infrastructure improvements in its budget.

Despite the lack of standardized information, the importance of accounting for deferred maintenance is clear. So, what about possible solutions? Ideally, municipal issuers could self-report deferred maintenance information in a sufficiently standardized way to enable a relative ranking of state and local governments' deferred maintenance obligations.

From our perspective, while a poor ranking wouldn't necessarily affect credit quality it could be an important indicator. For example, investors would appreciate this information, along with the economic and financial information, to feature in a bond prospectus. But gaining such knowledge could take time because many state and local governments would need to undertake an analysis before standardizing the findings.

While at first glance the situation may seem dire, we believe that deferred maintenance is more an emerging challenge for state and local governments – not a crisis.

That said, municipalities with the greatest backlogs could see the delays begin to harm economic growth. Though this might be difficult to quantify, a failure to address infrastructure deficiencies could expose municipalities to liabilities and legal challenges on grounds of safety, not to mention more borrowing to address deficiencies in the longer term. For now, what's needed is more comprehensive measurement of deferred infrastructure maintenance. And it remains on our list of factors when assessing future state and local credit quality.

Further information is available on the Capital IQ portal in the research piece entitled: "Between A Budget And A Hard Place: The Risks Of Deferring Maintenance For U.S. Infrastructure"

TRAFFIC GROWTH WILL LARGELY SUPPORT TOLL ROAD CREDIT STABILITY

Kurt Forsgren considers the outlook for the global toll road sector in 2018, with a particular focus on the U.S. market.

Our 2018 outlook for business conditions and credit quality for rated toll road facilities is stable across most parts of the world – except for in the U.S., where the toll sector outlook is positive. From January 2017 to April 24 2018, we upgraded 15 issuers and downgraded five around the world.

Toll roads have generally been sensitive to both broad economic trends and demographic changes and geopolitical risks that affect the movement of people and goods. S&P Global Ratings' rated toll facility operators have generally performed very well, with continued strong competitive positions and demonstrated resilience as an asset class. In our view, with supportive regulatory regimes and concession frameworks, toll operators are well positioned to manage credit risks.

Moreover, we expect that a pickup in GDP growth across all regions in 2018 will translate into increased traffic, resulting in improved financial margins for many issuers. But on the flip side, more traffic will likely result in continued infrastructure requirements and capital expenditures, either as additions to existing capacity enhancements to rated toll networks or for new projects.

Common factors

S&P Global Ratings' toll facility ratings range from publicly owned facilities operated by state or local governments, for example, to diverse corporate entities. So while financial profiles and governance structures differ, toll operators share exposure to some common factors. These include: regional, and often national, business conditions that determine traffic; advances in technology that will improve operational efficiencies; inadequate public funding for roadway improvements; and tightening emissions regulations that are accelerating the electrification infrastructure trend.

For example, the growth of autonomous vehicles, ride-sharing, and other forms of transportation worldwide could radically change traffic dynamics, especially for commuter roads that provide free access for high-occupancy vehicles. However, in our view, advanced, completely autonomous vehicles will take several decades to become common.

Toll roads in the U.S.

The positive outlook for the U.S. toll sector reflects our view that tolls from traffic levels will increase slightly faster than baseline U.S. GDP. Greater use of tolling technology and inflation-adjusted toll increases will also allow for improved revenue growth. In addition, we expect an increase in tolled networks, with additional projects such as managed lanes to add capacity, and time-of-day pricing to result in revenue growth or outright expansions to existing toll road operators.

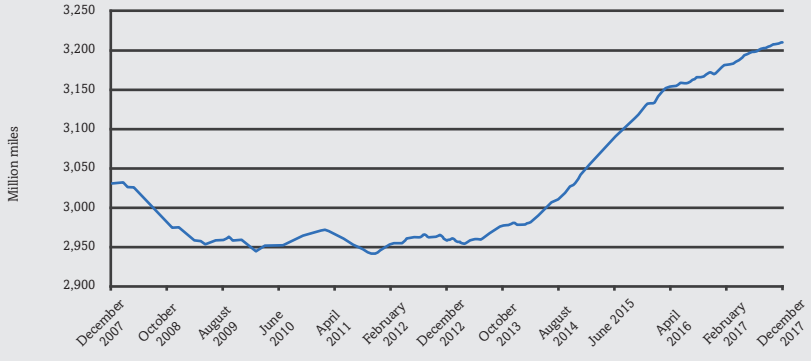
Overall risks to the sector include disruptive trade or tariff policies that could affect cross-border traffic, expanded capital spending by toll facility issuers without a commensurate increase in revenue sources, and higher construction labor costs. Policymakers continue to debate a federal infrastructure investment initiative, although the funding sources and form of any stimulus under the Trump Administration and Congress are unknown.

However, given the recent federal tax reform, we expect that strong economic growth over the next couple of years should continue to increase vehicle miles travelled (VMT), which rose about 1.2% in 2017 – albeit moderating from about 3.0% growth in the previous two years (see chart). And expect the U.S. economy to grow 2.8% this year and 2.2% in 2019. With nearly 86% of work commute trips being by car (based on INRIX 2016 Global Traffic Scorecard), an economy at or near full employment, increasing population, rising household income and wages, and the growth in VMT and congestion, we believe higher volumes for rated toll road operators will continue.

Further information is available on the Capital IQ portal in the research piece entitled: "Global Toll Road 2018 Sector Outlook: Increasing Traffic Growth Will Largely Support Credit Stability"

"With forecast GDP growth and favourable economic conditions, we believe traffic for toll road operators globally will increase in 2018."

U.S. TOTAL VEHICLE MILES TRAVELED 2007-2017*



*Moving 12-month total vehicle miles traveled


WIND AND SOLAR: KEY RATING ASSUMPTIONS

Julyana Yokota and Corinne Bendersky consider the strengths of both the wind and solar sectors – as well as the challenges they face.

"We have learned that wind resource availability of rated projects often failed to live up to estimates, and hence focus on P-90 forecasts in our analysis. By contrast our rated solar projects have typically performed better than expected, both in terms of availability and operating costs."

The renewable energy sector has undergone tremendous expansion. Thanks largely to rising awareness of how fossil fuels' use in power generation contributes to climate change, the compound annual growth rate has been 20%.

Fostering onshore wind power's rapid development have been falling prices throughout the wind turbine supply chain and higher capacity factor. Meanwhile, a slew of robust government incentives stimulating growth, steep falls in manufacturing and installation costs, and continuing improvements in generation efficiency have made solar generation competitive – even on an unsubsidized level.

Blustery winds onshore

Thanks to cost reductions, the wind market is evolving quickly. In the past six years in the U.S., the cost of wind-generated electricity dropped 66%, according to the American Wind Energy Association (AWEA). And that's not just the result of falling production costs across the supply chain; it's also due to growing production scale. With the cost-reduction trend not yet subsided, some experts anticipate a further 24%-30% reduction by 2030 and a 35%-41% drop by 2050.

However, the onshore wind sector's growth isn't without serious challenges. Wind resource availability has often failed to live up to estimates made while planning and financing various projects: rated onshore wind farm projects have performed only in line with average P-90 one-year generation expectations, rather than the P-50 baseline forecasts of wind studies.

And as turbine costs drop and projects expand to create greater efficiencies of scale, more competitors are entering the market. In turn, this forces power prices down and makes it more challenging to operate wind power projects at profitable levels. In our view, merchant exposure, as opposed to long-term fixed-price energy contracts, will be wind power's greatest antagonist over the next decade. Forecasting long-term power prices is particularly challenging as the power mix in many countries shifts to renewables, which have a zero marginal production cost. In addition, inter-, as well as intra-year variations, and intermittency of wind power add additional layers of complexity.

Consequently, across S&P Global Ratings' portfolio of wind farms, we have seen a majority of negative ratings actions over the last 15 years, mostly from a combination of consistently lower-than-expected wind speeds at financial close, volatility in wind supply between debt service payment periods, and higher-than-expected operating expenses, particularly among projects that we rated before 2010. By contrast, in May 2017, we assigned positive outlooks on two projects located in Mexico – Oaxaca Dos and Oaxaca Cuatro – reflecting the possibility of a future upgrade, should these projects continue to strengthen their main credit measures. The geography of the area helps, too. Located in a "corridor" that creates stronger winds, Oaxaca is situated in one of the best regions for onshore wind farms worlwide.

With 53 gigawatts (GW) of global wind additions in 2017, and 540 GW of total capacity, we expect onshore wind to continue to grow in the energy matrix globally, boosted by new technologies and cost improvements of battery storage, which we expect will play a big role in disrupting the traditional utilities market.

Shining the light on solar

We expect growth in the solar industry to continue, spurred by a number of factors. These include countries' regulatory requirements to meet their national commitments under the Paris Climate Agreement, as well as decreasing capital costs for construction and equipment. In addition, new energy storage technologies will provide the system with additional flexibility to integrate solar energy into local grids.

In contrast to the wind project, the six solar projects in our rated portfolio have shown very stable performance over their operational lives, with higher- than-assumed solar radiation or availability levels. (better than our one-year P-90 generation expectations). Yet it is important to note that operating histories remain relatively short and we could see this strong performance fall off slightly as the assets age. Rating actions have generally been positive, with the main reasons for upgrades being lower-than-expected operating costs, and our view that operational risk is more benign than for other power technologies such as wind or gas-fired power plants.

Still, the solar industry is also facing a number of challenges – for example, the Trump Administration's recent ruling to impose a tariff on imports of certain solar cells and models to the U.S. And while we expect the industry to adjust – especially given continued declines in balance-of-system costs – this will slow growth in the U.S. market in the near term, in our view.

Counterparty dependencies and regulatory regime changes also continue to be areas of risk and could result in rating movement over the long term. Moreover, increasingly competitive auctions and the shift toward merchant pricing introduce another set of challenges for the industry and are generally credit-negative if not mitigated by lower leverage. Nevertheless, we expect solar PV to continue to play an important role in the future of energy worldwide. Last year, installed capacity reached 90GW, bringing the worlwide total close to 400GW. The sun is shining, indeed.

Further information is available on the Capital IQ portal in the research pieces entitled: "Blustery Winds Underlie Key Rating Assumptions For Onshore Wind Power Producers" and "Shining Light On The Key Rating Assumptions For Our Solar Photovoltaic Project Portfolio"

WILL WILDFIRES SCORCH CALIFORNIA'S UTILITIES?

Gabe Grosberg finds electric utilities in California are facing operational and financial risks from natural disasters that could potentially weaken their credit quality.

"California is particularly exposed to natural disaster risks due to the prevalence of wildfires, earthquakes, and mudslides."

Heightened risk associated with potential wildfire-related liabilities presents an immediate threat to California's regulated electric utilities. Given the severity of the risks at hand, if the key issues are not resolved in an expedited manner, we may need to reassess our assessment of the California regulatory compact – reflecting the potentially increasing regulatory and legislative risks.

In turn, this would lower the business risk profiles for the California regulated electric utilities and could result in ratings below investment grade for those that are the most affected by the wildfires.

The wildfires

During October 2017, 21 major wildfires in California burned over 245,000 acres – resulting in 44 fatalities and destroying an estimated 8,900 structures. In January 2018, the California Department of Insurance disclosed that insurers received approximately US$10 billion of insurance claims related to the October 2017 wildfires, with some reports placing the total losses at around US$15 billion.

These potential contingent liabilities and the still-unsettling regulatory compact, as later discussed, could significantly affect the credit quality of California's electric regulated utilities for years to come.

Natural disaster in credit

California is particularly exposed to natural disaster risks due to the prevalence of wildfires, earthquakes, and mudslides. In particular, wildfire risks seem to have been intensifying in recent years and have consequently exposed a fracture in the regulatory and legislative framework in the state.

Wildfires pushed by high winds can spread very quickly, affect densely populated areas, and can cause billions of dollars in damages in a relatively short time. This could significantly increase a utility's potential contingent liabilities and hurt its credit quality through the application of the legal doctrine of inverse condemnation.

This doctrine, developed in California's common law, holds a utility strictly liable for damages arising from wildfires if its equipment is a contributing cause of the wildfire, regardless of the utility's negligence. Inverse condemnation puts the utility at a distinct disadvantage in managing its legal costs as it navigates the numerous tort claims made against it. Under the current construct in California, the utilities are effectively the insurer of last resort every time there is a devastating wildfire in its service territory.

This issue is only magnified when utilities then attempt to recover the wildfire costs from ratepayers. Until recently, this had not been tested because wildfire costs had historically been lower than insured coverage. So the first such case of recoverability of costs higher than insured coverage involved San Deago Gas & Electric's (SDG&E) request to the California Public Utility Commission (CPUC) to recover about US$380 million in connection with a 2007 wildfire.

The CPUC applied a different standard than the courts in evaluating SDG&E's handling of the fire – the higher bar of the prudence standard used for most utility costs, instead of recognizing that utilities were held to the lower bar of strict liability by the courts. Ultimately, this resulted in no recovery for SDG&E.

This disconnect between the CPUC's prudence standard and the courts strict liability standard is a material risk to Californian regulated electric utilities. This discrepancy potentially holds the utilities financially responsible for wildfires without allowing them a direct means to collect the wildfire costs from ratepayers.

What are the credit implications?

The state's susceptibility to wildfires, combined with its regulatory risks, are inconsistent with any other regulatory jurisdiction across North America, and if not addressed will probably lead to a weakening of the California electric regulated utilities' credit quality.

Given the complexity of this situation, we expect that this issue will be resolved or will be on a clear path toward a resolution over the next two to six months. The governor and state legislators are collaborating to develop solutions for vegetation management and insurance products, as well as to revise the liability rules and regulation for utilities. However, time is of the essence.

While there are potential bills moving through various stages of the California legislation, the 2018 legislation session closes at the end of August. The severity of the issue at hand is great and the lack of determination to quickly resolve these issues may materially weaken the credit quality of all Californian regulated electric utilities.

Further information is available on the Capital IQ portal in the research piece entitled: "Will Wildfires Scorch California's Utilities?"

CALIFORNIA UTILITIES POTENTIALLY FACING INCREASING RISKS

Company	Business Risk Profile	Issuer Credit Rating
Edison International	Excellent	BBB+
Pacific Gas & Electric Co.	Excellent	BBB
PG&E Corp.	Excellent	BBB
San Diego Gas & Electric Co.	Excellent	A
Sempra Energy	Excellent	BBB+
Southern California Edison Co.	Excellent	BBB+
Southern California Gas Co.	Excellent	A

Source: S&P Global Ratings
Ratings correct as of 14 June, 2018

REGULATORY STABILITY COULD ENCOURAGE INVESTORS IN ASIA-PACIFIC

Richard Langberg and his team consider how greater regulatory oversight could strengthen investor appetite for Asia-Pacific infrastructure projects.

Thanks to higher growth rates and infrastructure deficits, Asia-Pacific's infrastructure markets are the world's busiest. They can be the brashest, too, as bullet trains and third-generation nuclear power outshine some aging infrastructure in the Western hemisphere.

Less cutting edge, however, are the means of financing Asia's buildout – in addition to the region's regulatory frameworks. In a recent survey we conducted with East & Partners Asia, nearly 80% of global fixed-income investors said they planned to increase exposure to infrastructure. Though in Asia, investors can often struggle to source deals that match their investment mandates and risk settings.

What can governments do? We see there is a particular need for governments to provide greater regulatory stability and better contractual predictability. This, we believe, could influence the appetite for infrastructure investment in the region.

"In a recent survey, nearly 80% of global fixed-income investors said they planned to increase exposure to infrastructure."

Regulation in China is evolving

China is experiencing tension between liberalizing electricity markets and promoting renewable energy (where substantial subsidies are in place). In turn, surprises can appear, even for segments that the government views favorably.

In May, regulators decided to cut feed-in tariff rates and subsidies for new solar power projects and to suspend new photovoltaic installations. In this case, regulators said they were responding to excessive investment: China's subsidy bill for solar energy had soared more than 60% in 2017, to Chinese renminbi 100 billion (US$15.6 billion), which is becoming burdensome on public funds. That said, existing operating projects will still receive the already-approved higher tariffs for the whole project life. As the new rules may slow capacity expansions, the slowdown in growth capex could even help rein in leverage of existing players.

On the gas side, it appears that China's policy largely favors city gas distribution companies. The government indicated its desire to lower gas tariffs for two reasons: to promote the switch to natural gas to reduce air pollution; and to lower the production costs of industrial users. The introduction of a new regulatory regime last year may prompt the central government to first focus on regulating returns in the transmission segment.

Managing contractual risk in South East Asia

Regulatory improvements in South East Asia have generally been slower than expected. Institutional investors are seeking commercially viable projects with good cash flow visibility, supportive regulatory frameworks and strong contractual visibility.

For instance, more timely regulatory resets for tariffs could reduce cash flow uncertainties for power companies in the Philippines and for Indian airports. Indonesia's independent power producers and toll-road operators meanwhile have been increasingly attracting private capital due to long-term fixed price contracts. That said, the central government's call for renegotiating power purchase agreements and cutting toll tariffs creates uncertainties. We understand that the government expects the impact to be limited and is committed to providing contract extensions among other compensations.

A state of flux for policies in Australia…

Regulators and businesses in Australia are having some robust exchanges. Allowances and returns for distribution and transmission utilities are under scrutiny, thanks to concerns over retail power prices.

As for the transport sector, there have been market losses at listed rail company Aurizon – in addition to disputes between the company and its major customers. This follows a draft decision by Queensland Competition Authority on rail charges, which Aurizon disputes as uncommercial. We deem Australia's energy policy environment to be in a state of flux, partly due to inconsistent government policy and select market intervention.

…Still we see Australian PPPs as a strong asset class

Notwithstanding some disputes on public-private partnerships (PPPs) such as Sydney Light Rail and Royal Adelaide Hospital, Australia's PPP deals remain a strong asset class, in our opinion, with clear guidelines from state governments. Though rail and road projects are typically more complex than others, Australia's state governments have streamlined using various means:

Refinancing risk wasn't shared in the early phase of PPPs, despite the lack of depth and liquidity in Australia's capital markets. Risk can increase when markets conditions are unfavorable and state governments soon realized that refining the structure was necessary. Means of risk sharing followed and the burden of refinancing a project (if necessary) now falls 50/50 between PPP and government.

Construction risk management: Pass-through of construction risk to third parties is now entrenched. There is more involvement of the various parties during the design and bid phase. This lowers the prospects of variation risks and ensures consistency of final design, which can mean smoother transitions from the construction to operations phase.

Abatement risk and reporting are inherent in any PPP. Such deals are subject to certain performance and availability standards, and can incur penalties if these are not met. For many Australian projects that S&P Global Ratings has evaluated to date, the abatement processes have been simplified. are inherent in any PPP. Such deals are subject to certain performance and availability standards, and can incur penalties if these are not met. For many Australian projects that S&P Global Ratings has evaluated to date, the abatement processes have been simplified.

Further information is available on the Capital IQ portal in the research piece entitled: "What Investors Want To See In Asia-Pacific Infrastructure Deals"

AUSTRALIA AND NEW ZEALAND AIRPORTS' CAPITAL SPEND HINGES ON PRUDENT POLICY

Kendrew Fung believes Australia and New Zealand's airports will be able to weather increases in debt – provided that tariffs and policies are well managed.

Airports in Australia and New Zealand are soaring to new heights. Over the past three years, the two countries have lured booming numbers of international travelers, particularly from China, India, and South East Asia.

In Australia, we expect lucrative international air traffic to grow by around 5%; the country is likely to attract its 40 millionth visitor by June 30, 2018. With a population and wealth boom having indirectly boosted international passenger volumes, buoyant demand has prompted low-cost carriers and Chinese airlines to expand capacity, fly new routes, and offer affordable fares. Over the past three years (2014-2017), traffic between Australia and Greater China regions (China, Hong Kong, and Taiwan) swelled to more than two million seats, a 40% jump.

In the New Zealand market, the story is no different. We expect international passenger traffic volume to grow at around 5% over the next 12 to 18 months – slightly higher than GDP growth. Continued expansion should come from markets like China, Japan, Korea, and Indonesia. In particular, Chinese passengers represent more than 10% of international visitor arrivals, the key growth driver in recent years.

Large capital expenditure program

Australian and New Zealand airports have a number of infrastructure expansion plans to accommodate long-term growth and increase competitiveness. We forecast that the eight we rate will roll out a total of A$7 billion worth of capital projects over the next three to five years – investing in new runways, terminal facilities, and other amenities to improve their services (see chart).

Current expansion plans include:

- Auckland International Airport Ltd.'s domestic jet terminal upgrade
- Brisbane Airport's new parallel runway phase 2 (operational by 2020)
- Melbourne Airport's (rated entity Australia Pacific Airports Corp. Ltd.) third runway construction (completion between 2022 and 2024)

As capital investment ramps up, debt burdens will increase to above A$25 billion by the year ending June 30, 2021.

Prudent tariff management and financial flexibility are key

Despite the rapid debt increase, Australian and New Zealand airports should be able to absorb the jump in capital expenditure. They are likely to prudently manage their capital programs and financial profiles to maintain their credit quality, for several reasons.

First, the capital projects are discrete in nature, enabling airports to delay or cancel parts of the program if needed, in order to preserve their cash and financial profiles when actual revenues fall below expectations, due to an unforeseen economic or industry shock. This mitigates their exposure to potential volatility in passenger numbers. In particular, non-aeronautical expenditures – relating to car parking, property, and retail facilities within the terminal – are discrete and offer greater flexibility in terms of timing.

For example, Perth Airport delayed its capital expenditure during the recent two fiscal years. Its annual capital expenses reduced to around A$100 million, the majority on maintaining existing assets.

Second, we expect them to manage their financial profiles through controlling distributions. Airports have a track record of proactively managing dividends, or re-injecting capital through dividend reinvestment plans when economic shocks or unforeseen events occur.

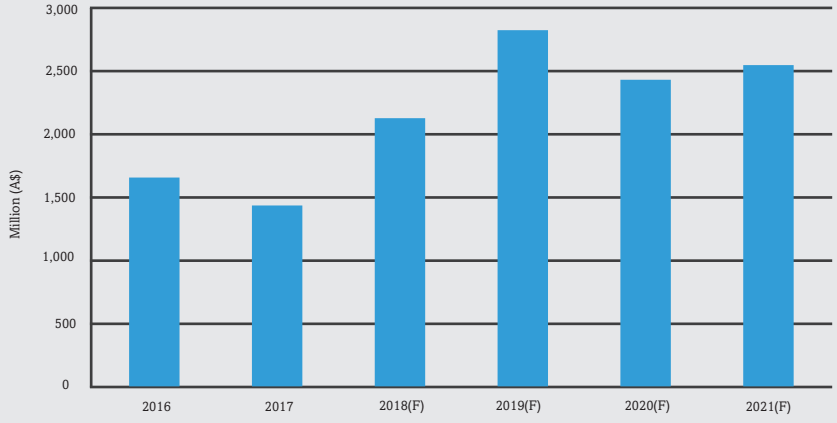
Third, airports are unlikely to embark on expansionary capital projects unless they get an adequate return and ensure predictability of future cash flows, through tariff negotiations similar to a building-block approach widely adopted in the utilities industry. Tariffs negotiated with airlines will allow airports to cover the cost and return on investment. Therefore, the combination of the tariff path, reset timing, and levels is important. Rated airports have tariff resets occurring at different years to match their capital expenditure profiles.

Finally, any unforeseen external shocks to the airport sector are likely to be temporary – and the sector would recover with a quick rebound. In the past, following a regional or global aviation downturn, passenger volumes in Australia and New Zealand recovered to long-term growth trends after two to three quarters. Therefore, we believe airports can introduce timely countermeasures to manage their cash flows over any temporary downturns and preserve their financial profiles.

Further information is available on the Capital IQ portal in the research piece entitled: "Australian And New Zealand Airports' Capital Splurge Will Hinge On Prudent Tariffs And Policies"

"Australian and New Zealand airports have a number of infrastructure expansion plans to accommodate long-term growth and increase competitiveness."

AUSTRALIA AND NEW ZEALAND'S AIRPORTS: INVESTMENT GROWTH FORECASTS



F - Forecast Source S&P Global Ratings

PUBLIC-PRIVATE PARTNERSHIPS TO UPGRADE ARGENTINA'S INFRASTRUCTURE: RISKY BUSINESS?

Despite macroeconomic uncertainty, the Macri Administration looks to carry out its infrastructure objectives. Candela Macchi explains.

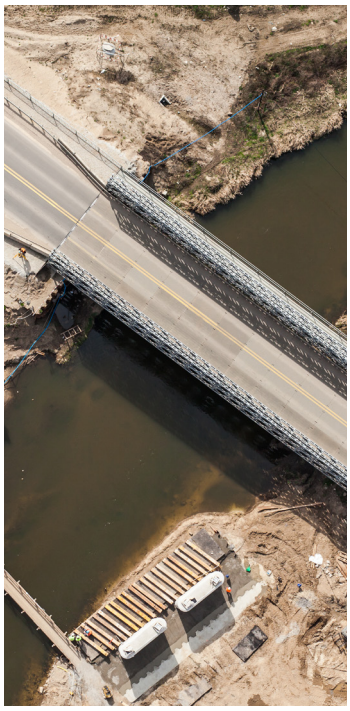
According to the Argentine government, public-private partnerships (PPPs) represent a win-win arrangement: they will allow for the completion of long-needed infrastructure upgrades, thanks to the help of private investors.

Inspired by other PPP regimes in markets like Peru, Panama, Chile and Australia, the Macri Administration seeks to compensate for two decades of low investment and the subsequent deterioration of core infrastructure assets, mainly focusing on energy and transportation projects.

However, challenges remain. Economic instability could weaken domestic and foreign investor interest and even lead to project delays. And mitigating these macroeconomic considerations is of critical importance. Projects will use Títulos de Pagos por Inversion (TPIs) and Títulos de Pagos por Disponibilidad (TPDs) to underwrite and pay for construction, operations, and maintenance. S&P Global Ratings believes that potential funding sources to contractors may come from repackaged securitizations backed by TPIs placed in international capital markets, mirroring recent transactions completed in Peru and Panama.

In our view, the creditworthiness of the certificates will either be equal to, or notched down from, our sovereign rating on Argentina, based on the relative prevalence of positive over negative attributes of the overall PPP framework according to our sovereign criteria.

"Overall, the PPP regime is expected to attract estimated investment bids totalling around US$26 billion – a potentially seismic opportunity for the country's development."



The plan

But what's happened, so far? The Ministry of Transport in 2016 announced a transportation plan worth US$33 billion, which was scheduled for completion by 2019. November 2017 saw the launch of a first round of PPPs comprising six highways and safe routes – requiring capital of around US$8 billion.

Financing for most of the transportation projects has thus far come through the public sector. But this is changing. In February 2017, the government approved a new PPP law that aims to bolster the framework for investments and to encourage infrastructure development for a wider range of sectors beyond 2019.

To date, the transportation plan has followed its expected course: of the 2,800 kilometers (km) of planned new roads, 1,400 km are already under construction, and upgrades are underway on over 10,000 km of the country's existing 13,000 km of roads and highways.

In S&P Global Ratings' view, the plan presents many positives. By diminishing the public resources devoted to infrastructure works, PPPs should improve the country's financial balance, as well as the efficiency of the planned upgrades. In addition, the use of PPPs, with private contractors competing for projects, should lower costs. The new approach also establishes clearer guidelines regarding the obligations and rights for private-sector concessionaires. For instance, it will elucidate how projects should be executed and how much compensation concessionaires can expect.

Further, the framework should allow sponsors and lenders to design financing structures that support long-term debt repayment. We consider this vital, especially given the long-term nature of the investments. In this context, we anticipate that international market issuances could become a viable alternative for financing these projects because the local capital markets are still underdeveloped.

Risks abound?

Macroeconomic factors could delay the plans, however. Argentina has a swelling budget deficit, while the depreciation of the Argentine peso recently prompted the central bank to raise the country's interest rate. Confronted by a steep depreciation in its currency, Argentina's central bank reacted swiftly. Over eight days in early May, it increased its policy interest rate to 40% from 27.25%.

Despite these developments creating uncertainty around the project bids, no concessionaire withdrew. A total of 32 potential concessionaires and consortiums presented bids on April 20, 2018, while the opening of the economic offers from 10 different concessionaires was held on May 17, 2018. In our opinion, the incrementally higher cost of debt, as a result of deteriorating macroeconomic factors may negatively affect both the local and international players and their access to financing. Nevertheless, the bidding process itself required a type of performance bond, whereby if the concessionaire withdraws from the project, the bond could be enforced by the government to make itself whole. Additionally, we believe the government's June 7, 2018, agreement to a three-year deal with the International Monetary Fund (IMF) for a $50 billion credit line is unlikely to materially weaken its own ability to proceed with the overall PPP framework.

Should the plans be successful, the ramifications for Argentina are potentially far-reaching. The likely projects under the same PPP regime include railroads, electrical transmission, hospitals, penitentiaries, water, sanitation, public lighting, bridges, and logistics contracts. Overall, the PPP regime is expected to attract estimated investment bids totaling around US$26 billion – a potentially seismic opportunity for the country's development. Let's see how it pans out.

Further information is available on the Global Credit Portal in the research piece entitled: "Public-Private Partnerships To Upgrade Argentina's Infrastructure: Risky Business?"

THE EFFECTS OF WEATHER EVENTS ON CORPORATE EARNINGS ARE GATHERING FORCE

S&P Global Ratings collaborated with Bermuda-based climate risk management specialist Resilience Economics to determine the prevalence and materiality of climate risk for companies in the S&P 500 index. Jessica Williams outlines the report's findings.

Of increasing interest is how climate change and severe weather events are hitting the bottom lines of companies around the world. Therefore, in order to determine the prevalence and materiality of climate risk for companies in the S&P 500 index, we examined public corporate research updates and earnings call transcripts from April 2017 to April 2018 (financial year 2017) to identify where a particular weather event had a material impact on earnings.

The results of our analysis show that in financial year 2017, 73 companies (15%) in the S&P 500 publicly disclosed an effect on earnings from weather events, but only 18 companies (4%) quantified the effect. However, the average materiality on earnings for the small number of companies that quantified it was a significant 6%. In our view, the effect of climate risk and severe weather events on corporate earnings is meaningful. And if left unmitigated, the financial impact could increase over time as climate change makes disruptive weather events more frequent and severe.

CEOs and climate risk

A review of the earnings call transcripts of S&P 500 companies in the past ten years revealed that "climate" and "weather" combined were among the most frequently discussed topics among executives – even more common than "Trump", "the dollar", "oil", and "recession" (see chart).

Moreover, discussions of climate risk and its effect on companies' earnings are now reaching the CEO's office. Of the earnings calls in financial year 2017 where weather was mentioned as having a material effect on corporate earnings, more than half (53%) of these disclosures were made directly by the CEO. Moreover, CEOs and other top company executives often cite climate and weather as a risk factor beyond the control of management.

Quantifying the effect

Quantifying the effect of climate risk can be difficult. In the airline industry, for example, the cost of delays (because of rain, thunderstorms or low visibility etc.) can be complex. This is because it depends on many factors – such as the location, time, class of aircraft, and the value of passenger time, if this is included. According to the Federal Aviation Administration, the cost to airlines of just a one-hour delay could range from US$1,400 to US$4,500, and the inclusion of the value of passenger time can add an additional US$35-US$63 per hour for every person on board.

Yet, despite the complexity in quantifying the impact of weather on earnings for reporting purposes, we did find cases of airlines making efforts to do so in 2017 and earlier. One driving force for quantifying comes from the Financial Stability Board's (FSB) Taskforce on Climate Related Financial Disclosures (TCFD), which has outlined a set of recommendations for companies to produce climate-related financial risk disclosures for investors, lenders, insurers, and other stakeholders.

So far, the utilities sector had the highest level of quantification in financial year 2017 – with 36% of the companies that attributed a negative earnings effect to weather quantifying the monetary impact in the disclosure. As management teams become more accountable for understanding the financial impact of weather events – and as more companies join more than 250 that have already signed up to support the TCFD's recommendations - we expect to see more companies increase reporting of the quantified impact of climate and weather in annual and quarterly financial reports and investor day presentations.

Climate in credit

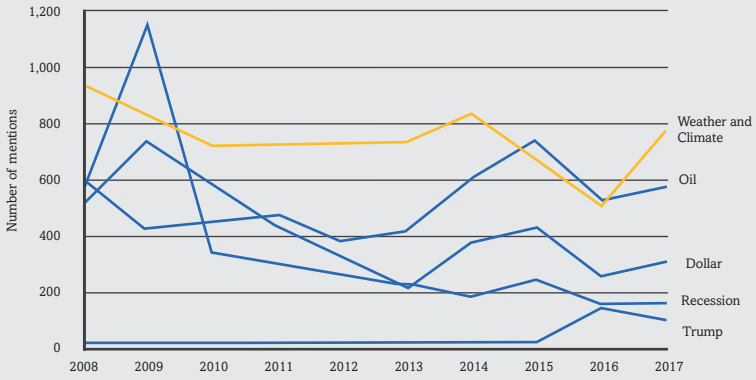
The impact of climate and severe weather events on credit ratings is also meaningful. Although it's difficult to draw concrete conclusions at this stage, the increase in negative rating actions due to climate risk (as found in our review of environmental and climate risks and opportunities in global corporate ratings) signals that companies are being adversely affected by climate risk.

The number of instances where climate factors feature in our analysis and are key drivers of rating actions (both positive and negative) indicates that climate issues are becoming increasingly important in terms of their influence on credit ratings. The effect on corporate earnings is also becoming more visible. There is growing demand among both equity and fixed-income investors for better reporting and disclosure of climate-related risks.

Further information is available on the Global Credit Portal in the research piece entitled: "The Effects Of Weather Events on Corproate Earnings are Gathering Force"

"Climate-related factors are becoming more significant in our credit analysis."

WEATHER AND CLIMATE HIGH ON THE AGENDA OF S&P 500 EARNINGS CALLS



Source: S&P Global Ratings

HOW SOCIAL RISKS AND OPPORTUNITIES FACTOR INTO GLOBAL CORPORATE RATINGS

As lenders and institutional investors become increasingly interested in how we incorporate social risks and opportunities into credit ratings, Noemie de la Gorce explains how these factors can impact credit quality.

Companies around the world are under scrutiny – politically and from the general public – with regard to their environmental, social, and governance (ESG) responsibilities. To aid transparency on these issues we completed a review of social factors incorporated into our analyses, and how these have affected ratings between July 2015 and August 2017.

Defining social factors

Identifying social risks and opportunities – linked to the complex and dynamic interactions between a company, its stakeholders, and broader society – is no easy task. For this research, we identified two main categories of social factors relevant to our corporate credit: internal and external.

Internal social factors

In this category, we include risks and opportunities associated with a company's management of human capital and safety – those typically internal to companies or their suppliers, and to a certain extent under their control.

For example, a company's human capital management relates to its capacity to develop a long-lasting productive workforce while reducing potential operational disruptions from workforce mismanagement. This includes a company's employee turnover, its vulnerability to strikes, and its ability to manage skill scarcity. Next, a company's safety management comprises its ability to ensure the safety of its workforce, production process, and its final products. This is because, in our opinion, delivering safe products through a safe operational environment reduces the likelihood of a negative impact on a company's employees and customers.

External social factors

Here, we include risks and opportunities associated with a company's exposure to external social trends, including demographic factors, changing consumer behaviors, and social cohesion. These external factors are less within the company's control and can be more difficult to manage directly.

For example, demographic factors relate to population growth and composition – such as an aging population and urbanization – and development-related factors such as rising living standards or a growing middle class. In our view, these demographic trends typically shape the long-term growth and demand dynamics in an industry. Consumer-related factors are similarly important – including changing preferences and increasing awareness about the environment, health, and privacy.

While we recognize that those changes are often the result of complex dynamics that may not be solely social in nature – such as technological innovations, higher levels of education, or new public policies – we see them as a social factor in itself.

Lastly, other external social risks include those stemming from geopolitics and community-related events such as conflicts, community unrests, and terror attacks. These social cohesion-related factors have the potential to disrupt a company's business environment through its supply chain and end market, and also result in direct operational disruptions.

The findings

Our study shows that social factors contributed less frequently to rating actions than environmental and climate factors: of the 9,000 research updates for global corporate entities from July 2015 to August 2017, social factors were identified as an important consideration in 346. Over the same period, we found 717 cases in which we considered environmental and climate (E&C) factors.

Of the 346 cases where social risk was relevant, there were 42 in which those risks were key to a rating action (in contrast to 106 for E&C factors). These cases were spread across multiple sectors, with retail and restaurants, leisure and sports, and regulated utilities being most frequently affected over the two-year review period. And when social factors were material, they were overwhelmingly negative to credit quality compared to environmental and climate factors.

Notably, of the 42 research updates that listed a social factor as a key element of rating action, close to three quarters were in the negative direction. Human capital management and social cohesion represent the majority of social factors leading to downgrades and negative outlook revisions. Of these negative actions, more than half were downgrades (55%), while the rest were split between negative outlook revisions (39%) and negative CreditWatch placements (6%). This result contrasts with actions associated with E&C risks and opportunities over the same period, in which only 56% of the ratings actions were in the negative direction.

However, there are also opportunities related to social factors. These mostly stem from companies' ability to anticipate and manage social risks through robust risk management systems and strategic planning.

Ultimately, while social factors were found to have less of a direct impact on credit ratings than E&C risks and opportunities, our research highlighted the significance they still have on companies' business risks and competitive position.

Further information is available on the Capital IQ portal in the research piece entitled: "How Social Risks And Opportunities Factor Into Global Corporate Ratings"

"When social factors were material, they were overwhelmingly negative to credit quality compared to environmental and climate factors."

NORTH AMERICAN UTILITIES

U.S. And Canadian Regulatory Jurisdictions Support Utilities' Credit Quality...

...But some more so than others.

Regulatory risk, what S&P Global Ratings calls "regulatory advantage" is a heavily weighted factor in its analysis of a regulated utility's business risk profile. Some recent developments are influencing our view of regulation in certain jurisdictions and the specific factors that we can use to determine the initial regulatory advantage when we are completing our credit analysis of each U.S. and Canadian regulated utility.

Because the U.S. and Canada have so many regulatory jurisdictions and numerous companies may operate in a single jurisdiction, we create assessments of the regulatory jurisdictions in U.S. and Canadian provinces that regulate the electric, gas, and water utilities that we rate. These provide starting points from which an analyst can begin to develop the initial regulatory advantage of a regulated utility or holding company with more than one regulated utility. For both determining the initial regulatory advantage of a rated entity and developing the assessment of a regulatory jurisdiction, we base our analysis on quantitative and qualitative factors, focusing on regulatory stability, tariff-setting procedures and design, financial stability, and regulatory independence and insulation.

Although we consider some jurisdictions "most credit supportive" it does not indicate that we think a commission in this category is a good regulator. Likewise, those jurisdictions we assess as only "credit supportive" does not indicate that we believe a commission is a bad regulator. We describe all jurisdictions as "credit supportive" and the designations only differ in degree rather than in kind.

Here are our latest assessments:

Arizona: We revised our regulatory jurisdiction assessment to "more credit supportive" from "very credit supportive," reflecting our opinion that regulatory independence and insulation has weakened lately.

The recent wildfires have prompted changes in financial stability. in **California**. We revised our assessment to "more credit supportive" from "highly credit supportive".

Our regulatory jurisdiction assessment for **New Mexico** has been revised to "credit supportive" from "more credit supportive", reflecting a reduction in overall regulatory stability because of inconsistency in the state's regulatory framework.

Oklahoma, meanwhile, has experienced reduced regulatory stability and a less transparent regulatory framework. We have revised our assessment to "more credit supportive" from "highly credit supportive".

Finally, we revised our regulatory jurisdiction assessment on **South Carolina** to "more credit supportive" from "most credit-supportive," reflecting our opinion that the political and regulatory framework is less transparent, less predictable, and has not been consistent with regard to historical actions.

The different assessments offer some granularity in our thinking about these jurisdictions' approach to regulation. Sometimes it will be due to trends such as the troublesome trends in the regulatory jurisdictions of California and South Carolina.

Often it simply designates a stable jurisdiction that is slightly better or worse than its closest peers from a credit-quality perspective. We will be publishing in-depth updates on selected jurisdictions to bring even more focus on how regulatory developments could affect credit quality across the North American regulatory landscape.

Further information is available on the Capital IQ portal in the report entitled: "U.S. And Canadian Regulatory Jurisdictions Support Utilities' Credit Quality - But Some More So Than Others"

ABERTIS

Abertis Taken Over By Atlantia

The transaction creates the world's largest toll road operator.

A consortium of Italian transportation group Atlantia, Spanish construction company ACS, and its Germany-based subsidiary Hochtief achieved a rate of acceptance of 78.79% of the entire issued capital (or 85.6% of the outstanding shares, net of the treasury shares) on its €16.7 billion all-cash offer for the shares of Spain-based toll road operator Abertis Infraestructuras S.A.

The acquisition is funded with about €10 billion debt via a special purpose vehicle above Abertis and pro rata shareholder equity.

Despite both Atlantia and Abertis taking on significant additional acquisition-related debt, which we will fully consolidate given Atlantia's control over Abertis, we expect credit-ratio deterioration to be partly mitigated by already-executed sales of minority stakes, planned disposals of Abertis' noncore assets, and some synergies from the joint operation of assets in overlapping regions.

Further information is available on the Capital IQ portal in the reports entitled: "Abertis Infraestructuras S.A. Outlook Revised To Stable From Developing After Takeover; 'BBB' Ratings Affirmed;" and "Italy-Based Atlantia Outlook Revised To Stable From Negative On Takeover Of Abertis; 'BBB+' Rating Affirmed"

"We expect credit-ratio deterioration to be partly mitigated by already-executed sales of minority stakes, planned disposals of Abertis' noncore assets."

VISTRA ENERGY

On May 16, 2018, S&P Global Ratings raised its corporate credit rating on diversified energy company Vistra Energy Corp. to 'BB' from 'BB-'. The outlook is stable. At the same time, we raised our senior secured ratings at subsidiary Vistra Operations Co. LLC to 'BBB-' from 'BB+'.

This rating action affects nearly US$3.8 billion of rated term loan B-1 ($2.81 billion outstanding) and term loan B-2 ($988 million outstanding). The recovery rating on the term loans is '1', reflecting our expectation of very high (90%-100%; rounded estimate: 95%) recovery in the event of default.

We also assigned our 'BBB-' ratings to Vistra Operations Co.'s new $2.05 billion term loan B-3, from which Vistra Energy will use proceeds to repay the $2.018 billion secured term loan assumed from Dynegy upon close, together with related fees and expenses.

Further information is available on the Capital IQ portal in the report entitled: "Vistra Energy Corp. Rating Raised To 'BB' From 'BB-', Outlook Stable; Vistra Operations Debt Rating Raised To 'BBB-'"

KOREA WESTERN POWER

On April 27, 2018, S&P Global Ratings assigned its 'AA' long-term issuer credit rating to Korea Western Power Co. Ltd. (KOWEPO), a Korea-based power generation company. The outlook is stable. At the same time, we assigned our 'AA' long-term issue ratings to the company's existing US$2 billion global medium-term notes (MTN) program and the three sets of senior unsecured notes drawn down from the program.

The rating on KOWEPO primarily reflects our view of the company as a core subsidiary of Korea Electric Power Corp. (KEPCO; AA/Stable/A-1+). KOWEPO's power generation is integral to KEPCO's role of providing a stable supply of electricity in Korea. KEPCO's six power generation subsidiaries (including KOWEPO) account for a key portion of its 80% share of the national electricity generation market. Reflecting these factors, we equalize the rating on KOWEPO with that on its parent, KEPCO.

Further information is available on the Capital IQ portal in the report entitled: "Korea Western Power Co. Ltd. Assigned 'AA' Rating With Stable Outlook; Global MTN And Senior Notes Drawdown Rated 'AA'"

ACS SERVICIOS COMUNICACIONES Y ENERGÍA S.L.

Subsidiary of Spain-based ACS Group's €750 million bond receives highest Green Evaluation score

Bonds will be used to either refinance or fund numerous environmentally beneficial assets across the globe.

The proceeds of ACS Servicios Comunicaciones y Energía S.L.'s (ACS SCE) €750 million of direct, general, unconditional, unsubordinated, and unsecured notes will be used to refinance and/or fund additional capital for a diversified set of environmentally beneficial assets dispersed across a vast geographic footprint spanning North America, South America, Europe, Asia, and Africa.

This transaction received a Green Evaluation score of E1/83.

The evaluation reflects a high Mitigation score of 83 – largely supported by proceeds allocated to renewable energy and water projects in countries with medium carbon intensity grids and medium high water stress. The score also reflects the strong Governance (88) and Transparency (82) framework, which is aligned with the Green Bond Principles.

Further information is available on the Capital IQ portal in the Green Evaluation entitled: "ACS Servicios Comunicaciones y Energía S.L. Green Notes"

"The Bazalgette Finance plc. transaction is, in our opinion, aligned with the Green Bond Principles 2017 (GBP)."

YGRENE ENERGY FUND INC.'S GOODGREEN SERIES

GoodGreen 2018-1 is a special purpose vehicle (SPV) created to issue US$340.47 million in private placement notes (Series 2018-1) secured by a portfolio of property-assessed clean energy (PACE) assets in California and Florida.

PACE programs allow for low-cost financing of a variety of energy efficiency, renewable energy, water conservation, storm protection, and seismic improvements on residential and commercial properties that are repaid through a special tax or an annual or semi-annual assessment on a property's tax bill. Ygrene, the transaction sponsor, is a leading provider of residential and commercial PACE financing.

This transaction received a Green Evaluation score of E1/76. The evaluation reflects a Mitigation score of 79 that is supported by building refurbishment, renewable energy installations, and energy efficiency measures in states with an aggregate grid carbon intensity that we consider medium high, coupled with water conservation initiatives in areas that exhibit extremely high water stress.

The E1 score also reflects the strong Governance (81) score enabled through the defined eligibility criteria underlying the California and Florida PACE programs and third-party verification of bonds' allocation proceeds. The environmental impact of wind projects typically ranks higher than solar on our scale given the better capacity factors over the life of wind projects.

Further information is available on the Capital IQ portal in the Green Evaluation entitled: "Ygrene Energy Fund Inc.'s GoodGreen Series 2018-1 Notes"

EÓLICA MESA LA PAZ S. DE R.L. DE C.V.

Eólica Mesa La Paz is a 306 megawatt (MW) greenfield onshore wind farm located in the state of Tamaulipas, Mexico, which consists of 85 Vestas V136-6 MW turbines. We believe this projects fits properly within the government's energy plans, considering Mexico's intention to increase electricity generated from clean energy sources to 35% by 2024 and 50% by 2050, and to reduce greenhouse gas emissions by 30% by the end of the decade.

This transaction received an overall Green Evaluation score of E1/91, determined by taking a weighted average of the excellent Transparency (80), solid Governance (95), and robust Mitigation (92) scores. In our view, renewable energy generation's contribution toward systemic decarbonization, the strong governance framework, and transparent reporting mechanisms position this financing at the top end of our scale.

Further information is available on the Capital IQ portal in the Green Evaluation entitled: "Eólica Mesa La Paz S. de R.L. de C.V.'s Proposed US$303 Million Bond"

BAZALGETTE FINANCE PLC.

In May 2018, Bazalgette Finance plc issued £175 million of index-linked green bonds. The green bonds were issued under Bazalgette Finance's £10 billion multicurrency bonds program, and will be used by Bazalgette Tunnel Ltd. to design, build, commission, and maintain the Thames Tideway Tunnel (TTT) in London.

The transaction received an overall score of E1/95 and, in our opinion, is aligned with the Green Bond Principles 2017 (GBP). The excellent Governance score (93) reflects the pure play and regulated nature of Bazalgette Tunnel Ltd. As sole owner of the TTT. The very strong Transparency score (88) reflects the disclosure requirements set by the regulators, and the excellent Mitigation score (97) reflects our view that system enhancement projects such as this one increase the availability of fresh water in the tidal Thames for general purposes and do not result in a significant byproduct with a negative water impact.

Further information is available on the Capital IQ portal in the Green Evaluation entitled: "Bazalgette Finance plc (Tideway)"

LANDSEA GREEN GROUP CO.

Landsea Green Group Co., Ltd's US$150 million green bond issuance will be used to finance debt related to both the construction of new, and the refurbishment of existing, environmentally certified green residential buildings in China.

The project received a green evaluation score of E1/84, a weighted average of the transaction's Transparency (79), Governance (76), and Mitigation (88) scores. The very strong Mitigation score reflects the meaningful environmental benefits from Landsea's green property projects in China, whereas the robust Transparency score indicates regular reporting with meaningful disclosure on the green projects and those environmental benefits.

Further information is available on the Capital IQ portal in the Green Evaluation entitled: "Landsea Green Group Co., Ltd. US$150 Million Green Bond"

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