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**POWER MARKET REVIEW**

**DECEMBER 2014**
Introduction

It is probably no exaggeration to say that the global power industry is facing unprecedented challenges, as traditional business models are increasingly threatened by transformative changes.

A number of potentially disruptive factors are in play, such as the need for huge investment in renewable generation to meet emissions reduction targets and new thermal plants, as the viability of aging plant is impacted by lack of efficiency and emissions legislation. With such transformation comes technological challenge: biomass conversion, development of carbon capture and storage, deeper water offshore wind farms and the need for greater flexibility from plants that were designed for base-load operation but now have to fit around the intermittencies inherent in renewable generation forms such as wind and solar. In some countries this environment has led to the proliferation of decentralised generation, which is eroding the utilisation and revenues of centralised generation portfolios and traditional transmission and distribution companies.

Additionally, technological developments can be witnessed in the lowering of renewable power prices, enhanced smart grid performance and reductions in demand through greater energy efficiency. The lingering fall-out from the global financial crisis which hit the world in 2008 have also had a dampening effect on demand, particularly in the developed world, where in places electricity consumption has not recovered to pre-crash levels.

New sources of fossil fuel supply are having a major impact, with shale gas and tight oil rewriting the economics of the industry, particularly in the USA. One of the consequences of the energy independence that ‘fracking’ has given the USA has been the displacement around the rest of the world of cheap coal, with devastating impact on the commercial viability of gas-fired generation in some countries. The geopolitical landscape of world energy supply and demand is therefore fundamentally changing.
At the same time companies are developing increasingly complex asset bases and global supply chains with significant exposures to climate change, political and/or regulatory risk, and financial instability.

Underpinning all of this is huge investment in infrastructure, required to be increasingly flexible and resilient to the climate and fluctuations in supply and demand. Companies are also required to meet stretching environmental, service level and financial targets against the spotlight of climate change, security of supply and the need to contain consumer costs.

Such has been the turmoil in the European energy sector that in recent weeks E.ON has announced plans to spin off most of its power generation, energy trading and upstream businesses, citing “dramatically altered global energy markets” and challenges that “E.ON’s existing broad business model can no longer properly address.” Included in this review is a very timely insight from Bloomberg New Energy Finance on the issues that are driving change in Europe’s power sector.

Faced with these challenges – some of which are highlighted in this review – companies in the power sector can take some comfort that one of the essential elements on which they rely for the conduct of their business is relatively stable and benign. This is the insurance market, which is continuing its lengthy ‘soft’ phase for most of the main insurance types typically bought by companies in the sector.

This is not to say that everything in the insurance garden is rosy, and the second half of 2014 has seen the withdrawal from the power insurance sector of two significant capacity providers – namely Infrassure and XL. Different factors applied to each company, but the combination of continuing attritional losses in the sector and downward pressure on premium rates may mean that we have not seen the last of this kind of development. In the meantime, however, the continued growth in market capacity and another year of low natural catastrophe activity have ensured a very favourable environment for insurance buyers.

This Power Market Review is divided into three parts. The first contains a number of reports on the insurance market for power sector companies across different insurance classes. The second consists of reports from a number of the world’s regions, highlighting particular regional issues and conditions. The final section contains reports on some of the industry challenges outlined above.

As in previous editions, the bulk of the content of this review has been produced by Willis Associates around the world. Our thanks go to all the contributors to this review.

The geopolitical landscape of world energy supply and demand is therefore fundamentally changing.

Graham Knight
Global Head of Power
INSURANCE MARKET UPDATE
As has been well documented, the general property market has been enjoying record levels of capacity following a relatively benign year for natural catastrophes in 2013 and an even better year (to date) in 2014 – Munich Re reported insured global natural catastrophe losses of USD 17 billion in the first 6 months of 2014, compared with USD 21 billion in the same period in 2013, and a 10 year average of USD 25 billion. This low loss activity and the influx of investment into the insurance sector have driven improved direct and facultative property business renewals, with rate reductions the norm.

The market for power risks, which is a specialist part of the market that exhibits its own dynamics, took longer to respond to these softening pressures than the general property market. For most of 2013 flat rate renewals were common, but during 2014 a buyer with a decent loss record would be entitled to feel disappointed if their broker did not secure a meaningful rate reduction at renewal.

This time-lag in power market movement is partly down to the sector’s persistence in continuing to post low severity but high frequency ‘attritional’ losses, many of them machinery breakdown events associated with gas turbine technology. In addition, despite the high levels of capacity available in the power market, there remains a relative shortage of potential lead insurers with the technical underwriting and engineering expertise to provide market leadership and added value to clients.

This means that the degree of competition in this area is not as great as in the wider property market.

On the other hand, there is plentiful support, or ‘follow’, capacity for most risks, which leads to placements often being oversubscribed, allowing buyers to select markets with track records of good service and claims payments.
New capacity has come from insurers taking a greater involvement in the power sector, with a number of established power markets also offering larger renewal lines, in order to grow, or maintain, their income levels in the soft market environment. Alternative capital and brokers’ facilities have further boosted the capacity for power risks. There is also an abundance of capacity in regional markets, which has put the London market under more pressure to improve terms in the clients’ favour.

There have, however, been two significant exceptions to the general capacity story. In July 2014 the Swiss-based specialty property and engineering insurer Infrassure informed the Swiss insurance regulator, FINMA, that it was ceasing to underwrite any new business, having lost its A- rating from A. M. Best in May and then been unable to find a buyer for the business, and subsequently went into run-off. Then in October 2014 XL Insurance Company (‘XL’) announced that it had decided, with immediate effect, to place the onshore oil & gas and utilities sections of its energy portfolio into run-off and exit the open market onshore energy business. This followed a detailed internal review of its business in the sector.

Both Infrassure and XL were active participants in the power sector, and XL in particular had been one of the relatively small number of technical insurers with the ability to lead major power accounts. It remains to be seen what impact, if any, this loss of technical capacity will have on the wider market environment.

The soft market pressures have generally had the greatest impact on price. There has not been a significant trend of reduced deductibles, although on occasion underwriters have made concessions on some deductibles on accounts with excellent loss records or where there is an existing long term relationship.

If underwriters wish to increase deductibles for a specific account, for example where they have concerns over loss experience, operational practices and/or risk management, generating technology, or exposure to natural catastrophes, competitive alternative capacity usually makes such increases impossible to achieve.

‘Profitability’ remains the mantra of underwriters, with underwriters’ aggressive rating behaviour being concentrated on accounts which are perceived as better risk quality. Many insurers are willing to deploy increased capacity and improved terms where clients can demonstrate risk quality backed up by good engineering information and data analysis. This differentiation allows underwriters to justify internally, for example through peer reviews, quoting market-leading improvements in terms.

The softening of the power market has not to date been slowed by some high-profile major loss incidents this year in areas South Africa, Bangladesh and Kuwait (amongst others), which continue to present power carriers with profitability challenges, over and above the attritional losses that the sector continues to experience.

Despite this loss activity, therefore, the market condition for power risks has moved from stable for most of 2013 to soft in 2014. Underwriters are looking to grow their books in a market in which capacity is plentiful, creating a competitive environment which, in the absence of any major game-changing loss events, appears likely to continue for the rest of 2014 and into 2015.
Liability

The global Liability market capacity has reached an all-time high of USD 2.8 billion (see chart opposite). Whilst this reflects the published maximum capacity of carriers, the realistic capacity of USD 1.4 billion is more than adequate for all but the very largest buyers. In the power sector hydro generators typically seek the highest limits and in some cases are testing the limits of the liability market. Overall the slowdown in power demand and the continued soft insurance market conditions are keeping a downward pressure on pricing.

Despite no end to the soft market conditions being in sight, new capacity continues to emerge.
1. Increased line sizes from a number of existing markets (through increased net lines and/or increased treaty capacity such as Kiln, Brit);
2. Increasingly active engagement of more recent start-ups (e.g. Apollo, Berkley, Canopius)
3. Increased/ reinvigorated appetite from traditional markets (e.g. Mitsui, Amlin, QBE)
4. Increased use of automatic facilities.

The increased capacity shown in the chart opposite is driving market competition. However it has not significantly eroded market discipline. Good quality information remains very important. Underwriters are under pressure to demonstrate that they have a sound basis for their pricing and coverage decisions particularly when pricing is flat or falling.

Liability underwriters are applying a special focus on specific areas of the power industry, driven by either claims or increasing concern about potential exposures. A major example is bushfire in the T&D sector. The conclusion in the first half of 2014 of a number of legal cases related to the 2009 Black Saturday bushfires in Australia have crystalized losses to the local and international liability markets running into hundreds of millions of Australian dollars. This is one area where pricing is under upward pressure and capacity is tougher to find.
Underwriters want to see detailed information about the risk management procedures in place to mitigate bushfire exposure, including the cycle of asset replacement and upgrading, asset inspection and vegetation management. Future maintenance budgets also come under scrutiny as an indication that the risk management programmes will be sustained.

The exposures from Hydro generation are also receiving focus both from within the industry and from insurers. We are seeing demand for higher limits from European operators, reflecting downstream inundation exposures. In some cases this is testing the limits of capacity available for these assets. Outside Western Europe we are also seeing increased demand for higher limits. A challenge in some cases is the undeveloped regulation surrounding the construction and management of dams. Insurers will want to see detailed technical information including inspection reports and in some cases inundation maps.

On a more general note the insurance market is being increasingly driven by competition in certain territories from aggressive local insurance markets. London insurers have to compete to retain their current market share. The greatest competition is seen on straightforward thermal generation and renewables operations, particularly where assets are relatively new.

Beyond the structure and pricing of the liability insurance programmes, issues such as sanctions regimes and regulatory and tax compliance are creating significant challenges. Sanctions may have a very direct impact on the markets that can be used and how a programme can be structured, and in some cases whether the broker can act. These issues have to be addressed very early in the planning process for any programme.

Placing an economically efficient programme requires careful strategy planning whatever the general market conditions. Issues such as those discussed above need to be identified and good quality information provided to assist the underwriter in delivering the client’s coverage and pricing objectives.
The global construction market remains highly capitalised and in most cases can respond to capacity and coverage needs of all types of power projects. However, major construction projects in locations exposed to natural catastrophes can challenge and in some cases bump up against the ceiling of available capacity; in these circumstances some insurers are forced (through reinsurance treaty or internal rules) to restrict their participation to a percentage of their capacity, thereby reducing their lines and requiring access to more insurers. Shareholders in LNG projects in Western Australia and in USA, for example, have had to accept a loss limit because capacity up to the full EPC value at economic terms was unavailable.

The Probable Maximum Loss capacity in the global Construction market is around USD 4 billion, assuming every carrier commits their full capacity - a scenario which hardly ever occurs in practice. Underwriters generally allocate their capacity on a “best risks” basis, with preference given to the better-quality risks.

The Construction market for power risks has enjoyed a positive claims experience for a number of years. The combination of profitable business, increased capital and high insurer appetite provides the perfect ingredients for a soft market, which describes the Construction market today. We believe that the market is likely to retain the current level of competitiveness for at least the next 24 months, with capacity likely to increase further. Indeed, we anticipate a further scramble for market share from emerging insurers in places such as Korea, China and even Bermuda, as well as from traditional markets such as Lloyd’s.

While the power sector continues to be a target for insurers to generate premium income, several features continue to attract attention when these programmes are being underwritten. Typically, scrutiny is paid to the importance of risk management, work methods and any potential financial loss, such as Delay in Start Up insurance where DSU is being considered by the owner or financing parties.
Projects located in remote areas with logistical challenges, difficulties in transportation and/or quality of supply chain continue to receive underwriters’ attention, notwithstanding the benign market environment. For most types of projects, Delay in Start Up insurance requires close assessment of relevant underwriting information before acceptance. Other risk features on which insurers continue to focus include transportation, storage, defects (Design, Workmanship and Materials) and Maintenance or Defects Liability cover, with detailed information required in order to secure Guarantee Maintenance cover. The importance of risk management and other quality controls remains a differentiator for buyers to distinguish themselves from their peers, although perhaps not as essential in the current market environment of the greater competition and continuing softening of the market as it would be in a tougher climate.

The decentralisation of the Construction market has continued in 2013/14, with increased resource, expertise and underwriting authority devolved to regional underwriting centres or hubs such as Singapore, Sao Paulo, Hong Kong, South Africa and Dubai. Key decisions still remain with the head offices of the leading companies such as Munich Re and Swiss Re, with the London market still a driving force behind innovation and creativity for the risks of tunnelling, underground mining and heavy civil works.

Improving technology, particularly scale up, continues to be an important issue to secure the best deals, although rising capacity and the squeeze on underwriting profits are creating an environment for improvements in the coverage to be obtained. These can take the form of combined Construction/Operating policies, wider design cover, lower deductibles and more easily obtainable Maintenance and Delay in Start-Up cover.

One important topic being constantly debated in the market is the risk of damage to Existing (or Surrounding) Property belonging to the Principal, and how and effectively it can be insured. General practice in the Construction market is to limit this extension to an amount representing the deductible under an Operational Property policy, in the expectation that amounts in excess of this deductible would be covered under the operational policy. However, as highlighted elsewhere in this review, Property insurers themselves are also experiencing extremely soft conditions, and as such are trying to pass as much responsibility to other markets as possible. This is having the effect of Existing Property limits under Construction policies rising to amounts far higher than previously seen - in some cases, to as much as USD 200 million, although it should be remembered that any damage to Existing Property is only covered arising out of the “performance of the construction works” and does not cover any resulting financial loss to the owner, which is normally insured under a Business Interruption policy.

A major issue within the Power sector is that the operational insurers are reluctant to include testing and commissioning risks, while the Construction market will only provide limited cover for projects that have been commissioned, taken into use and are therefore effectively operational.

Projects that have phased completion, but also have items that are required to commission other parts of the project, can often be operational for a long period, and Construction underwriters are hesitant to provide cover for fully operational risks beyond a given period, unless it is for a substantial additional premium.

The prevailing market conditions therefore create opportunities for more flexibility, but careful consideration is still required as to the exact periods of commissioning and handover. In particular, it should be clearly identified as to where responsibility resides for completed works, ensuring at the same time that the Construction policy insurers accept that they will be required to cover such works in the event of recommissioning. The implementation of Maintenance cover for completed works that are handed over early, or on a phased basis, should also form a major part of the programme design.

In summary, therefore, prevailing market conditions are expected to remain “soft” for the foreseeable future. These conditions allow more creativity by brokers and a general greater product range offering. Rates will eventually “bottom out” but in the meantime there still seems scope for deductibles to be eased downwards by market pressure and for coverage to become even wider.
Terrorism & Political Violence

Environmental Background

Terrorism & Political Violence has seemingly been a constant presence in the press through 2013 and 2014, with some high profile incidents reported in detail. The Middle East, Africa and Central Asia have continued to be the main centres of terrorist violence. Countries such as Iraq, Syria, Egypt, Lebanon, Pakistan and Afghanistan have continued to suffer regular terrorist atrocities, frequently involving suicide bomb attacks on ‘soft’ targets such as busy marketplaces or on police or military personnel and premises.

The rise of the militant Islamist group Boko Haram in Nigeria led to its being designated a terrorist organisation by the USA in November 2013. Its activities are centred on civilians, including the kidnapping of 276 female students in April 2014 and the killing of over 100 residents in an attack on the village of Izghe in February. It is estimated to be responsible for the deaths of at least 2,000 civilians in the first half of 2014.

Attention has also been focused on Russia, where two attacks in as many days took place in Volgograd in December 2013, just before Russia hosted the Winter Olympics, which were eventually successfully staged amid an unprecedented security operation. More recently, the Russian FSB security service announced during 2014 that it had foiled what it described as “major terrorist attacks” on World War Two victory celebrations in Moscow and newly annexed Crimea, allegedly by members of a far-right Ukrainian nationalist group – although it should be noted that those arrested have protested their innocence. Nevertheless, in a speech in June 2014 FSB chief Alexander Bortnikov stated that Russia had foiled six attacks so far this year and “liquidated” 130 militants, and warned of an ongoing threat from groups with the support of (unnamed) foreign backers.
Although by far the majority of reported terrorist attacks are not directed against western business interests, western companies operating in areas of political unrest are often targets, with those supplying power and energy being frequently targeted. The increased terrorism and political violence activity has resulted in a number of claims to underwriters, and when coupled with the losses for Aviation War, the year 2014 could see claims exceed premiums – although market-wide historic loss ratios are not published, this could be the first time that this has happened since the September 11th attacks in 2001.

Notwithstanding the increase in claims, improvements in site security have helped to minimise asset damage, and can also reduce the risk of becoming a target, a soft target typically being more attractive to the terrorist than a well-protected one. Measures such as preventing vehicle access, or having double gate entry, which enables the risk posed by site entrants to be assessed while they are corralled between the two gates, before the second gate is opened, are important to both preventing and discouraging suicide bombers. Another example of improved security which a number of prudent operators have implemented is surveillance of approach roads by trained operators to give early warning of a possible attack.

Looting following events has become common practice, where seemingly anything of value will be taken, and it is important that consideration is given to removing the common exclusion for looting in standard policies.

Insurance Market Environment
The Terrorism market remains generally stable. 2013 saw an influx of new capacity into the market, but in 2014 there have been no significant new entrants. However, some syndicates have increased their line size, writing more exposure for same premium to maintain income. The markets in Asia and Dubai have grown, bringing competition to the global market; this capacity can be utilised even if the Insured does not have assets in the region. Today, available capacity remains in excess of USD 1.5 billion for the right risk in the right location, with Strike Riot & Civil Commotion and Political Violence-related perils restricted from region to region.

Rates fell across many regions in 2013, and in the early part of 2014, particularly for the less volatile territories, although they have risen for some loss-impacted programmes, and insurers continue to seek more information in higher threat areas. Lloyd’s continues to restrict capacity for certain high-risk territories, keeping a close watch on aggregations for Terrorism and Political Violence/War – both per country and local aggregations within certain countries (i.e. within a 500 metre radius). Some syndicates are “full” in some territories, and are therefore unable to write further business there.

As underwriters are now seeing losses coming to the market from diverse territories such as Libya, Israel, Nigeria, Colombia and Mali (to name but a few), which could impact reinsurance costs for 2015, commentators are hesitant to predict trends for 2015.

Terrorism & Political Violence risk and appetite change on a daily basis. The Willis team of 17 are always available to provide specific updates, and working with the SCR Alert:24 team we are able to get detailed information ‘ad hoc’, as well as provide a monthly client Newsletter.

Political Risks
The market for PRI remains extremely robust despite challenging economic and political conditions. Market capacity has increased by circa 10% over the previous year and has almost doubled since the Financial Crisis. This year alone there have been half a dozen new entrants to the market and existing carriers have also been able to increase their lines and available tenors.

With a soft P&C market combined with a low interest environment, investors and reinsurers alike have ploughed their monies into Specialties and PRI has been one of the beneficiaries of this. Also, PRI is view as a non-correlated class of business from a Solvency II perspective.

Sanctions in Russia, which represents the PRI market’s single largest country exposure, have effectively turned the tap off to a large income stream which will undoubtedly impact the market. This has led to a slight softening of rates as insurers chase assets in an increasingly crowded market.

However, the closure of markets such as Russia and Ukraine has forced insurers to look at new risks and territories and we are seeing significant appetite growth for risks in Africa and Asia particularly.
Renewables

Offshore Wind
Offshore wind projects in the North Sea are providing an increasing amount of electricity to the Northern European power grid. According to the European Wind Energy Agency (EWEA) at 1 July 2014 73 offshore wind farms with a nameplate capacity of 7,343 MW were grid connected in European waters. Construction activity, primarily in the UK and Germany, continued with 781 MW installed to 1 July in 2014, down from the same period in 2013, which saw just over a gigawatt constructed in the first half of the year.

With each new project lessons are learned and processes improve. Equity providers, project managers and contractors are counting on this translating into improved performance and lower downtime. The same can be said for the offshore wind insurers who have borne the losses that came in the earlier stages of the industry’s development.

The insurance market for offshore wind has long relied on thought leadership from a select group of offshore wind underwriters. These underwriters, often backed by significant capacity, helped steer the sector and usher in risk management improvements. As offshore wind sits on the cusp of another burst of new construction activity these market leaders are facing increasing competition from more recent market entrants.

The combination of improving project experiences and increasing capacity is improving terms for offshore wind insurance buyers. But for projects to maximise this benefit they will have to continue to show the traits found in successfully completed projects; robust quality checks on suppliers, project timelines that leave sufficient room for contingency planning and following the procedures prescribed by 3rd party surveyors.

Efficient management of projects will allow the rate softening trend in offshore wind to continue. This trend will ultimately help make projects more cost effective and therefore more feasible as an increasing part of the energy mix not just in Europe, but in North America and Asia.
Onshore Wind

Onshore wind power has become a recognized part of many utilities’ generation mix. Established markets in Europe continue to add new capacity. More mature markets such as Denmark have reached a saturation point on the available sites for onshore wind and are focusing primarily on offshore wind activities. In the coming years other early adopters of onshore wind energy in Europe may find themselves in a similar position. The United States occupies a unique position in that it has large amounts of onshore wind and the capacity to site many more facilities. However there continues to be a high degree of political uncertainty that makes forecasting market growth tricky at best.

But as growth rates slow in established markets, growth is picking up further afield in South America, the Middle East and Asia. Developers move into these new areas it provides exciting opportunities for renewable energy insurers but also new risks related to natural catastrophe exposed areas and increased distances from key suppliers.

Technological advancements continue to bring larger onshore wind turbines to market, boosting power production but also increasing the quantum following a loss. Deductible structures are often significantly lower than those seen in main power generation insurance market, making the insurers much closer to the losses when they do occur. Insurers are having a harder time making onshore wind a profitable class of business in the face of these losses and an ongoing soft market. While there are signs we might be at the nadir of the soft market in onshore renewables, new capacity is still entering the market, showing that the growing onshore renewable energy sector remains attractive to insurers looking to grow their book of business.

Several years ago gearbox failures were the critical machinery breakdown issue facing the sector. At that time manufacturers responded robustly in the honouring their warranties. This proved a trying time financially for some manufacturers, but in the long run it has set up the industry for success as it worked through its quality assurance issues with gearboxes. The attention of some renewable energy insurers is now turning to blades. As wind turbine generators grow larger, the blades must also increase in size in order to generate the force necessary to rotate the larger turbine. Increasing the size while minimising the weight of the blade can lead to damage. Manufacturers and insurers will be looking to study the root causes of blade losses carefully to establish trends and mitigate future losses.

As the vast majority of onshore wind farms are project financed there is limited scope for self-insured retention strategies. As such deductibles will likely remain low. But in order for premiums to remain stable insurers will increasingly be judged on their own levels of risk management and the effect on their operational performance. Strong performers will be rewarded for their efforts by insurers through lower premiums and no-claim rebates while risk management laggards will find their portfolios harder to place at premium levels they previously were able to obtain.
Solar
Solar continues to be an interesting space to watch in the renewable energy sector. Several years ago the industry underwent a fundamental change as the price of photovoltaic (PV) panels dropped by more than 75% from 2008 to 2013 according to Bloomberg New Energy Finance. The price decrease was driven by an influx of Chinese made solar panels into the global market. This influx into the market cause short-term disruptions, such as the bankruptcy of several well-established manufacturers and a flurry of mergers as the industry consolidated in order to survive. But the long-term result was a market that was more competitive, leading to the consenting of more solar projects.

The solar sector is split into three main activities, each with their own risks that insurers measure differently. Roof mounted solar started as a niche activity of individual building owners looking to reduce their energy costs. The drop in panel prices has had the most impact on this part of the market and led to high levels of growth, particularly in Germany. The risk of damage to the primary structure is something that must be considered when mounting panels to the roof of an existing building. But this has been mitigated by improved installation techniques developed though experience. Insurance for roof mounted solar is usually rolled into the property programme of the main structure. Only when scaled up to cover multiple locations is there a need for dedicated renewable energy to provide a more specialised form of cover.

The most active space in solar for renewable energy insurers is for utility scale photovoltaic arrays. These projects vary in size from 5 MW to 150MW and up as the lower price and greater availability of panels allows larger projects to take shape. The technology has performed well, though there have been isolated issues related to the electrical infrastructure that have led to losses. The renewable energy market continues to look at utility scale PV favourably. As the technology matures new projects are being developed outside of the traditional markets. Of particular note is the growth of projects in the Middle East and Asia. In countries of limited hydrocarbon resource the cost of electricity can be quite high, and solar energy allows these countries to diversify their electricity supply.

The most technologically advanced solar technology, Concentrated Solar Power (CSP), makes it possible to scale solar power up into a large energy provider. However the complex nature of the projects means that each CSP installation must be underwritten carefully.

Emerging Technologies
The growth of renewable energy is helping electricity markets meet their carbon abatement goals. But as wind and solar generation increases to 20% or more of the generation mix in some areas, issues of power intermittency and grid reliability are coming to the forefront. The issue stems from the fact that wind and solar power cannot be matched to ramp up and down with the demand of end users, but is beholden to when the sun shines and the wind blows. The fluctuation of power supply can strain the grid and often expensive back up generation capacity must be kept on standby in case of a spike in demand.

This has created a market to develop a better solution for dealing with the intermittency of renewables and support the grid. Battery Energy Storage System technology has stepped in to meet this demand. The battery technologies vary by manufacturer, but the concept is to install battery banks at strategic points along the grid. These batteries take power from the grid in times of ample supply and release it back to the grid when needed to help balance the load.

This emerging technology is new and in some cases still prototypical. As such it has received a mixed reception from the renewable energy insurance market. However the insurers that have been early adopters in insuring the technology have been happy with its performance to date and have set themselves up to share in the growth of this technology as market research IHS forecasts Battery Energy Storage Systems to grow up to grow from 0.34 GW in the US to 6 GW by 2017.
Europe

European power utilities and Independent Power Producers (IPPs) find themselves in a fast evolving operating environment. The rise of power generation from renewable energy sources, primarily sun and wind, is leading to fundamental change in how energy is priced and used in Europe. Owners of fossil fuel fired generation assets are finding that the changing market environment is having negative impacts on their financial and operating performance.

For one, the rapid growth of renewable energy is reducing the overall wholesale price for electricity. While renewable energy assets are heavily subsidized to account for the high fixed costs in building the asset, their use of sun and wind for fuel means they have lower variable operating costs to generate at any particular time, so long as the wind blows and the sun shines. The end result being that gas fired generation does not get dispatched as frequently as they are less often “in the money” (cost of generation < wholesale electricity price).

Secondly, the influx of renewable energy into the European generation pool is impacting how demand for fossil fuel power electricity is created. In the past, demand was determined by the level of MWh required by end users. Today we are seeing demand for fossil fuel generation shaped by two factors, (1) overall demand and (2) the degree to which renewable energy sources can meet overall demand based on climatic conditions. The combination of lower wholesale power prices and lower demand, in the aftermath of the global financial crisis, is eroding the margins of the utilities and IPPs operating conventional power generation plant in Europe.
A third factor is the changing dynamics of fossil fuel prices relative to each other, in particular coal vs gas. Global coal prices have fallen significantly, due to factors such as displaced coal which is no longer required by US generators as a result of the boom in shale gas, and the consequent fall in domestic US gas prices. In contrast, European gas prices have been relatively high in recent years, and gas-fired CCGTs, designed to run as base-load capacity, have become uncompetitive and uneconomic. As a result, several generation companies in Europe have had to mothball some of their CCGT plants, or close them altogether – even though some of these plants may only have been built quite recently.

It is important to understand the broader business environment when considering the dynamics of the European power generation insurance market. Power generation insurers have been coping with multiple years of adverse loss history. 2014 has unfortunately continued this trend with at least one of the biggest global power sector losses occurring in the UK.

The insurance market is taking a close look at losses in order to determine if any trends can be determined and whether or not there is a correlation between the frequency and severity of losses experienced in the European power sector over the last several years and the change in operating environment for fossil fuel producers with the influx of renewable energy in Europe.

The insurance market remains competitive for those generators with favourable loss histories. But market conditions will likely harden for fossil fuel generators that have put large losses into the insurance market. These generators will need to consider how increased insurance costs will impact their already strained balance sheets. It is likely that those who are able will choose to increase their self-insured retentions rather than accept higher premiums as they work to improve performance.

The demand for electricity power in the Middle East is accelerating at a rapid pace, a trend which is expected to continue towards 2020, with factors such as population growth, industrialization and maturing economies in the Gulf Cooperation Council (GCC) states and the wider Middle East playing a significant role. This trend is being met by continued investment in the industry, with several high profile power generation projects planned or currently construction, particularly in Qatar, Oman and the UAE. According to GlobalData, installed capacity in the UAE, for example, is predicted to increase from 27,870 MW in 2014 to 39,081 MW in 2025, while in Qatar over the same period installed capacity will more than double from 9,764 MW to 22,091 MW.

The main source of power production in the region remains gas, whilst renewable energy as well as oil and even nuclear energy are likely to play an important role in power production for the region going forwards.

The power insurance market has developed considerably during the last 18 months with appetite for Middle Eastern domiciled risks increasing, primarily due to capacity and underlying authority being mobilized from traditional locations such as London and Singapore towards the Dubai International Financial Centre (DIFC) and the wider Middle East. Whilst few underwriters are aggressively quoting against an incumbent lead in the power sector, once tangible lead terms have been formed with a technical lead, there are many reinsurers who will provide support capacity which can lead to oversubscription.

Risk quality remains an important factor for both lead and follow reinsurers in this market with an increasing demand for high calibre technical risk information, including but not limited to: specialized risk engineering, specific location information, turbine specifications, business interruption worksheets (where insured), regular risk recommendation updates and sight of Power Purchase Agreements.

As reinsurance capacity continues to evolve in the Middle East, it seems that the only real factor which could lead to a softening of the market will be significant claims activity in the sector. Whilst there have been a number of high profile incidents globally during 2014, the loss activity in the Middle East has been limited. Moreover, whilst power generation capacity in the region continues to increase, with the commissioning of prominent Independent Power Plants such as in Oman, Qatar and the UAE, it is envisaged that underwriters’ appetite within for the power sector in the region will continue to grow in 2015.
Asia

The power sector has been characterized in recent years by regular attritional losses, and in 2014 this trend has continued unabated. Insurance losses in the power sector in 2014 to date have been in line with the past five years, averaging an estimated USD 2 billion to USD 2.5 billion per annum. Whilst attritional losses are the dominating factor, there have also been the occasional loss of USD 50 million or more, and in 2014 Asia has contributed to the continuation of this feature with a USD 120 million Steam Turbine loss in Bangladesh earlier in the year.

2013 saw insurers trying to drive premium increases and retain a disciplined approach to coverage and deductibles. Overall, the ready availability of capacity tempered any rate increases on business which had not incurred significant losses, whilst underwriting discipline elsewhere was maintained. Whilst some insurers reined in their appetite for the sector or tried to hold the line that increased rates were needed, typically it was possible to replace them with alternative capacity. Overall premium rates were flat.

In 2014, though, we have witnessed premium rate reductions not typically seen in 2013 – though admittedly not across the board, as insurers approach each risk very much on its own merits. There has been a renewed appetite for growth in the sector from existing insurers keen to capitalize on the relatively good results in 2013. Those risks portraying good standards of risk management backed up by attractive loss records have been enjoying single digit rate reductions across the region from the regional market in Singapore and Hong Kong.
Perhaps as evidence of the begrudging acceptance that the power market may still have further to go in terms of rate reductions, we are seeing 2 or 3 year deals back on the table as insurers try to forestall future rate reductions.

So for the better quality risks the market has been an attractive one in 2014, and there is no obvious sign that this will change any time soon. To enjoy the full benefits of the ever-more competitive landscape, however, the same degree of technical underwriting information is required, as whilst insurers may accept pressures on rates there is no such latitude on matters such as coverage and deductibles.

Insurers are not just concerned about premium rate erosion. With more and more technically “unproven” turbines being utilized in the region the associated risks are evident, and underwriters mostly approach with caution. On the other hand, perhaps underwriters may start to see an opportunity with this kind of machinery, if higher rates can be secured as a result of the relative shortage of available capacity compared with more established equipment.

A final word on the other overriding feature of the power market in Asia in recent years – the supply of capacity versus demand. Whilst in 2013 we did see some insurers take a more conservative view towards the sector, this year we have witnessed some key markets flex their muscles and push for growth. Some are revisiting accounts from which they “walked away” in the past, and seem able to provide terms as a new insurer that they were previously not prepared to support as an incumbent. We are also seeing the emergence of new capacity from carriers such as HDI Gerling, an established European direct market now entering the Asia reinsurance market with potentially significant lead capacity to deploy on the right risk.

When this is added to the existing abundant capacity, Asian power clients with a good risk profile should have plenty of options as 2014 closes out and we move into 2015.

In 2014, we have witnessed premium rate reductions not typically seen in 2013. There has been a renewed appetite for growth in the sector from existing insurers keen to capitalize on the relatively good results in 2013.
Latin America

Latin America power generation has major challenges ahead because of a growing demand for power generation and because of upcoming changes in regulation in Mexico.

Electricity demand in Latin America is expected to grow about 70% between 2014 and 2030, caused by economic growth*. So an additional 239 GW is expected to be added to the region’s current roughly 330GW installed capacity. A World Energy Council report in March 2014 (“World Energy Scenarios: Composing energy futures to 2050”) noted that it will be a significant challenge to meet the expected increase in the region’s energy demand. One of the challenges identified was the fragmentation of the energy market across the region, which was said to be hindering the effective use of energy resources compromising the competitiveness of national energy markets. Another challenge will be in putting the necessary infrastructure in place to meet future demand.

The main types of the investments in the sector will be large hydro projects (especially in Brazil), gas fuelled units and renewables (wind, solar and geothermal).

In the coming years Peru and Chile are expected to be outperformers in terms of percentage growth. In absolute numbers of growth, as the largest countries in the region Brazil and Mexico will be at the forefront.

In Mexico the government enacted legislation in August 2014 to establish a competitive power market, which will be open to the private sector to participate in generation and sale of electricity. CFE, the state-owned company which is dominant in the power sector in Mexico, will become a competitive company in the new market environment, but will not be privatized. The government will also retain ownership and control of the national grid, and transmission and distribution will remain under state control. An independent regulator will be established, which will create a more liberal wholesale power generation market. It is expected that the rules of the new market will be issued mid-2015, with the establishment of a new wholesale market.

* Source: BN Americas & America Economia
Major construction investments in power generation projects are expected in Latin America in the coming years, and it is important that investors and all project parties involved are well protected for any consequences of hazard risks to which they are exposed.

Power generation construction projects in Latin America are often still insured by the standard Latin America Munich Re form, which was developed many years ago to provide cover to reinsurance companies. Since then, the breadth of coverage globally available for important projects has improved dramatically, and those buyers that are still insured under the standard form are therefore not enjoying the widest scope of cover available.

The Standard Latin America form contains restrictions and exclusions which give insurers many opportunities to reject claims and deny liability. Many Insureds therefore pay important premiums for what is actually a very restrictive cover and they get no certainty to receive indemnification for claims which they would otherwise believe they are entitled to under a ‘broad form’ market wording.

The breadth of cover for physical damage/loss determines the scope of cover for loss of revenue (Delay in Start Up/Advance Loss Of Profits and/or Business Interruption), because loss of revenue cover can only be triggered by an insured physical loss/damage. Hence, the restrictions in physical damage/loss cover of a Standard Latin America form cause equivalent restrictions on Delay in Start Up/Advance Loss Of Profits and/or Business Interruption cover.

The reason why use of the Munich Re Standard Latin America form still persists is probably because insurance companies and clients know that form very well and it is difficult to change old habits, and its restrictive nature gives insurers no incentive to change of their own volition.

It is usually better to seek to negotiate terms on the basis of a broker manuscript wording. The price can still be very competitive, taking into consideration the broader coverage and benefits provided, although this may be slightly higher than it would be under the standard form. In this case the buyer can judge whether the advantages of the manuscript wording outweigh any pricing differential.

In terms of insurers, for major construction projects the main international markets remain important players, willing to provide cover based on tailormade wordings. Local insurers are also active in the region, but tend to provide capacity based on the Standard Munich Re Latam form.

For operational power insurance the available wordings are more varied, and many of the major global insurers are active in the sector in Latin America with master wordings offering wide operational coverage.

Because of its regulatory requirements, Brazil remains a special case, where wordings need to be approved by the regulator before they can be implemented. This makes the opportunity to provide the higher-quality option of a bespoke wording with the international markets a challenge.

The main types of the investments in the sector will be large hydro projects (especially in Brazil), gas fuelled units and renewables (wind, solar and geothermal).
North America

Impact of Closure of Coal Fired Generation

With the introduction of new and enhanced regulations by the United States Environmental Protection Agency (EPA) relating to Mercury and Air Toxic rules and the Cross State Air Pollution Rule, over 10% of the US's coal-fired generation could be shut down. Originally the industry prediction was that 28.3 GW of generating capacity would close, but current announced and predicted closures amount to 34.7 GW of generating capacity*. This is well over the 9.5 GW that was estimated by the EPA when the rule changes were being implemented. The North American Electric Reliability Corporation (NERC) predicted 16.4 GW closure and the Department of Energy predicted 21 GW of closures. Due to these complex and strict EPA rules the cost to utilities of operating older coal fired plants is too high to keep them in operation, and the cost of installing emission control systems is not cost effective.

Most of these retired plants, or soon to be retired plants, acted as base load generation plants. If grid reliability is to be retained they will need to be replaced by generation plants capable of being operated on a base load basis.

There has been a move to increase the amount of generation derived from renewable energy sources, with California leading the charge with a requirement for 33% of generation derived from renewable energy in the next few years. However, without reliable and robust storage, which is still in development, solar and wind cannot take up the base load role, and are still more expensive than current conventional base load generation, and would therefore drive up the energy costs to the end consumer.

* Source: Institute for Energy Research
Electricity Generation Capacity to be Shut Down by EPA's CSAPR and MATS Rules

US Power Plant Capacity Additions: Jan - June 2013 vs Jan - June 2014

Source: US Energy Information Administration
This suggests there will be a number of combined cycle generation technology (CCGT) plants being built to replace the closed coal fired plants. These may be cost effective alternatives, with the current plentiful supply of natural gas at reasonable prices in the US due to the shale gas production ramp-up over the last several years. This ramp-up has led to a sharp decline in natural gas pricing, which makes the CCGT and simple cycle gas plants a cost effective alternative to coal fired power plants.

The insurance market is comfortable with insuring these capacity additions where the technology is proven. However, new more efficient technology is being developed which will introduce new design and upgrades in the CCGT plants being built, and based on prior experience in the industry, prototype plants will see substantial deductibles being imposed and healthy rates being applied.

An offset to the increased insurance cost in pure premium and overall cost of risk (when factoring in the deductible) is the efficiency of the new natural gas fired technology. Today simple cycle gas turbines have 35% efficiency rates, and some of the newer designs are stated to have a 45% efficiency rate. CCGT plants are now approaching 60% efficiency or better.

Other potential base load plant replacement options include larger scale biomass plants and new generation “Trash to Cash” plants with the evolution of plants gasifying municipal solid waste to fire CCGT plants. Again, there may be insurance implications, as these technologies may be considered prototype in the early years of development.

**Grid Stability Issues**

As additional renewable energy projects are built, the transmission grid needs to be enhanced to allow the power generated in remote locations to be transported to the population centers where the greatest demand exists. This is leading to planned build out of the transmission grid to enable expansion of the renewable energy opportunities.

Against this is a growing development of micro grids, where hospitals, universities, municipalities and large industrial complexes are building their transmission and distribution grid complete with their own generation assets to ensure supply. In these models the local utility becomes the back-up supplier and effectively loses potential revenue to these micro grids.

The problem with the build-out of the transmission grid is the “Not In My Back Yard” approach of most consumers, which makes the permitting of new transmission a fairly long term process. However, we are beginning to see these projects start to begin construction and move into full operation.
For existing transmission systems there is now a lot of focus on the cyber risk to the systems, and the Federal Energy Regulatory Commission (FERC) has created the Office of Energy Infrastructure Security which primary goals are as follows:

- Developing recommendations for identifying, communicating and mitigating potential cyber and physical security threats and vulnerabilities to FERC-jurisdictional energy facilities using the Commission’s existing statutory authority;
- Providing assistance, expertise and advice to other federal and state agencies, jurisdictional utilities and Congress in identifying, communicating and mitigating potential cyber and physical threats and vulnerabilities to FERC-jurisdictional energy facilities;
- Participating in inter-agency and intelligence-related coordination and collaboration efforts with appropriate federal and state agencies and industry representatives on cyber and physical security matters related to FERC-jurisdictional energy facilities including, but not limited to, participating in conferences, workshops and classified briefings; and
- Conducting outreach with private sector owners, users and operators of energy delivery systems regarding identification, communication and mitigation of cyber and physical threats to FERC-jurisdictional energy facilities (Source: North American Electric Reliability Corporation)

This started in 2012 and has brought a real focus to utility and power generators on the need to review cyber risk exposures and possibly transfer much of the risk via the growing cyber insurance market place.

In early 2014 in response to a terrorist attack on a Silicon Valley substation in 2013, FERC instructed the North American Electric Reliability Corporation (NERC) to set a standard for each utility to undertake a full review of critical substations in their service territories and to develop essential protection against these type attacks. There are over 55,000 substations in the USA; many of these are not critical substations and if they were attacked by terrorists the power could be rerouted to keep the grid energized. However, there are a few substations in each service territory that are critical and the NERC has developed a standard for this review to be undertaken, which is currently ongoing.

At the moment this has not had a major impact on the insurance market, as most utilities only purchase physical damage coverage for their systems and do not purchase business interruption. On this basis the loss of a substation would be at worst in the USD 30 million to USD 50 million range. However, if there is a trend to purchase business interruption the financial loss would be significant and we expect insurers would take this risk into greater consideration.

**Property**

The number of machinery breakdown and associated business interruption claims at power generation plants have continued to be troublesome for some insurers, but with new capacity in the market the first half 2014 saw rate decreases of 5% to 10% for accounts with nominal loss experience, and higher for accounts with clean loss records. Accounts with recent significant loss experience are renewing at flat to modest rate increases.

Insurers continue to challenge the valuation of assets, and many have developed internal valuation guidelines for most types of power generation assets. Several Insureds are now looking at having independent valuations carried out to ensure they are not being overvalued by insurers’ valuation system.

Deductibles continue to be looked at closely, particularly the waiting period for business interruption losses, and we are seeing significant increases for those accounts with any loss frequency, particularly if there is prototypical technology involved. This is a counter-influence to the general trend of rate decreases being granted by insurers.

The exit of some insurers from the Utility and Power Generation sector has subsided and we are now seeing renewed interest by insurers, with examples being a move back in by Allianz, Berkshire Hathaway, Scor and Travelers. There is still significant domestic North American capacity available, estimated at over $3 billion for the right accounts, although this drops off significantly if the risk has extensive loss experience or catastrophe peril exposure. Key markets include Associated Electric & Gas Insurance Services (AEGIS), Ace (StarrTech), AIG, Chubb, Liberty International, Munich American, Swiss re IRI, and Zurich.
Casualty

Primary General Liability
There continue to be a limited number of markets willing to write primary Utility and Power Generation risks, and the lead markets are ACE, AIG, Chubb, Liberty Mutual, Travelers and Zurich. Many of the Utility and Power Generation companies take a self-insured retention of USD 1 million, with some as high as USD 5 million, so the overall available market to insurers is fairly limited and this has kept other insurers with a limited risk appetite out on this segment.

In the Power Generation sector there has been generally good loss experience, with losses mainly being in the area of property damage to third parties and a few personal injury claims. In the Utility sector, loss experience has been far greater with a large number of electrical contact claims occurring, which coupled with increased court awards have led to some insurers having very poor results. This is a continuation of the 2013 experience. Rate increases have been in the 5% range for accounts with poor experience, but clean accounts have seen renewals with flat to -5% rates. Some insurers have looked for increased self-insured retentions to reduce the impact of losses.

Excess Liability
There are a larger number of insurers willing to write Umbrella Liability and excess layer liability insurance for the Utility and Power Generation sector. However, the industry mutuals Associated Electric Gas Insurance Services (AEGIS), with $35 million of capacity, and Energy Insurance Mutual (EIM), with $100 million of capacity, continue to have a large market share of this sector. Other markets include Ace, Chubb, CV Starr, Endurance, Arch, Liberty Mutual, Munich American, Travelers and Zurich.

AEGIS’ loss experience has stabilized after the rate increase sought over the last few years and AM Best has reinstated the “A” rating this year. We expect to see flat renewals with AEGIS and EIM in the next year and a reinstatement of the AEGIS continuity credit. Commercial markets continue to offer flat renewals for clean accounts, and an average increase of 5% for accounts with loss experience. Overall capacity available is in excess of $2 billion, but if there is a wildfire exposure the available capacity drops to around $1 billion.

Workers Compensation
Many Utilities have self-insured programs, many through AEGIS and EIM, with excess Workers Compensation above the retention. In some States the required insurance is for Statutory Limits, in which case the program is fronted by a market that has the capacity to provide such limits. Typically Liberty Mutual has an arrangement with AEGIS and EIM. Other markets active in this space are AIG, ACE, and Zurich.

Loss experience has not been good in recent quarters and we are continuing to see rate increases ranging from 5% to 15% depending on the individual loss experience.

Utility risks are treated carefully by insurers due to the potential for large aggregation losses, such as at a nuclear power plant if targeted by terrorists. In these cases there is a limited market for Workers Compensation insurance.

For Power Generation accounts where there are normally limited numbers of employees at any one site, the coverage is more readily available.

Executive Risk
Over the last several years the Utility and Power Generation sector has experienced very good loss experience in the Directors and Officers Liability and associated lines. There is a very competitive market for this business and significant capacity to meet the needs of most buyers. Rates have been flat to -10% depending on the risk.

Captives
Several Utilities and Power Generation accounts have utilized captives as part of their risk management structure. These include single parent captives, but the majority are rent-a-captive facilities with segregated cells. The captives are used for a range of coverages such as deductible buy-downs, primary casualty cover to protect larger retentions, owner-controlled insurance programs, and supplementary insurance for Transmission and Distribution assets, which are largely uninsured. We continue to see interest in the utilization of captives as part of the risk management strategy.

Renewable Energy
The market for renewable energy continues to be competitive, particularly in the solar sector. Start-up of new wind projects has fallen off as the Federal tax incentives expired at the end of 2013, but there are signs that some level of wind activity will continue.

The loss experience has been good and markets are looking to increase their market share. Large levels of capacity are available from insurers, with some insurers having USD 500 million plus of capacity available for renewable energy risks not located in a catastrophe peril zone. Where there is catastrophe peril exposure the underwriting falls more in line with the approach noted above for conventional power generation assets, and deductible and rate increases apply. Many of these projects are only practicable with the federal and state incentives being provided, so the business interruption is extended to include coverage for lost incentives in the event of a fortuitous loss.
Australia

Current & Forecast Demand
The power sector in Australia, like so many other countries around the globe, has been affected by the move toward renewable forms of power generation, such as wind and solar. When coupled with reduced demand owing to the closure of aluminium smelters, reduction in manufacturing, and consumers carefully managing their consumption, this has had a significant impact on the overall landscape and planned capital expenditure.

Another driver for change has been the implementation and subsequent repeal two years later of the Carbon Tax legislation, which has left power generators in particular grappling with both the initially-imposed cost and then the effect of the tax's elimination and what that has meant to their generation footprints. Effectively the Carbon Tax legislation, which had been introduced in July 2012, imposed a cost of carbon at the rate of AUD 23 per tonne of CO₂ which for some of the emitters, such as brown coal generators, increased their MWh cost by approximately AUD 30 compared to AUD 0 for Wind and Solar, circa AUD 15 for gas and AUD 20 for black coal. This had the intended effect of favouring less polluting forms of generation, with base-load coal plants having to modify their hours of dispatch. With the repeal of the legislation in July 2014, the increased costs imposed on the thermal generators have evaporated, thereby restoring their competitive position vis-à-vis the renewable generators.

Noticeably, the imposition of the Carbon Tax, along with general increases in the cost of electricity, has had an impact on the behaviour of the general residential consumer and they have modified their behaviour accordingly. Many have sought alternatives to relying on the major generators by the installation of rooftop solar panels for home consumption. Notwithstanding that the Carbon Tax has now been repealed, it is expected that consumption will continue to decrease in line with reduced demand.
The following graph supplied by the Australian Energy Management Organisation (AEMO) provides an interesting insight into the expectations with respect to consumption along with recent history and the various effects of solar and consumer decline in demand.

As highlighted on the graph, the development of Liquified Natural Gas in Australia has been significant in recent years with a number of projects coming online. It is noticeable that the state of Queensland, where a good proportion of these projects are located, is the only state currently experiencing industrial growth.

The main states of Victoria and New South Wales (NSW) have experienced a decline in industrial consumption following manufacturing and industrial wind-downs and closures, and South Australia has been affected by decreasing consumption and the highest per capita installation of PV Solar across the National Electricity Market (NEM).
### Regulatory Environment

Both the NSW and Queensland State Governments have signalled their intention to sell some of their State Electricity assets, with NSW being well and truly in selling mode.

During the course of 2014 the largest single generator in NSW, Macquarie Generation, has been sold to AGL, and Energy Australia has acquired the Mount Piper and Wallerawang assets of Delta Electricity.

The Transmission and Distribution (‘T&D’) assets, or “Poles and Wires” for NSW are also expected to be sold following the State Election in early 2015 at which point the current government is hoping to have a mandate for the sales. This is likely to include TransGrid at the transmission level and potentially all or some of the distributors, namely AusGrid, Endeavour and Essential, placing NSW in a similar position to Victoria with respect to the level of assets operated and managed by private enterprise.

### Major Events

The events of “Black Saturday” have been well publicised and have had a significant impact on the community as well as the electricity industry, in respect of the risk of distribution lines being identified as a contributing factor in causing bushfires.

The Black Saturday bushfires were in fact a number of fires that ignited over a period commencing 7 February 2009 which followed a few extremely hot days which experienced temperatures exceeding 43°C. As a result of the fires, 173 people were killed and over 2,000 houses and 11,800 head of livestock were destroyed. The total area burnt was approximately 450,000 ha or 1,100,000 acres.

There were a number of sources of ignition that caused the fires including arson, lightning and the power lines with the last cause becoming the trigger for the largest legal class action settlement of its kind in Australian history. Around midday on 7 February 2009 a section of approximately 2 km of distribution lines owned by SP AusNet in Kilmore East sparked a grass fire that adjoined pine plantations. Fanned by very high winds from a north westerly direction, this fire quickly spread 50km, including into the Kinglake National Park. The total area was the single largest area impacted with over 120 deaths and in excess of 1,200 homes destroyed.

One of Australia's largest law firms, Maurice Blackburn, recently announced that they had reached an agreement for the settlement of the class action subject to approval from the Court. Of the approximately AUD 494.7 million settlement, the defendants will be contributing as follows without admission of liability:

- **SP AusNet**: $378,574,121
- **State Parties**: $103,592,546
- **UAM**: $12,500,000

**Total**: $494,666,667

*Source: Maurice Blackburn Information sheet Bushfire class action*
Property
The local market in Australia continues to enjoy no shortage of capacity, albeit the market for power risks is not as competitive as it is for general property risks, due to the restricted number of insurers participating on power risks. Where a client has been loss free we are typically seeing reductions of 5% with no change in deductible. In general, only a major change in the structure of a programme or greater retentions would deliver higher levels of premium savings. Rather than premium reductions, in many cases the insurers are more willing to provide enhanced policy cover as a trade-off.

With respect to the individual appetite expressed by insurers for property risks, FM Global, ACE and AIG continue to be the main lead insurers, with FM generally looking to write 100% of the programme. AIG are also selectively taking a lead position on a few accounts where they may have not been involved in the expiring period, although it continue to place great emphasis on loss control and engineering, which is also the case with ACE. FM as always continue to vigorously engineer the risks they underwrite.

Other notable participants are Zurich Global Energy, having gained greater domestic authority to participate, and CV Starr. HDI-Gerling are looking to expand their book for power generally. AGC&S (Allianz) are also looking to provide levels of support, subject to satisfaction on the extent of catastrophe risk.

Liability
Underwriting appetite for Retail and Generation risks continues to be fairly broad and offered by a number of insurers as has been the case for a number of years.

We are however seeing a focus on Failure to Supply by most of the insurers and the need to be satisfied that Generators in particular are limiting their liability contractually or alternatively putting in place redundancies in order to reduce any significant exposure in that regard. These could be in the form of back-up generation that may be called upon in the event that an incident was to occur, which would limit the expenses incurred to those increased costs associated with the back-up.

There is very much an individual organisation approach being adopted to underwriting the risk of T&D companies, with clear differentiation drawn between Transmission and Distribution. Transmission is seen as normally more attractive due to the height of towers and line clearance to ground and other vegetation. Accordingly, premium pricing and retentions reflect the difference when compared to Distribution-only organisations.

As previously highlighted, the appetite for providing Bushfire Liability cover is quite restricted, with only a handful of insurers prepared to offer cover at the primary level. Although this has tended to be the case for some time, we are certainly not expecting any new entrants at this level for the foreseeable future. Some commentators have suggested that if there any other events comparable to the Black Saturday bushfires occur, then we could see a complete withdrawal of insurers providing cover from the market for this risk.
Africa

Overview
The growth and development in Sub-Saharan Africa has been well publicised. Power generation is at the forefront of the minds of both the Kenyan and Ugandan governments; rising populations, increased urbanisation and increased living standards have led to an increase in pressure on the generation and distribution networks of both countries. Both governments understand that there is a need to demonstrate progress both through the modernisation of the power sector and through the building of new power producing facilities.

Both the Kenyan and Ugandan governments have announced various policies (Kenyan least cost power development plan 2010-2030) that are designed to address and improve the current situation.

This article will look at the trends in both power sectors (consumption and generation) and will then go on to look at the implications for the local insurance market.
Kenya

Demand Trends
Annual electricity consumption in Kenya rose from 3.3 TWh in 2000 to 6.4 TWh at a CAGR of 5.6%. It is expected to grow at a CAGR of 7.2% from 7 TWh to 22.5 TWh in 2030.

Electricity consumption has increased in Kenya due to an increase in demand from households and greater access to electricity, which is increasing annually in the country while its economy is also growing. Industrial demand has also increased.

Trends in Generation
Hydropower contributed 54.4% of the total installed capacity of Kenya in 2012, thus dominating its power mix. It was followed by oil-based thermal power, which accounted for 29.4% of the total installed capacity of the country. Geothermal power is an important resource and in 2012 contributed 14.1% of the total installed capacity. Other renewable sources such as wind, biomass, and photovoltaic solar power contributed the remaining 2.1% of the total installed capacity of Kenya in 2012.

The major power generator in Kenya is the state-owned KenGen.

The renewable power sector has been the fastest growing sub-sector in the power sector, and is expected to see the fastest growth in the future. Between 2000 and 2012, renewable power capacity grew at a CAGR of 12.5%. This is in keeping with the government’s Least Cost Power Development Plan, which seeks to generate the cheapest possible power in the country in an environmentally sustainable manner.

Uganda

Demand Trends
The rate of electrification in the country is 12%, and the government has declared that it wants to achieve 100% electrification by 2035. This will present a significant opportunity for transmission and generation projects. Additionally, the government is focusing on the development of renewable power projects, especially biomass-based cogeneration. However, the government needs to tackle certain systemic problems in the country such as high transmission and distribution losses of around 35% of generation and delays in project execution that have a negative impact on the economy as a whole.

Trends in Generation
Hydropower has traditionally been the dominant source of power generation in Uganda due to the presence of large rivers in the country. The emergence of thermal power generation in Uganda was due to droughts occurring in the country during 2005–2006, which led to decreased levels of water in Victoria Lake. This lake provides the water needed for the Kiira and Nalubale hydropower projects, the two main hydroelectric generating stations in the country. The impact of the droughts on the output of these stations led to crippling power cuts in the country, forcing the government to introduce thermal power generation. However, the costly diesel imports that are needed to run these emergency power plants have currently forced the country to plan more hydropower projects. Alongside these, renewable biomass power cogeneration has also been active in the country since 2008. Eskom Uganda Ltd. (EUL) holds the majority of the market share for total installed capacity. In 2011, it had a market share of 67% of the total cumulative installed capacity. Aggreko contributed a share of 21%, and 12% was contributed by the remaining IPPs. Some of the IPPs operating in Uganda include: Aggreko, Jacobsen Electro Co. Ltd., Electro-Maxx, Kilembe Mines, Kasese Cobalt Co. Ltd., Kakira Sugar Works and Kinyara Sugar Ltd.

In 2010, EUL had two hydropower plants – Nalubaale and Kiira – in Jinjia, with a combined capacity of 300 MW, which increased to 380 MW in 2011.

Hydropower contributed 54.4% of the total installed capacity of Kenya in 2012, thus dominating its power mix.
Regional Insurance Market Regulation

The Kenyan and Ugandan insurance markets are regulated by separate authorities, both of which called the Insurance Regulation Authority (IRA). ‘Technical’ rates are set by the regulators’ technical committee and should be followed. An example of the technical listed rate for a power risk emanating from the Kenyan market is shown below:

The Updated Schedule Of Rates

<table>
<thead>
<tr>
<th>Risk</th>
<th>Type of Cover</th>
<th>Minimum Recommended Rate</th>
<th>Excesses / Deductible KSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>XYZ Power Station</td>
<td>MB</td>
<td>3.85%</td>
<td>5% of sum insured per item min. 300,000</td>
</tr>
</tbody>
</table>

Source: GlobalData Power

The respective market regulators can be approached for an exemption or a review of rates; this should be a joint initiative between broker and underwriter. It should not be assumed that an exemption will be granted, and there is therefore an imperative to have a strong case for an exemption.

Deductibles tend to follow the international market standards, with brokers tending to steer the market as opposed to the other way round. The level of deductible applied will affect the listed rate.

There are roughly 47 underwriters in the market locally, of which around 10 will look at power and have relationships with global carriers. Local capacity can absorb most small risks, but on large risks local insurers will look to reinsure to the international market. If a broker or client has a preferred ‘bespoke’ wording, local insurers tend to be flexible enough to accept them.

There is an increasing amount of interest from international carriers in the local markets. Whilst this is mainly on the facultative reinsurance side, it will not be long before the international carriers look to have a local office on the ground. Whilst this likely growth in capacity seems likely to increase competition for business and therefore point towards a reduction of rates, the interest taken by the regulators in rating individual assets may temper this process.

In comparison to international standards, the quality of underwriting information and the risk profiles presented to underwriters is limited. The standard of risk engineering information, which is usually a key feature of marketing power risks, is generally poor. Those buyers that can show good risk engineering standards and information will therefore benefit by being able to differentiate themselves with underwriters, and this is where engaging a broker with expertise in this field can pay dividends.
SPECIAL REPORTS
Claims

What happens when I have a major loss?

In previous editions of this review we have made reference to the frequency with which “mega losses” – claims that exceed USD 100 million in value – tend to occur in the Power sector. 2014 has seen a continuation of this trend, with a high number of major events already this year, at least three of which are likely to be mega losses. Major losses to date this year include:

• UK – Mechanical failure and fire at a biomass plant (February)
• USA – Gas turbine fire (February)
• Italy – Generator breakdown, Hydro plant (March)
• Bangladesh – Breakdown causing severe damage to steam turbine generator and steam turbine (April)
• Algeria – Gas turbine breakdown (April)
• UK – Fire at a coal-fired power station, (July)

As in previous years, it can be seen that major loss events can occur at all types of power station, at any time – while most losses occur during operation, the July UK loss occurred at a time when the station was reportedly on “summer shutdown” and being fitted with equipment to make the plant compliant with EU air pollution standards.

Most operators and risk managers will never experience a mega loss, but there is a strong possibility that they will have a Property Damage and Business Interruption claim of some type to deal with in the normal course of business. In this edition of the Power Market Review we are going to look at what happens when a major claim does occur, and how the process of resolving it tends to flow. Similar, but possibly less detailed, processes will apply to smaller losses.
Notification of a possible claim – the first step
In the case of most major losses (and certainly in the case of a mega loss) it will be obvious that a major event has occurred, and that insurers will be involved. Inevitably such an event will provoke immediate and sometimes dramatic disruption in an organisation, as an overwhelming list of tasks hits the desks of the management team, insurance being simply one of these.

Most insurers follow the news feeds and may well have contacted the broker about the loss before the policyholder has had a chance to provide any meaningful advice of the incident. It is important to let insurers know of the event quickly and accurately, and this is a task that can be delegated to the insurance broker.

A big loss will lead to a major unplanned project with significant capital expenditure. The project will have to be assessed and implemented within a very short period of time and with limited resources – most operations have staff on hand who are skilled at operating a plant, but who may have little or no experience of executing a major construction. The demands on time will be significant, and should not be underestimated if the job is to be done well. The broker can play a significant role in helping his client through the process, not least by ensuring that insurers meet cash flow needs to fund the reconstruction through periodic payments on account.

Insurers will invariably wish to retain a loss adjuster to investigate the claim on their behalf. The adjuster will wish to access the loss site at the first opportunity to see the locus of the loss at first hand and to make an early assessment of the situation. He will need to be guided around the site and provided with access to all accessible damaged areas, any witnesses and key personnel. This is something that will require that valuable, experienced, human resources be made available to him and is again something that should be undertaken with the help and guidance of the broker.

The adjuster is the insurers’ agent and will be tasked with reporting back to insurers with a loss estimate at the earliest opportunity, a task that he can only meaningfully complete if he has access to information. To add to the burden on management resources, the adjuster will usually produce a preliminary “document request list” (or DRL) setting out the information he needs.

As the claim progresses the insurers are likely to call on additional expertise. It is commonly the case that an accountant will be hired to help to verify the business Interruption, which can be complex; expediting experts may be retained on long rebuilds to seek to shorten the schedule; and even scheduling experts may be retained to “de-bottleneck” the programme. As a result, the loss adjuster may have to become a project manager in a shadow operation, requiring close and careful cooperation between all parties. The broker should be able to provide a corresponding project management role on the policyholder’s behalf.

Three key steps
1. Cause
All claims, big and small, follow three basic steps. The first is the establishment of the cause of loss. This is an essential piece of knowledge to establish if the cause of loss is covered under the terms and conditions of the policy.

Very few loss adjusters specialise solely in the power industry and, even when they do their principals will almost certainly require that they obtain independent expert advice to help to establish the root cause. In the case of a damaged steam turbine, for example, they may be required to retain a steam turbine specialist and possibly other experts, such as a metallurgist to assist the investigation of cause. This may mean that the insurers’ expert leads the investigation or possibly verifies the investigation by the Original Equipment Manufacturer (OEM). In some instances, the owner will perform their own Investigation, and this is often the best method for the policyholder to maintain control of events. Willis maintains a staff of specialist power industry engineers who can help policyholders with cause investigation.
2 Coverage

Once the nature and cause of loss have been established, and it has been verified that (a) it is an accident to property covered by the policy and (b) no policy exclusions of particular perils apply, the full scope of cover can start to be mapped out. This will include verifying the policy limits, the adequacy of the sum insured, reviewing any sublimits that may apply, checking the maximum indemnity period for Business Interruption (if applicable) and so on.

Frequently the Business Interruption claim will not be predicated on a loss of revenue consequent on the damage, but on the additional costs incurred in order to avoid or mitigate a loss of revenue, or to ensure that supply contracts are not breached. In the power sector, the main additional costs are usually the costs of buying power to replace the Insured's own lost output, in order to meet existing contractual obligations, or the transactional costs of buying back forward contracted power that the Insured will not now be able to generate. There may also be “take or pay” obligations under fuel supply contracts. Estimating the extent to which the policy responds to these costs may not be a straightforward matter, given that the coverage may be provided under a standard policy form which was not primarily designed to meet the needs of the power sector.

The coverage map that this process produces then becomes the “envelope” within which the claim will sit. At the earliest stages of a claim, some areas of the coverage may not be completely clear and require refinement as further information becomes available. We would strongly urge that the broker be fully engaged in this ongoing process.

3. Quantum

The determination of quantum is likely to fall into two areas – the physical damage repair or replacement costs and the Business Interruption calculation.

The Physical Damage adjustment is largely a matter of relating costs expended to the repair scope which will have been established before repairs commenced. The work will most likely be performed by the loss adjuster with reference to any experts that insurers retained, and he will be looking to ensure that the invoices he is presented with in support of the claim are reasonable, relate solely to the physical damage repair, and do not include “improvements and betterments” and unrelated work.

The Business Interruption calculation is more subjective, in that it involves an element of prediction of what the Insured’s financial situation would have been had the loss not occurred. This is usually calculated with reference to prior operating history with adjustments made to reflect the expected future financial performance.

If the Business Interruption claim involves replacement power or other additional costs, the money saved in fuel and other operating costs that would otherwise have been incurred (if not for the loss) needs to be taken into account in any calculation of quantum.

Depending on the policy wording, the resultant figures may then need to be assessed by reference to the Gross Profit that would have been incurred if the additional expenditure had not been made, and/or against any applicable sublimits (which themselves be limited to a certain amount per month or other period).

On most Business Interruption losses, the insurers will retain an accounting firm to assist the loss adjuster in making the calculation. The accountant will have expertise in the power sector and will be familiar with the typical earning methods used in the sector.

Where a policyholder requires help in assembling a claim for submission to the insurers, Willis are able to offer a claims preparation service through our forensic accounting and complex claims practice. This service ensures that the claim submitted falls squarely within the coverage envelope addressed above and contains all recoverable costs.

We all hope that these losses never happen but they do and with startling frequency. Dealing with a major loss is very like a new build project but delivered in a very short period of time and often without the luxury of a full project team to plan and execute the project. The insurance industry is very experienced at dealing with such events and can offer a valuable lifeline to a distressed policyholder – but the insurance claim needs to be very carefully managed and Willis have an excellent track record of delivering success in this arena.
Almost four years since the March 2011, Fukushima Daiichi nuclear power plant accident, the global interest in new nuclear power continues to grow and is likely to remain an important part of the world's electricity generating mix.

In 2013, there were 430 nuclear reactors operating in 31 countries which provided around 11.0% of the world's electricity demand as a reliable and continuous base load supply. Whilst some countries such as Germany and Switzerland have developed plans to phase out nuclear power, the future growth of nuclear construction projects will be driven by large-scale capacity additions worldwide. This seems at odds when considering the anxieties surrounding nuclear power, however with rapid urbanisation, increasing standards of living and a world population projected to grow from 6.7 billion in 2011 to 8.7 billion by 2035, the demand for electricity is on an upward trajectory.

Most of the demand is for continuous, reliable supply on a large scale which makes base-load fossil fuel and nuclear power especially suitable. Whilst renewable energy sources will continue to play a role, their small scale and intermittent nature make the twin goals of producing large scale environmentally friendly electricity unattainable without nuclear power. In fact, World Energy Outlook highlights the increasing importance of nuclear power in meeting clean energy needs while achieving security of supply and minimising carbon dioxide emissions.

New nuclear power construction projects have protracted timeframes, due in part to the long lead times associated with nuclear grade components. Today the supply chain is global with many risks that can impact the contractor, future operator or owner, investors and insurers. Therefore a deep understanding of the global supply chain and its many challenges is essential.
What does the nuclear supply chain look like?

- Small and medium sized components manufactured locally or sourced from the domestic market
- A range of nuclear grade small, medium and large components sourced from a limited number of accredited global manufacturers
- Extremely large nuclear grade forged components sourced from a handful of accredited manufacturing facilities worldwide
- Thousands of contractors both from local and overseas markets during the peak construction phase

Nuclear Supply Chain Challenges

Components, personnel and services are no longer available in large quantities from the domestic market. The majority of the procurement will be in collaboration with global suppliers, presenting a complex supply chain management challenge that is likely to include:

Global Sourcing

In the majority of cases there will be no domestic nuclear component suppliers. This leads to difficulties in developing, controlling and maintaining nuclear safety culture, technical expertise and knowledge transfer through the global supply chain.

Qualifying Suppliers

Difficulty inspecting and certifying overseas manufacturing facilities to ensure appropriate design standards and Quality Assurance (QA) is followed. This increases the risk of substandard components and counterfeit parts entering the supply chain.

Services

Availability of skilled workforce, services and local manufacturing facilities. This has the potential for substandard equipment and lack of available services to negatively impact the construction schedule.

Infrastructure

Adequacy of roads, ports, port facilities and shipping lanes, heavy haulage and lifting equipment that is often project specific and one of a kind. There is only a small fleet of marine vessels that can ship large forgings resulting in shipping schedules of up to two years. All of which pose a risk to the construction schedule and potential damage to long lead time (critical path) components.

Equipment Lead Times

Due to the high demand for power plants, there are long lead times for critical path items, services and materials worldwide. In particular limited manufacturing facilities for nuclear grade components necessitate very long lead times of up to three years, see Figure 1 – Typical nuclear component lead times. Additional delays due to manufacturing and quality issues with other projects (i.e. bottlenecks) can have an adverse knock-on effect.

<table>
<thead>
<tr>
<th>Machinery &amp; Equipment (Estimated)</th>
<th>Lead Times</th>
</tr>
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<tbody>
<tr>
<td>Feed pumps and pressurisers</td>
<td>36 months</td>
</tr>
<tr>
<td>Reactor vessel and steam generators</td>
<td>36 months</td>
</tr>
<tr>
<td>Valves, main condenser, other nuclear grade components</td>
<td>24 months</td>
</tr>
<tr>
<td>Heavy forgings (steam turbine and generator shaft forging)</td>
<td>24 months</td>
</tr>
<tr>
<td>Transformers, plant simulators, I&amp;C</td>
<td>18 months</td>
</tr>
<tr>
<td>Marine shipping schedule</td>
<td>24 months</td>
</tr>
</tbody>
</table>

Source: Deloitte Centre for Energy Solutions
Securing Supply Chain Quality
There are some broad principles, as outlined below, which underpin a robust and efficient nuclear global supply chain that is capable of delivering components on time and to the desired quality:

• In-house resource capability to fully understand the nuclear safety significance of any purchased expertise or equipment outsourced from the supply chain.
• Developing a framework for promoting, enhancing and maintaining nuclear safety culture throughout all tiers of the supply chain.
• Developing a robust Quality Assurance (QA) programme, ensuring roles and responsibilities are defined throughout the supply chain, including audits, inspections and manufacturing hold points.
• Developing strategic supplier partnerships and ensuring lowest price is not the main driver.
• Ensuring Tier 1 suppliers understand the technical and process quality requirements in order to maintain nuclear safety when purchasing from their own supply chain.
• Ensuring any incentive payments for on-time delivery does not impact QA.
• Developing and making available the appropriate level of skilled labour and manufacturing facilities locally.
• Ensuring thorough transport feasibility studies are carried out.
• Enforcing a ‘Stop and Ask’ culture throughout the supply chain.

Conclusion
During the construction of a nuclear power plant, the risks are similar to that of a conventional power plant build. However the reliance on a robust global supply chain can have significant implications to schedule and cost overruns. It is important that all parties involved in nuclear construction understand these risks and are able to identify the unique supply chain challenges and opportunities. In doing so, improvement initiatives and loss prevention measures can be implemented at the earliest opportunity helping to maximise supply chain efficiency whilst minimising risk.

Today the supply chain is global with many risks that can impact the contractor, future operator or owner, investors and insurers. Therefore a deep understanding of the global supply chain and its many challenges is essential.
Renewable Investors Face New (Uninsured) Risks from Government Drawbacks

Such has been the surge in investment in renewable energy projects, driven by political pressure to invest in less emission-intensive energy production and the provision of renewable energy incentives, that investment in renewables has now outstripped fossil fuel fired plants.

According to a recent Bloomberg report on New Energy Finance, Europe is set to halve greenhouse gas emissions from the power sector by 2030 by securing USD 1 trillion of investments in renewable energy technologies.

The report also predicts that renewable energy investments will rise to USD 5 trillion during the next 15 years. Asia is perhaps to witness the largest investment in renewables with investment reaching USD 2.5 trillion across the Asia-Pacific region by 2030.

New Risks Beyond Weather

However, whilst investments in renewable energy plants are growing, so too are the risks; foremost amongst these, aside from the more traditional weather-related volume risks, are regulatory and political risks.

These risks are now increasingly providing a degree of uncertainty to investors, with the result that confidence is being eroded and lenders may be increasingly reluctant to commit funds.

At Willis, we have seen a significant uptick in enquiries over the last 12 months, from both investors and lenders, for insurance coverage to protect themselves against ‘illegitimate’ changes in government tariffs or a change in the tax regime that is associated with that tariff.
Where Political Risk Insurance Falls Short
Political risk insurance has long been available to protect against the risk of government intervention, including expropriation as well as any physical loss or damage occasioned by political violence. However, the political risk insurance market is largely reluctant to provide cover against any change in the feed-in-tariff (FIT) or abrogation of the power purchase agreement, which is arguably the main risk, as these subsidies are the foundations which underpin the basis upon which the project financing has been provided.

Investors and lenders can take steps to mitigate many of the risks associated with renewable projects and it was reported in the Financial Times in July that Willis were working with underwriters to develop solutions and cover against these types of risk, following a surge in inquiries over the past year from renewable energy investors and lenders for insurance to protect against retrospective changes in state support. It was noted, however, that the complexity in assessing the risks would make the cover difficult to price, and that (as with all types of insurance) the attractiveness of any insurance solution would depend on premium levels. In the near-term, it looks as if covering these types of exposure could be a step too far for most political risk underwriters.

Reductions in Renewable Energy Subsidies
Whilst subsidies, in the form of FITs, have now been provided by over 50 countries to encourage renewable generation, there have been numerous cases where these subsidies have been reduced or even withdrawn with limited notice.

- Spain and the Czech Republic in 2010 introduced cuts to feed-in tariffs for existing solar projects by up to 45%.
- Germany cut solar fee-in tariffs in Germany by 15% the UK by up to 70%.
- The UK, despite being sued by 17 companies for cutting FIT rates prematurely, the UK government has recently announced further ‘degressions’ due in part to the dramatic fall in hardware costs.
- Italy has also recently proposed to retroactively reduce their FITs inviting legal challenges under the Energy Charter Treaty, to which they are a signatory.

The problem for investors is that if European governments can be seen to amend these subsidies, what then for investments in more ‘challenging’ jurisdictions. What is to say that further governments do not seek to make changes to their subsidies.

If the rules of the game can change at any time such that they negatively impact the cash-flow model, lenders may think twice before providing funds to these types of investments.

Asia is perhaps to witness the largest investment in renewables with investment reaching USD 2.5 trillion across the Asia-Pacific region by 2030.

This article first appeared in a ‘WillisWire’ blog by Andrew Van den Born, Executive Director of Willis’ Financial Solutions division, available at http://blog.willis.com/. It has been modified slightly from the original.
There is no shortage of discussion on the growing awareness of water risk to thermal generation. Since 2003, when an unprecedented heat-wave across Europe led to the shutdown of up to one quarter of France’s nuclear capacity, there have been an increasing number of thermal power shutdowns around the world. China, not surprisingly, attracts much of the attention since many of its large coal fired power stations are being built in the arid north of the country. Water, however, is not the only story. For some time, many developers have opted for air-cooled condensers at thermal plants. However, these also have climactic limitations. Climate risk, both from a water and ambient temperature perspective, needs to be considered when developing new thermal capacity.

Like all risks, ensuring thermal power stations are effectively cooled is a combination of exposure (where they are sited) and hazard (the extent of the physical risk). Not surprisingly, many of the world’s dry regions are also prone to extreme heat. Climate projections from latest IPCC report (‘Climate Change 2014: Impacts, Adaptation, and Vulnerability’) suggest these trends are likely to worsen. Current estimates suggest that up to 15% of the world’s water withdrawals are for energy production, which could potentially affect fuel production as well. In a world of increasing water stress, competition for water resources is likely to be prioritised for agricultural production. In the extreme drought and heat-wave affecting California this summer, this precarious balance was highlighted; water rights vary based on locality.
Water shortages are not just an issue of business interruption. They also present an environmental liability risk. With the French shutdowns in 2003 and risks of California thermal shutdowns in 2014, the issue isn’t just the quantity of water itself, but also the temperature of the rivers and lakes where water is discharged. To protect wildlife and other water users, there are often strict limits on water discharges from power stations where these raise the water temperature over a certain threshold. In areas where water stress is growing, regulators are likely to become more stringent about enforcement, while also balancing the needs of grid reliability and agriculture.

The growing proliferation of air-cooled condensers at thermal power stations is a response to many of these risks. In addition to increasing costs and reducing plant efficiency, however, research published in the International Journal of Modern Engineering Research indicates the performance of air-cooled condensers decreases with high ambient temperatures and high winds. There are some mitigations that can address these issues, such as shading and wind-walls, but whether or not they increase resilience in the face of changing climactic patterns is uncertain.

Technology typically responds to these trends. The wind industry has used water risk in its marketing to developers. Wind and solar, however, face issues of intermittence, and climate change is likely to affect wind patterns as well. Energy storage probably has a role to play here, but this technology is in its infancy. In the meantime, electricity demand continues to grow and new thermal generation capacity continues apace.

Like other players in the built environment, such as real estate developers, utilities and power developers need to consider future hazards when building long-lived assets. Using geospatial mapping and climate models, understanding the current hazard exposure is a good place to start. However, the industry needs to consider future climate scenarios as well. Water risk and heat risk tend to go hand in hand. The first step in building a profitable asset is building it in the right place and ensuring it is still the right place in 30 years’ time. While we can never be certain of the future, the good news is we have the analytics and technology to make good decisions. That’s what resilience is all about.

With the French shutdowns in 2003 and risks of California thermal shutdowns in 2014, the issue isn’t just the quantity of water itself, but also the temperature of the rivers and lakes where water is discharged.
What is Driving Change in Europe’s Power Sector?

By Richard Chatterton, Head of European Gas & Carbon Risk, and Jonas Rooze, Head of European Power & Carbon, Bloomberg New Energy Finance

The European power sector is undergoing a painful evolution. Long-established certainties upon which utilities have built their businesses are being torn up by a combination of economic headwinds and the penetration of renewable energy technologies. This leaves utilities facing unprecedented uncertainties and is forcing policymakers to implement sweeping reforms to the way that Europe’s power markets are governed and operate. Prior to the global financial crisis, a common assumption among energy industry insiders was that European power demand would continue to rise at around 2% per annum, as it had done so between 1995 and 2007 (see Figure 1). This stable outlook made utility stocks the ideal defensive investment; with stable and predictable pay-out ratios, shares in E.ON and RWE traded in line with German government debt for much of the 1990s (see Figure 2). New capacity was planned to meet growing demand and utilities had access to plenty of cheap capital – it was a good time for the industry.

Since 2008, however, Europe’s power market has been thrown into disarray. Electricity demand fell by 6% during the recession and the recovery has been slow. We expect to see growth of around 0.5% per annum across the EU28 (plus Iceland and Norway) going forward, with aggregate demand not reaching its 2008 high again until 2022. Meanwhile, renewable energy technologies, which operate at a near zero short-run cost, and have been financed with the help of government subsidy programmes, are having a severe disruptive impact, forcing down baseload wholesale power prices and limiting the run hours of fossil fuel plants.
**Figure 1**
*Source: Bloomberg New Energy Finance*

**Figure 2**
*Source: Bloomberg*
This combination of weak demand growth and increased renewables generation has crushed the profitability of Europe’s largest utilities, and investors have responded by dumping their stocks – shares in E.ON and RWE falling around 70% from their 2006-07 highs.

Utilities are faced with increasing costs of capital and are struggling to justify investments in new capacity given the outlook for generation spreads. Furthermore, many mid-merit power plants such as combined-cycle gas turbines are being mothballed or retired as they stand to run at a loss if they remain operational in the current market environment (see Figure 3).

Investment in new baseload generation capacity is nevertheless needed in several countries, whether because of increasing peak load (e.g. France), or planned capacity closures (e.g. coal and nuclear in the UK). Policymakers are rightly concerned that the market in its current form is not creating the price signals needed to drive investment into new capacity. Many governments are pursuing sweeping reforms – such as establishing capacity mechanisms and altering support for renewables – in order to re-orient the incentives for capital investment towards new capacity that will be needed to replace retired plants and balance the variability of an ever increasing volume of wind and solar.

Importantly, as the costs of renewables continue to decline, wind and solar power will become less and less reliant on subsidies. Our analysis indicates that based on levelised cost, wind and solar are already competitive with thermal generation in a number of countries. Investment in solar PV, in particular, makes increasing economic sense, as rooftop-scale systems compete with retail, not wholesale, power prices*. We expect to see a boom in the uptake of rooftop solar across Europe, fuelling close to $1 trillion of capex in renewables by 2030 (see Figure 4 and 5).

*Levelised cost of energy calculates the minimum per unit of energy price that a generating plant should receive over its lifetime to exactly make expected investment returns.
Such an increase in renewable generation will transform the economics of power generation. The disruptive impact is already being felt today, with German daytime peak power prices falling as increasing amounts of solar generation coincide with the period of peak daytime demand. In 10 years’ time we forecast that peak-time prices will equal off-peak prices, and in 20 years’ time that daytime prices will be lower than night-time prices, effectively turning the traditional peak/off-peak load profile on its head.

We see a risk that in a world of high penetration by subsidy-free renewables, wind and solar will end up cannibalising their own revenues, if average power prices fall below their levelised cost of energy. Meanwhile, thermal generators will dispatch only in order to balance the grid – i.e. when the wind fails to blow or the sun fails to shine. Fossil plants, particularly CCGTs, are likely to be able to capture above average ‘peak-time’ power prices, but load factors are likely to be so low that they will fail to earn sufficient economic returns. The end result could be a stalemate, where neither renewables nor thermal generators are able to pay back their capital investments.

An additional issue that we foresee is the increased need for ramping – changing output hour to hour – as renewables penetration grows. Fluctuating wind speeds and solar hours affect how much dispatchable power generation needs to be brought on- or off-line, and a range of solutions will be needed in addition to capacity and flexibility mechanisms to increase the resilience and responsiveness of the grid: demand response technologies, storage, greater interconnection between countries and markets, etc. We take the view that more reforms and government support will be needed to drive these solutions, creating risks but also opportunities for utilities.

Whilst the value of electricity in society is evident, the remuneration process for generating power is less so. Perhaps, ultimately, the market will cease to be a mechanism for price discovery and will merely decide the order of dispatch, with the main source of income for utilities coming instead from capacity (megawatts) and flexibility (megawatts/hour) payments, which may become more valuable services than actual generation (megawatt-hours).

The structure of utility revenue streams for power generation in Europe are likely to look very different in 10–20 years’ time. It is crucial for power market actors to understand this changing landscape as it will fundamentally impact the outlook for investment, and the operational and market risks facing power generators.

_Bloomberg New Energy Finance (www.bnef.com) provides unique analysis, tools and data for decision makers driving change in the energy system._
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