Willis Towers Watson

Ready and waiting?

Power and Renewable Energy Market Review 2019

Natural Resources

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Our Review uses a mixture of American and English spelling, depending on the nationality of the author concerned.

We have used capital letters to describe various classes of insurance products and markets, but otherwise we have used.

Introduction: are you ready and waiting?

Welcome to our Power and Renewable Energy Market Review for 2019.

Are companies in the power and renewable energy industries "ready and waiting" for the changes to their risk landscape – changes that are becoming ever-more apparent across a wide range of issues?

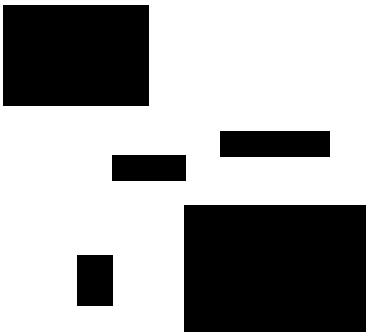
- Are they ready, for example, to play their part in the transition towards a low-carbon world?
- Are they ready to take in their stride the likely unfavourable developments in the global insurance and reinsurance markets, as Lloyd's and the company market seek to improve their profitability and some of the major European carriers withdraw from underwriting coal risks?
- Are they ready to resist the growing threat of cyber-attacks? Are their controls sufficiently resilient and do they have appropriate financing mechanisms in place should an enterprising hacker manage to get through and disrupt their operations?
- Are they ready to take advantage of new analytics and data-driven risk management techniques to improve the quality of their risk financing decisions?

These are some of the questions addressed in this Review. It comes at a time when rapid innovations in technology present both threats and opportunities; a time when geopolitical risk remains at the top of boardroom agendas; and a time when there are signs that the global insurance and reinsurance markets, after years of benign conditions fuelled by an oversupply of capacity, may finally be on the turn.

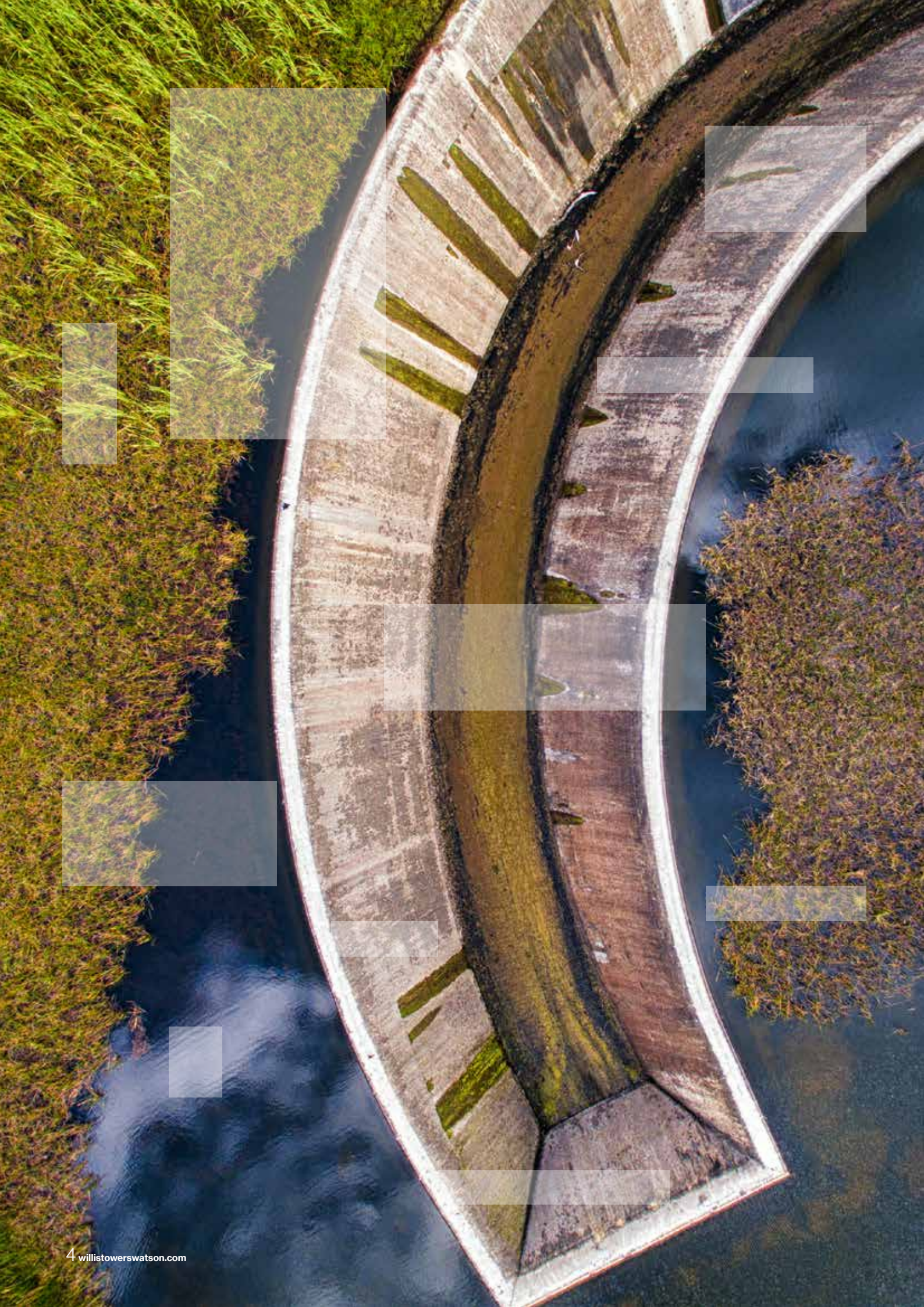
From a personal perspective, I am delighted that this year's Review includes new ideas and solutions on a broad number of risk areas from our Natural Resources team.

Hopefully they will help you to become "ready and waiting" for the changes to your industries which, if they are not happening already, are surely just around the corner.

Graham Knight is Head of Natural Resources GB at Willis Towers Watson, based in London.



"Are companies in the power and renewable energy industries "ready and waiting" for the changes to their risk landscape – changes that are becoming ever-more apparent across a wide range of issues?"



Part one - power industry issues

Climate change: will the power industry evolve to meet the challenges ahead?

Introduction: climate change is here - and it won't go away...

Climate change is happening: the world is getting warmer. The years 2015, 2016 and 2017 were the three warmest in recorded history[1], and preliminary results for 2018 from the World Meteorological Organisation[2] show this warmth to be continuing, meaning that the last four years are also set to be the four warmest years in the observed record. To work out how much the climate has warmed, these temperatures are compared to the pre-industrial era (1850-1900). The recent warm years are part of a clear and robust long-term global warming trend, which currently indicates that the global average temperature is close to one degree Celsius above pre-industrial levels.

However, these global statistics can be somewhat abstract compared to our everyday experience of the weather. To come up with a global average temperature, the spatial detail is lost and daily, monthly and seasonal variations around the average are smoothed. This means that the longer term trend can be warming, but there will still be room for cold spells, even cold seasons. Our memories are biased towards the significant weather that has an impact of our lives, whether it's a particularly cold winter or a long drought in the summer, so therefore it can be hard to imagine what a 'global average temperature' is really telling us. When thinking about extreme weather, long term climate trends may seem trivial.

The evidence

The Intergovernmental Panel on Climate Change (IPCC) states clearly that scientific evidence for warming of the Earth's climate system is unequivocal. Evidence is found across a range of environmental systems:

- Globally averaged temperatures have risen by around 1 degree Celsius since pre-industrial times[3]
- The last three decades have been warmer than any of those back to 1880[4]
- The globally averaged sea-level has risen by around 20cm between around 1870 to 2000, and is currently changing at a rate of 3.2mm per year (according to 1993-present data)[5]
- Greenhouse gas concentrations of carbon dioxide, methane and nitrous oxide have significantly increased through human activity[6] and there is a more than 95% probability that human activity over the past 50 years has warmed our planet[7]

[1] https://climate.nasa.gov/vital-signs/global-temperature/
[2] https://public.wmo.int/en/media/press-release/wmo-climate-statement-past-4-years-warmest-record
[3] https://climate.nasa.gov/vital-signs/global-temperature/
[4] https://www.climate.gov/news-features/featured-images/past-three-decades-warmest-record
[5] https://climate.nasa.gov/vital-signs/sea-level/
[6] https://ar5-syr.ipcc.ch/topic_observedchanges.php
[7] https://climate.nasa.gov/causes/

- Since the beginning of the industrial era, ocean uptake of Carbon Dioxide (CO_2) has acidified the oceans by around close to 30%, damaging marine ecosystems and changing fisheries[8]
- Rainfall across the land areas has likely increased in more areas than it has decreased since 1950[9]
- Between 1993 and 2016, the Greenland ice sheet lost an average of 281 billion tons of ice per year, and Antarctic lost around 119 tons of ice per year, while glaciers continue to shrink worldwide[10]
- Artic sea ice annual minimum extent has decreased at a rate of 12.8% per decade relative to the 1981-2010 average[11].
- There is also evidence for changes in storm activity, such that tropical cyclones have increased in intensity in since 1970 in the North Atlantic[12] and globally[13].

In recent years the debate has moved on from the science, to focus more on what can be done to adapt to the warming that we are already locked in to, and to mitigate further global warming that we can still prevent to avoid the worst effects of climate change.

The cause

According to NASA[14] and peer-reviewed literature[15], 97% of climate scientists agree that warming trends are due to rising levels of greenhouse gases. A report by the American Association of Advancement of Science (AAAS)[16] likens this conclusion to the levels of confidence associated with the link between smoking and lung cancer. The difference is that reducing greenhouse gas emissions, such as CO_2, will take a global concerted effort, and the link between CO_2 and climate change is a much more complex causal chain than the link between smoking and lung cancer. Reducing greenhouse gas emissions will require much more action than the cultural changes, education and advertising regulations that have reduced the number of people smoking. CO_2 is the chief culprit in causing climate change, and the elevated concentrations of CO_2 in the atmosphere and oceans are set to remain for centuries to come. Emissions today are going to impact many generations into the future, which is why continuing unabated emissions will only exacerbate global warming.

To put the increases into context, the current levels of CO_2 are unprecedented in the last 800,000 years[17]. For nearly a million years, CO_2 concentrations oscillated between around 200 and 300 parts per million (ppm) in sync with the ice ages, but since the industrial revolution these concentrations have risen from around 280ppm to over 400ppm, driven largely by economic and population growth.

And despite efforts by many countries to reduce emissions, CO_2 concentration continues to rise. A recent report on the "emissions gap" by the United Nations[18] describes how CO_2 levels are linked to economic growth, with high GDP in 2017 pushing emissions up by 1.2% after two relatively stable years of modest economic activity. Research carried out by the Global Carbon Project indicates that 2018 has seen a rise in emissions of 2.7%[19]. Transitioning to an economy that is not reliant on the burning of fossil fuels is essential for limiting the impacts of climate change.

The risks

The Prudential Regulation Authority released a report in 2015[20] outlining the impact of climate change on the insurance sector. It analyses the risks of climate change in terms of three broad themes:

1. **Physical risks** are the direct risks from damage, loss of business or supply chain disruption due to increasing intensity of extremes of weather and climate.
2. **Transition risks** are the financial impacts of moving towards a low or zero-carbon economy, such as re-pricing of carbon intensive assets, the opportunity costs of making the transition too fast or too slowly, or choosing sub-optimal technological solutions.

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[8] https://ar5-syr.ipcc.ch/topic_summary.php
[9] http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf
[10] https://climate.nasa.gov/evidence/
[11] https://climate.nasa.gov/vital-signs/arctic-sea-ice/
[12] http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf
[13] https://link.springer.com/article/10.1007/s00382-013-1713-0
[14] https://climate.nasa.gov/scientific-consensus/
[15] http://iopscience.iop.org/article/10.1088/1748-9326/11/4/048002
[16] "What We Know: The Reality, Risks And Response to Climate Change", AAAS
[17] IPCC AR5
[18] https://www.unenvironment.org/resources/emissions-gap-report-2018
[19] https://www.bbc.co.uk/news/science-environment-46447459
[20] https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/publication/impact-of-climate-change-on-the-uk-insurance-sector.pdf?la=en&hash=EF9FE0FF9AEC940A2BA722324902FFBA49A5A29A

3. **Liability risks** include those that arise from parties who have suffered loss or harm due to climate change and seek to recover damages from those who are judged by law to be responsible. The liability risks can be passed to insurance firms if policies allow, but damage to reputation and subsequent uninsurable claims could be significant.

The energy industry, like many others, can draw examples under these themes in terms of known and emerging threats but also opportunities.

Physical risk

Assessment of physical risk can help a power company understand its operational risks and respond to extreme events. Insurance industry catastrophe modelling techniques can be applied to assess risks to infrastructure, or incorporate adjustments based on IPCC projected scenarios to investigate extreme events and changes to energy demand. Modeling likely amounts of damage or financial losses linked to future climate scenarios may help to make the impacts of possible future climates more tangible.

One of the difficulties with physical risk assessment related to climate change is the difference between the timescales of a weather event, and the long term changes, both of which are mixed into the background of natural climate variability. But it is important to realise that with small changes in the average conditions, it is the extremes where we are likely to notice a change first. It is of course difficult to assign a single event to a longer term trend, but certain characteristics of extreme weather events, such as increasing heavy rainfall in tropical cyclones, or longer and more severe droughts leading to abundant fuel for wildfires, can be examined. Research into climate attribution has been growing as modelling capabilities increase. The level to which an individual event can be attributed to climate change depends on the characteristics being examined; however, recent peer-reviewed studies are able to isolate the proportion of certain extreme events to the changes we have seen in our climate since pre-industrial times[21].

One metric used in academic study is the Fraction of Attributable Risk (FAR) which has been applied to summer heat waves and mortality rates among other climate extremes. Increasingly, studies are finding greater relationships between individual events and the changing background climate as the average temperature creeps up. The insurance industry is developing methods which involve tailoring catastrophe model event catalogues to represent climate variability and adapting this process to portray future warmer climates. We can also use event scenarios to describe impacts from severe flooding, droughts and intense storms that all may be more likely in the future.

"Recent peer-reviewed studies are able to isolate the proportion of certain extreme events to the changes we have seen in our climate since pre-industrial times."

[21] https://www.nature.com/articles/d41586-017-08808-y

Transition risk

Transitioning to low-carbon energy technology represents a tangible opportunity for market differentiation. As technology has increased solar efficiency and brought other renewable sources to the fore, energy demand is less dependent on the traditional oil and gas resources. Unused fossil-fuel reserves surveyed by the oil and gas industry contain five times the amount of carbon than is safe to burn. "Safe" in this context means keeping levels of CO_2 below that which is likely to bring about continued global warming through this century, and avoiding the worst effects of dangerous levels of climate change, generally accepted to be 1.5 Celsius above pre-industrial levels. As part of the COP21 Paris Agreement, countries had to submit their Intended Nationally Determined Contributions (INDC) which outline their goals and strategy for this transition to a low or zero-carbon economy.

Governments of the world are tied into meeting these commitments, and industry needs to evolve and adapt to the challenges that are to come. But the driving force will not just be regulation or international policy. The private sector is primed to lead the way, with companies already signing up to voluntary climate risk initiatives such as the Task Force for Climate Related Financial Disclosures[22] (TCFD), which encourages them to assess and report on their climate risk both now and into the future, to allow investors to better assess their resilience and sustainability.

As the climate warms, our energy demand will also increase, leading to a technological challenge in how to meet the needs of growing urban centres, while maintaining the stability of increasingly important electricity grids as society embraces the Fourth Industrial Revolution. Aside from renewables, the growing demand for energy can also be met by nuclear power, a solution which will significantly increase energy supply at relatively low carbon emission rates. In conjunction with a more general switch to electricity, this combination can make a big contribution to meeting carbon reduction goals. Removing our reliance on fossil fuels will bring risks which need to be measured and managed for companies to remain competitive.

Liability risk

In terms of liability, the range of possible plaintiffs range from individuals affected by extreme events[23] made worse by climate change, such as Typhoon Haiyan, to city governing bodies[24] who must foot the bill for resilience and recovery efforts following climate extremes such as heatwaves, forest fires, floods or droughts. Liability settlements or costs of court cases may well grow if such cases start to win compensation from the oil and gas industry. As science develops a deeper understanding of how extremes of climate are modified by global warming, the scientific evidence upon which such liability risks may be based will grow.

"Transitioning to low-carbon energy technology represents a tangible opportunity for market differentiation."

[22] https://www.fsb-tcfd.org/

[23] https://www.vice.com/en_uk/article/3k7dv9/the-woman-going-after-big-energy-for-the-typhoon-that-killed-her-family

[24] http://www.climateactionprogramme.org/news/paris-is-considering-suing-the-fossil-fuel-industry

Projected impacts on the power industry

Regional variations in extreme weather

However the power industry adapts to climate change, it will be dictated by an ever-growing energy demand[25] by an expanding urban environment and increasing temperatures. It will not be the same everywhere and regional detail will be important depending on the method of power generation. An EU report[26] highlights the impact on hydropower as changing rainfall and melting glaciers could increase power output by over 5% in Northern Europe, while southern parts of Europe are likely to see a decrease in hydropower by around 25%. Areas that are projected to see a decrease in rainfall and increase intensity and duration of heat waves will also experience a detrimental effect on thermal power plants. In terms of demand, increasing summer peak temperatures will increase the demand for cooling which is likely to outweigh the decrease in demand for heating during winter.

Views on how extreme weather events will change in a warmer world vary, depending on the type of event and its individual characteristics. For example, there is strong evidence to suggest that hurricanes in the North Atlantic have increased in intensity since the 1970s, and may continue to with global warming, while conclusions concerning storms affecting Europe are more mixed, although precipitation is expected to increase. The impact will then depend on the specific interest, whether the result is physical damage or interruption to supply.

Analysing recent events

Scientific studies have also used recent events as analogues for potential future extreme. A study by Emanuel et al. (2017)[27] looked at the likelihood of Hurricane Harvey magnitude rainfall in future climates. Under the worst case scenario from the IPCC, the chances of Harvey-like rainfall for Texas increases from roughly 1% annual probability (in the climatological period 1981 to 2000) up to around 18% by 2081-2100. These kinds of studies can help us understand what the future holds in terms that we have already directly experienced.

Computational modelling –power and opportunity

A recent report from the UK government[28] highlights the power and opportunity arising from computational modelling. A wide array of modelling applications exist in climate risk-related research to aid decision making; as computing power grows, the real world processes based on the laws of thermodynamics and fluid mechanics, that represent our weather and climate, can be modelled in greater and greater detail. Models also help us visualise the outcomes of our decisions, whether it's through catastrophe modelling for insurance and risk management, or visualising a pathway towards our carbon reduction goals as a nation. The 2050 Energy Calculator[29] is an example of a model that helps non-specialists to imagine and compare the consequences of different decisions and understand the complexity of the huge array of opportunities available as our society shifts towards a low-carbon economy. Non-specialists can quickly familiarise themselves with the trade-offs in managing complex systems. Reducing carbon emissions is complex, and there is no simple solution to how we can avoid the worst effects of climate change. There is much uncertainty, largely due to the future actions of the human race on an international and individual scale. This is why the IPCC uses scenarios in the form of their Representative Concentration Pathways[30], to show the future effects of the choices we make today. If we can recognise the impact of our actions, and reduce our greenhouse gas emissions to shift to a less 'carboniferous' energy system, we can mitigate the negative effects of global warming to some degree, and help to reduce the impact on those most vulnerable to the effects of climate change.

"However the power industry adapts to climate change, it will be dictated by an ever-growing energy demand by an expanding urban environment and increasing temperatures."

[25] https://dailyplanet.climate-kic.org/european-energy-demand-to-increase-with-climate-change/
[26] https://www.eea.europa.eu/
[27] http://www.pnas.org/content/early/2017/11/07/1716222114.short
[28] https://www.gov.uk/government/publications/computational-modelling-blackett-review
[29] http://2050-calculator-tool.decc.gov.uk/%20-%20/home#/home
[30] http://sedac.ipcc-data.org/ddc/ar5_scenario_process/RCPs.html

Conclusion: the way forward

The power and insurance industries will play crucial roles in the transformation of society to meet national and international carbon targets to avoid the worst effects of climate change. Through innovation and development of modelling capabilities we can provide more confidence in the decisions that need to be made.

Geoff Saville is Senior Research Manager for the Willis Research Network (WRN), which develops strategies to help companies in adapting to climate change and reducing their carbon emissions. WRN is funded by Willis Towers Watson to link leading scientific expertise in the academic community with the needs of the insurance industry. For over ten years the WRN has been supporting scientific projects to provide deeper insight into ways the different industries can manage their extreme risk through financial means or improved risk management.

Our collaborations span the globe and include multiple initiatives linked to climate change research. For example, the Engineering for Climate Extremes Partnership is an initiative set up by our WRN partners at the National Center for Atmospheric Research, which aims to build new tools and datasets to help users assess their resilience to the impacts of climate change and better manage future risks. There is a growing interest in finding new ways to understand and manage climate risk, and the WRN will remain at the forefront of industry understanding on the issues as the evolve.

Insurers' retreat from coal: is it worth the candle?

Introduction

Fossil fuel divestment

Since 2010 the movement for fossil fuel divestment ('the divestment movement'), started by the climate movement 350.org[1], has been seeking to persuade institutions which have pension funds or other significant sums of money under their management to remove their investments from fossil fuel companies – with some success. For example, in July 2018 the Irish parliament passed legislation which requires the €8bn Ireland Strategic Investment Fund to dispose of all its coal, oil, gas and peat investments "as soon as is practicable"[2], making it the first country in the world to fully divest public money from fossil fuels.

During the last few years the insurance industry, or at least parts of it, has gradually bought into the goals of the divestment movement. Although the divestment movement campaigns against coal, oil and gas projects, insurers to date have focused predominantly on one type of fossil fuel – coal. By the middle of 2018, nearly half of the global reinsurance market were reported to have divested some or all of their assets from coal, after Hannover Re joined Swiss Re, Munich Re, SCOR, Lloyd's, Generali and the Markel Corporation in announcing its decision to divest from the coal industry. Together, these companies are estimated to control 45% of global reinsurance premiums.[3]

The IPCC October 2018 report

Stakes raised for energy and power generation sector

The urgency of the transition to cleaner energy sources being sought by the divestment movement (and others) was given a significant impetus by the special report issued by the Intergovernmental Panel on Climate Change (IPCC) in October 2018 on "the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development and efforts to eradicate poverty".[4]

One of the reasons this report made headlines was that it lowered the previous consensus "manageable" warming level (up to 2°C above pre-industrial levels this century) to 1.5°C. Among an unprecedented range of industrial and individual behaviour changes that will be needed to limit global warming to this level, it states that all of the following must happen by 2050:

- Lower overall global energy usage, including through enhanced energy efficiency
- Renewables to supply 70–85% of electricity
- Increased participation of nuclear and fossil fuels with carbon dioxide capture and storage (CCS) capability
- The use of CCS to allow the gas industry's share of electricity generation to be limited to approximately 8% of all global electricity generated
- A steep reduction in the use of coal to close to 0% (0–2%) of all global electricity generated

"During the last few years the insurance industry, or at least parts of it, has gradually bought into the goals of the divestment movement. Although the divestment movement campaigns against coal, oil and gas projects, insurers to date have focused predominantly on one type of fossil fuel – coal."

[1] https://350.org/

[2] https://www.theguardian.com/environment/2018/jul/12/ireland-becomes-worlds-first-country-to-divest-from-fossil-fuels

[3] http://www.theactuary.com/news/2018/06/almost-half-the-global-reinsurance-market-divests-from-coal/

[4] http://www.ipcc.ch/report/sr15/

Can this be achieved?

- Whether this transition can proceed at the pace that the IPCC report authors consider necessary is, at best, uncertain. To take one aspect, the CCS industry has not developed as quickly as had been hoped. The Global CCS Institute reported in November 2017 (Global Status of CCS Report: 2017) that although there were "now 17 large-scale CCS facilities operating globally, with four more coming on stream in 2018", more than 2,000 CCS facilities will be needed by 2040 in order to meet the Paris climate target (which, as already noted, was to limit warming to 2°C rather than 1.5°C).[5]
- As for achieving "a steep reduction in the use of coal to close to 0%" by 2050, the indicators are not immediately encouraging. Since the turn of the century, the amount of coal-fired power capacity in the world has doubled to 2,000 gigawatts (GW), due principally to growth in China and India. Another 200GW is being built and 450GW is planned (as of mid-2018).[6]
- Coal still has a dominant position in the power sector, generating 40-41% of the world's electricity. Although 13 countries have pledged to phase out coal by 2030, another 13 are travelling in the opposite direction, planning to join the club of coal power producers.[7]

Some signs of change – but is it enough?

- However, there are a few encouraging signs. In the first half of 2018, the capacity of new coal plants entering operation was almost balanced by that of units being retired, and the global pipeline for proposed new coal capacity is quickly reducing.[8] According to the International Energy Agency, global coal investment has already peaked and is now in a "dramatic slowdown".[9]

[5] https://www.globalccsinstitute.com/news/institute-updates/paris-climate-change-targets-cannot-be-met-without-ccs-cop23
[6] https://www.carbonbrief.org/mapped-worlds-coal-power-plants
[7] https://www.carbonbrief.org/mapped-worlds-coal-power-plants
[8] https://www.carbonbrief.org/guest-post-peak-coal-is-getting-closer-latest-figures-show
[9] https://www.carbonbrief.org/seven-charts-show-why-the-iea-thinks-coal-investment-has-already-peaked

Climate aware underwriting

A potentially significant development which may help to accelerate the global "retreat from coal" has emerged from the insurance industry. Over the past 18 months or so a number of the insurance and reinsurance giants, as if anticipating the conclusions of the IPCC special report, have decided that divestment from coal does not go far enough, and announced restrictions in their underwriting policy towards companies operating in the coal sector.

Environmental altruism?

These insurers' stated motivation for the changes in their underwriting stances announced in 2017 and 2018 is to assist in the efforts to reduce CO_2 emissions in order to meet the Paris Agreement goal of restricting global warming to no more than 2°C above pre-industrial levels (this was the previously considered manageable increase, before the IPCC report lowered it to 1.5°C). Announcing the change in its position in a press release of November 2017, Zurich stated:

"Insurers can play a role in facilitating this generational transition towards cleaner energy by increasingly reflecting the climate-related risks inherent in thermal coal in their underwriting and investment policies".[10]

Enlightened self-interest?

While insurers' announcements on their fossil fuel positions have tended to be worded in altruistic language of this kind, they also are likely to have been motivated by self-interest.

In December 2016 ClimateWise, a global network of 29 insurance industry organisations convened by the University of Cambridge Institute for Sustainability Leadership, reported that the frequency of windstorms, floods, and weather-related catastrophes had increased six-fold since the 1950s.[11] Given the likely link between this trend and changes in the earth's climate, insurers that will be expected to pay claims arising from such events now have a clear incentive to try to mitigate the extent of climate change.

2017 – the first signs of a new climate-aware underwriting philosophy

By the end of 2017 three major European insurers – Zurich, AXA and SCOR – had made official announcements that they were curtailing the provision of insurance to entities that derived a significant part of their income from coal-fired power generation or coal mining:

- **Zurich** announced that it would no longer insure companies that derive more than 50% of their revenues from coal mining or coal-fired power generation; for companies deriving between 30% and 50% of their revenues from coal, Zurich said that it will undertake additional Environmental-Social-Governance ('ESG') due diligence.[12]
- **SCOR** said that it will not "issue insurance or facultative reinsurance that would specifically encourage new greenfield thermal coal mines or stand-alone lignite mines or plants."[13]
- **AXA** declared in December 2017 that it would stop insuring any new coal construction projects and would no longer provide property insurance to existing power plants and coal mines when presented as "coal only" risks, although some exemptions will still apply in countries where coal comprises the main baseload energy.[14]

[10] https://www.zurich.com/en/knowledge/articles/2017/11/insurers-can-facilitate-the-transition-to-a-low-carbon-future
[11] https://www.cisl.cam.ac.uk/business-action/sustainable-finance/climatewise/news/insurance-leaders-warn-protection-gap-due-to-impact-climate-risks
[12] https://www.zurich.com/en/knowledge/articles/2017/11/insurers-can-facilitate-the-transition-to-a-low-carbon-future
[13] https://www.scor.com/en/media/news-press-releases/scor-announces-further-environmental-sustainability-initiatives
[14] https://www.axa.com/en/newsroom/press-releases/axa-accelerates-its-commitment-to-fight-climate-change

2018 – the pace accelerates

Zurich, AXA and SCOR were joined in 2018 by other major European carriers:

- **Allianz** announced in May that it would no longer be providing Property or Casualty insurance to single coal-fired power plants or coal mines, whether operational or planned, and that "Allianz's stated goal is to completely phase out coal risks in the insurance business by 2040".[15]
- **Swiss Re** declared in July that it "will not provide re/insurance to businesses with more than 30% exposure to thermal coal across all lines of business", a policy which applies to "both existing and new thermal coal mines and power plants."[16]
- In August **Munich Re** reversed its previously neutral stance by announcing in the German newspaper Frankfurter Allgemeine Zeitung: "In the individual risk business, where we can see the risks exactly, we will in future in principle no longer insure new coal-fired power plants or mines in industrial countries."[17]
- In November, **AXA** announced that its recently-acquired XL division would adopt AXA's position on climate change and withdraw from insuring coal business.[18]
- And in the same month **Generali** became the latest European insurer to declare an underwriting position against coal, publishing what it termed a technical note in which it committed not to increase its "minimal" involvement in coal-related activities and "not to insure any new coal-related customer and any new coal construction project (mines and plants) with immediate effect".[19] (Cynics might note that this announcement came shortly after Generali, together with Vienna Insurance Group, had agreed to insure the new 660MW Ledvice coal plant in the Czech Republic.)[20]

Underwriters marching in lockstep?

Differing criteria allow some coverage

Despite these developments, the criteria for what these major carriers will or will not insure not only differ from each other, but also allow for the continued underwriting of certain coal risks. Although they will not insure single coal-fired power plants, most insurers will continue to insure companies that generate electricity from multiple sources, including coal, provided that the contribution from coal is less than approximately 30% (or similar ceiling). This creates the anomalous situation where the insurability of a coal plant could be determined not on its own qualities or environmental impact, but by whether or not it is part of a mixed portfolio with other types of fossil fuel or renewable energy plants.

Other European insurer reluctance

Meanwhile not all of the major European carriers have bitten the underwriting bullet. For example, when Hannover Re announced its coal divestment decision it said that it will continue to reinsure coal plants and other "fossil energy resources", and would not "act contrary to the decisions of sovereign nations" that wish to continue with such projects[21]. And despite the Lloyd's Corporation implementing a "coal exclusion policy" with effect from 1 April 2018, it has been reported that this leaves individual Lloyd's syndicates free to continue to both invest in and insure coal projects.[22]

"Meanwhile not all of the major European carriers have bitten the underwriting bullet."

[15] https://www.allianz.com/en/press/news/business/insurance/180504_allianz-announces-climate-protection-package/

[16] https://www.finanznachrichten.de/nachrichten-2018-07/44184219-swiss-re-ag-swiss-re-establishes-thermal-coal-policy-to-support-transition-to-a-low-carbon-economy-353.htm

[17] https://www.reuters.com/article/us-munich-re-group-coal/munich-re-to-back-away-from-coal-related-business-ceo-idUSKBN1KQ0NE

[18] https://www.insurancebusinessmag.com/uk/news/environmental/axa-makes-xl-ditch-coal-accepts-100-million-losses-117107.aspx

[19] https://www.generali.com/our-responsibilities/our-commitment-to-the-environment-and-climate

[20] https://www.insurancebusinessmag.com/uk/news/environmental/campaign-group-slams-insurers-of-new-coal-power-plant-115443.aspx

[21] https://www.insurancebusinessmag.com/uk/news/environmental/coal-update-hannover-re-adopts-exclusion-policy-103791.aspx

[22] http://www.theactuary.com/news/2017/04/lloyds-accused-of-putting-profits-ahead-of-people-by-continuing-to-insure-coal/

European case study: Poland

Diversification – but inconsistencies remain

Heavily dependent on black coal and lignite, the Polish government has announced that, as part of the country's energy strategy, by 2030 the coal's share of the country's power generation mix will decrease from 80% to 60%.[23]

The country intends to develop non–coal generation facilities such as gas, onshore wind farms, biomass and photovoltaic.

There are plans to diversify gas supplies by:

- The construction of a gas pipeline from Norway to Poland
- The development of an LNG terminal in Swinoujście
- The possible construction of a floating terminal in the Gdańsk Bay area

Meanwhile, Onshore Wind Farms projects on the Baltic Sea await parliamentary legislation. It is expected that by 2030 onshore wind farms will account for over 8GW of power generation.[24]

However, certain decisions are inconsistent - for example, the ministry of energy recently confirmed their plan to build a new 1.000 MW coal-fired installation in Ostrołęka[25]. Indeed, the chances of the renewable energy industry supplying 70%-85% of electricity in Poland by 2050 as currently envisaged are, in reality, very small.

Polish insurance market will still offer cover

In Poland, most of mines and power generation plants are still controlled by the state – as are the largest insurers, such as PZU S.A. and PZU Mutual. It is therefore difficult to imagine a situation whereby these insurers will want to withdraw or restrict writing coal based power business in Poland. Furthermore, these insurers will seek reinsurance protection from outside Europe as well.

Moreover, certain large insurance companies from outside Europe, such as the People's Insurance Company of China, have already expressed their interest to write coal fired plants in Poland.

Across the pond –the view from the US

Less activity - but some signs of movement

It is noticeable that all of the insurers who have announced a curtailment of underwriting coal risks are European. To date, there has been little sign of the major US insurers following suit. However, it would be wrong to assume that there is complete inactivity in the US on this issue; in July 2018 the San Francisco Board of Supervisors became the first municipal body in the US to pass a resolution urging insurance companies to stop insuring and investing in fossil fuels, citing climate change and the impact of pollution on public health and the economy.[26]

And in September 2018, a new coalition of public interest groups called Insure Our Future was launched, calling on the US insurance industry to "follow their European cousins and divest from coal and tar sands companies, and to make plans to stop underwriting extreme fossil fuel projects".[27]

Insure Our Future is part of the global Unfriend Coal campaign, which promotes a rapid shift of the insurance industry from fossil fuels to clean energy. Its rationale for targeting the insurance sector is the premise that coal plants cannot be built or operate if they do not have insurance. "Insurance companies are uniquely placed to drive the transition from coal to clean energy by ceasing to underwrite and invest in coal projects".[28]

"Insure Our Future is part of the global Unfriend Coal campaign, which promotes a rapid shift of the insurance industry from fossil fuels to clean energy."

[23] https://www.gov.pl/web/energia/polityka-energetyczna-polski-do-2040-r-zapraszamy-do-konsultacji
[24] http://globenergia.pl/8-gw-z-morskich-farm-wiatrowych-oto-nowy-cel-energetyczny-w-polsce/
[25] http://globenergia.pl/8-gw-z-morskich-farm-wiatrowych-oto-nowy-cel-energetyczny-w-polsce/
[26] https://www.insurancebusinessmag.com/us/news/breaking-news/san-francisco-urges-insurers-to-ditch-fossil-fuel-investments-107028.aspx
[27] https://www.sfchronicle.com/opinion/openforum/article/Insurance-for-fossil-fuel-projects-but-not-13282801.php
[28] https://unfriendcoal.com/

Coal's share of US power generation declining...

Coal's share of US generation is aging and shrinking. The current US president continues his advocacy for coal, but this has been trumped (so to speak) by economics, as coal-fired generation is not competitive compared to cleaner technologies; consequently, no new coal projects are in the works and new power projects are dominated by renewables and natural gas. Other factors working against coal include:

- Many states continue to pursue established long-term renewable targets
- 2018 Congressional elections were favourable towards cleaner power, with Democrats taking control of the House
- Historically damaging wildfires on the West Coast have helped sway even many staunch conservatives into begrudgingly acknowledging man's impact on our climate

...but insurance still needed!

However, US coal generating facilities remain and need to be insured, especially against Property Damage. The exodus of many international insurers from the market for coal risks complicates securing Property coverage, particularly when insured individually rather than as part of a portfolio shared with non-coal assets. FM Global, AEGIS and American International Group (AIG) continue to insure these risks, though AIG is reducing its capacity for many business classes, not just coal generation. Munich Re continues to renew their existing clients' business, at least for now. Bucking the trend, other insurers (HDI, Liberty International, Aspen, and Berkshire Hathaway) offer modest capacity to complete programs, albeit often on their terms. Ultimately, while sufficient capacity remains to insure stand-alone coal clients, these clients have less leverage with the insurance marketplace, given the limited choices available.

Implications for coal power generating companies

Surplus capacity may mitigate effect

Whether the unavailability of certain carriers will make a material difference to the scope and/or cost of insurance for coal power generation companies in practice remains to be seen. Although there will be geographical differences and variances between different classes of insurance, it is well documented that the global insurance market in recent years has enjoyed record levels of capacity, as new capital has flowed into the market from investors seeking better returns than have been available from traditional interest-bearing investments. The position for buyers will also depend on how many other insurers join those who have already declared a restricted coal policy. The carrier announcements over the past 18 months have not yet precipitated a domino effect on the rest of the market, with insurers domiciled outside Europe yet to make any sort of move on the issue.

'Portfolio' generators will be least affected

As already noted, we think that most insurers with declared coal underwriting positions will continue to offer insurance to power producers who generate electricity from multiple sources, provided coal represents less than 30% of total activity. Therefore those power generation companies that operate diversified portfolios may find that they fall within the 'insurability' thresholds.

Danger for smaller operators

The generation companies more likely to be affected in the short-to-medium term are therefore the independent and smaller coal operators, with single-site exposures and/or without a diversified portfolio of other activities, especially if they operate in a competitive electricity market alongside a range of other types of generator. Even if they can find sufficient insurance capacity for their needs, the unavailability of most of the major European carriers is likely to mean that their insurance will cost more than it would otherwise have done – both because they might have to use insurers who would otherwise have been uncompetitive and because the reduced level of competition itself will affect the demand/supply price dynamic.

Additional insurance costs may well affect their competitive position, especially as insurance is usually one of a power company's highest costs. Having to factor this element into their bidding will put them at a commercial disadvantage when competing with lower-cost greener generators. One can therefore see that this could be the area in which insurers' coal underwriting policies will come closest to having their desired impact.

Coal-dependent countries

If, as Unfriend Coal maintains, power plants cannot operate without insurance, one would expect the new underwriting policies to be felt most in those parts of the world where the ultimate consequence of unavailability of insurance would be severe power shortages. In South Africa, for example, over 90% of electricity is generated from coal, higher than anywhere else in the world. In Poland, the figure is 83%. In China and India it's more than 70%, and more than 60% in Australia (Figures from 2017).[29]

China also happens to be the world's leading country in electricity production from renewable energy sources, with half of the world's new solar capacity[30], and Australia is reported to be on track for producing 50% of its electricity from renewable sources by 2025[31]. But for the lights to stay on, traffic lights, televisions and hospital equipment to keep working, and a host of other socially-desirable outcomes to continue, large parts of the world, in particular in the Asia Pacific region, will continue to rely extensively on coal-fired generation, at least in the medium term and probably for longer. Something will have to give.

Insurer flexibility?

It is our understanding that AXA's underwriting guidelines explicitly allow for exemptions to apply in countries where coal comprises the main baseload energy, and others may apply the same criterion when faced with this 'real world' conundrum. Together with the capacity of domestic insurers and those international insurers who have not declared a curtailed position on coal, so coal plants in these countries might still be able to find enough commercial insurance cover for their needs.

If not, it is in these places that Unfriend Coal's axiom that power plants cannot operate without insurance may start to feel the strain. Experience suggests that, in the absence of commercially available insurance, national governments are likely to step in as insurer of last resort. Examples of such action include the UK government's setting up of the Northern Ireland Compensation Scheme in 1972, or the US government's formation of the National Flood Insurance Program to enable plants to continue operating.

The example of India

Like China and Australia, India is on a path to reduce its dependence on coal-fired electricity generation and expand its renewable generation capability. Its National Electricity Plan 2018[32] includes a core target of 275 GW of renewable energy by 2027, with the closure of 48.3 GW of end-of-life coal plants. However, the plan still envisages that India will have coal power capacity of 238 GW in 2027, including 94.3 GW of new construction.

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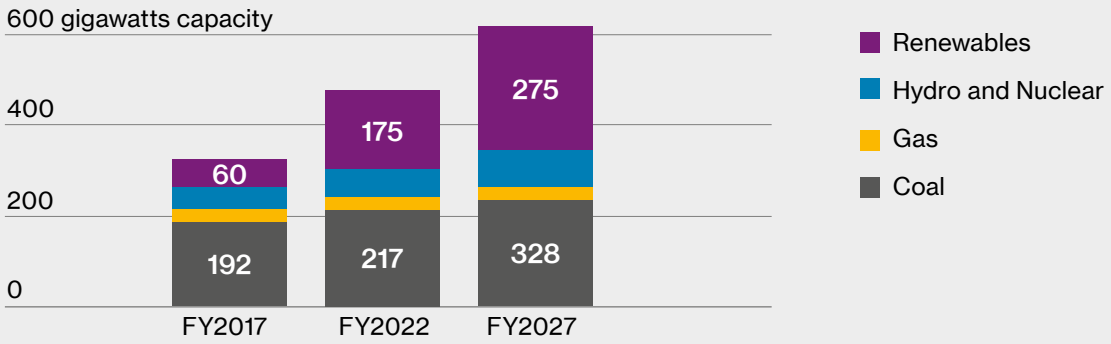
[29] https://www.worldatlas.com/articles/15-countries-most-dependent-on-coal-for-energy.html

[30] https://www.dw.com/en/china-leads-in-global-shift-to-renewable-energy/a-43266203

[31] http://theconversation.com/at-its-current-rate-australia-is-on-track-for-50-renewable-electricity-in-2025-102903

[32] http://ieefa.org/ieefa-india-new-national-electricity-plan-reinforces-intent-toward-275-gigawatts-of-renewables-generated-electricity-by-2027/

Fig 1 – India's National Electricity Plan, 2018



Renewables grow rapidly under India's new electricity mix – but coal's actual capacity figure still increases

Source: Institute for Energy Economics and Financial Analysis

India's economy is forecast to grow significantly, with GDP rising 7-8%[33] annually over the coming decade. It is surely stretching credibility to suppose that the unavailability of insurance would be enough by itself to persuade the Indian government to scrap its strategy for securing the electricity capacity required to fuel this growth.

Unintended consequences...

One of the benefits of commercial insurance is that it brings with it the discipline of external risk engineering, with insurers and/or brokers sending specialist engineers to survey industrial facilities and recommend, and sometimes mandate, measures to protect and improve the risk.

If power plants in certain territories are allowed to operate without commercial insurance, this external discipline is likely to be lost. Over time, this could bring about a fall in the risk quality of some of these plants, increasing both the risk of losses occurring and their potential severity. This in turn could lead to less efficient and more polluting plants being utilized to replace the lost generation capacity – the exact opposite of what insurers are trying to achieve.

..and will they stick to their knitting?

If insurers start to see that withholding their capacity is not having the desired effect on the amount of coal generation capacity being built and operated around the world, or if they see their "less enlightened" competitors increasing their market share of the power generation sector at their expense, will they be forced to conclude that trying to maintain a socially responsible underwriting position in these circumstances might not be worth the candle?

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Additional material by Michael Perron and Wojciech Woznica

"Experience suggests that, in the absence of commercially available insurance, national governments are likely to step in as insurer of last resort."

[33] http://ieefa.org/ieefa-india-new-national-electricity-plan-reinforces-intent-toward-275-gigawatts-of-renewables-generated-electricity-by-2027/

Geopolitical risk: why it matters to power companies

Introduction – geopolitics high on the C-suite agenda

The world is an increasingly complicated and complex place, with multiple factors driving risks globally. A survey of 350 executives in the natural resources industry conducted by Willis Towers Watson revealed that geopolitical instability and regulatory change ranked as the top concern among CEOs, CFOs, and CROs[1]. The latest research from the Cambridge Centre for Risk Studies indicates that the risk to cities' GDP from geopolitics and security has risen by some 40% in the past 4 years to almost $140bn, the biggest increase out of any risk factor.[2]

Four global issues driving geopolitical risk

Geopolitical drivers of risk are varied and interrelated, but four stand out as the most impactful:

1. **Geopolitical instability – powers in flux.** The risks of interstate and intrastate conflict remain high. There are multiple tension points around the globe, such as the South China Sea, which, were they to manifest in dispute or war, would have effects beyond their immediate geographic locale.
2. **Climate change – a world of (dis)agreements.** The physical risks associated with climate change are well-documented (rising sea levels, increased storm severity) yet the geopolitical processes which underpin these risks are less understood. International emissions agreements, such as COP 21 and COP 24, are not purely based on science, but on political and economic imperatives.
3. **Cyber – more devices, more regulation.** An exponential growth in connected devices, especially in industrial settings, has led to greater efficiency, but also introduced new attack vectors on a larger attack surface. Industry's inability to control these has generated impetus for governments to introduce regulations and legislation, such as NISD, with stiff penalties for infringements.
4. **Trade – uncertainties and shifts.** With globalisation seemingly losing momentum, giving way to conservative trade relationships and protectionism, the trade policies of some of the world's biggest economies come under closer scrutiny. This results in shifting business opportunities as some markets become more restrictive while others open up for participation.

[1] The View from the Boardroom: Willis Towers Watson Natural Resources Risk Index, April 2016

[2] https://www.jbs.cam.ac.uk/fileadmin/user_upload/research/centres/risk/downloads/crs-global-risk-index-exec-summary-2019.pdf

So what? Three potential effects on power industry assets and people

In an increasingly connected world, geopolitical drivers of risk are interrelated and effects often cascade beyond local geographies or individual industry sectors. For the power market in particular, there are effects of critical importance stemming from key geopolitical drivers.

1. **The regulatory landscape.** Driven partly by climate change imperatives, the regulatory landscape for the power industry is likely to shift. In some countries, increased power consumption will be tempered by public demand for assurances about the sustainability of power generation, and regulation severely restricting non-renewables will follow. In other respects, as the international geopolitical balance shifts from West to East and North to South, the countries who assume global leadership may have fewer environmental regulations, enabling investment in traditional power sources.
2. **Supply chain risk.** A diversified international supply chain presents significant, often unmanaged, risk. For the power industry, an expansion of internet-enabled devices – the "Industrial Internet of Things" – introduces cyber security problems and exposes companies to supply chain risks. In the past six months we have seen countries restrict imports of devices or components from other countries on grounds of national security, which creates supply constraints and drives up prices.
3. **Workforce availability.** Access to a highly skilled workforce is critical to the power industry. When the world's geography feels the impact of climate change, security turmoil creates unsafe areas, and the political will to embrace migration decreases. Large population movements will occur, potentially altering the availability of suitable workers. Anticipating, rather than reacting, to such shifts will be key to human resources business resilience.

"In an increasingly connected world, geopolitical drivers of risk are interrelated and effects often cascade beyond local geographies or individual industry sectors."

Four ways to manage geopolitical drivers of risk and their impact

So what can power companies do to mitigate these geopolitical risks? Research conducted by Willis Towers Watson in 2018, integrating expertise from business, government and academia, has revealed four themes crucial to managing risks associated with geopolitical drivers:

1. **Interrelated risks require an integrated response.** Geopolitical risks are complex, fluid and, above all, interrelated. Each component risk needs to be considered holistically in the context of other risks and the wider political landscape. Only by considering risks together is it possible to unpick the best ways to manage and mitigate.
2. **Credible information from trusted partners is key.** Credible and accessible risk information is essential in getting the buy-in needed for an effective risk management strategy. Generalisations won't achieve this; together, those of us concerned with risk will succeed when we help senior decision makers understand the impact that political, ideologically driven events can have on the strategy and effective operation of their business.
3. **Answer the question: 'should we do the deal"?** Decision makers are often surrounded with data that tells them if they can do the deal – for example, information from credit agencies. But it's much tougher to answer the question: should we do the deal? Effective geopolitical risk management must help businesses to "move beyond strategy to direction".
4. **Geopolitical risk management requires innovation.** As the geopolitical landscape changes, so must the way in which we respond. Innovation is critical to help prevent and protect against business risk events. Innovation has to go beyond enhancements to traditional insurance coverage. That means new ways of working, financing, protecting and responding.

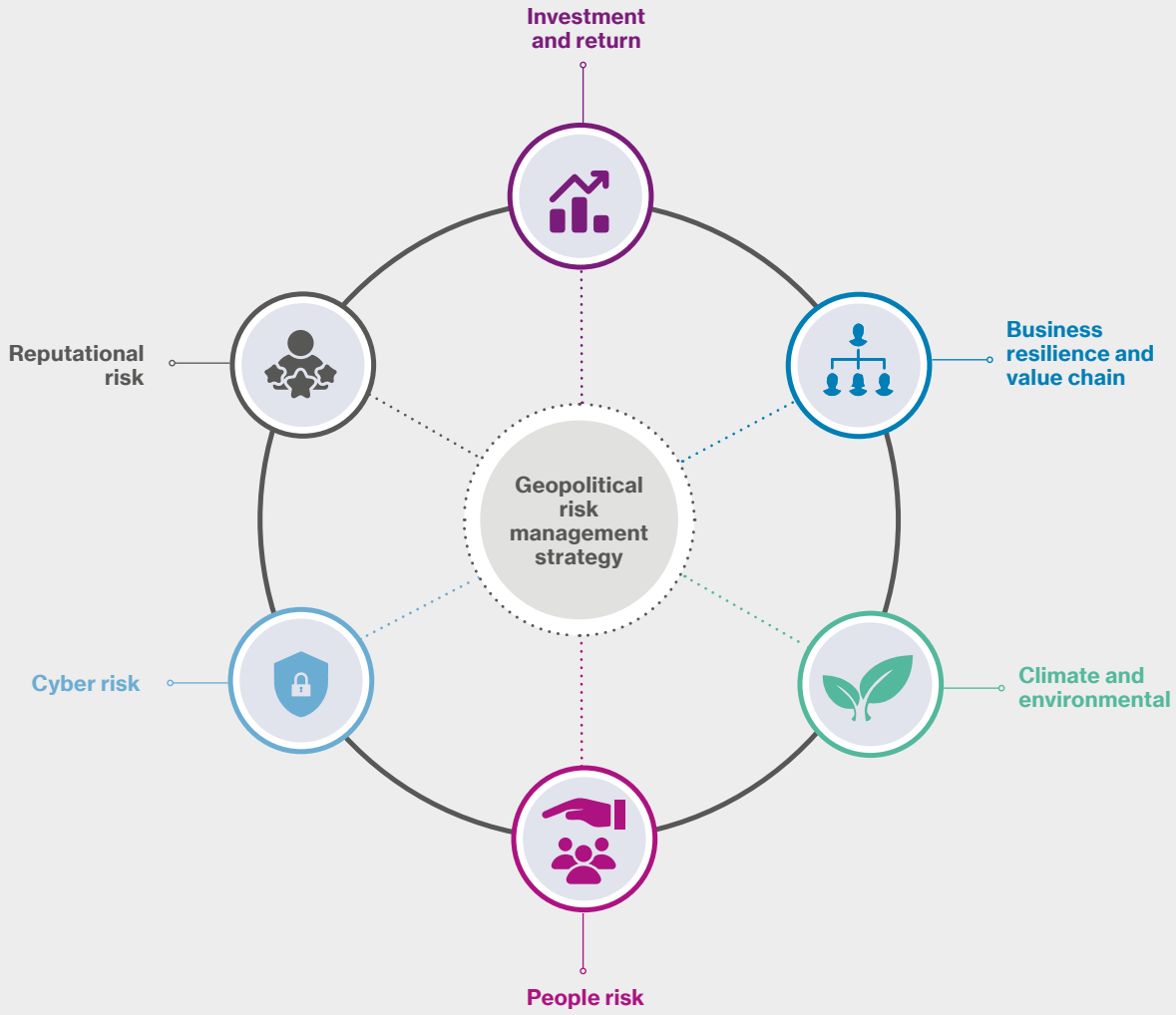
Six pillars – an integrated approach to geopolitical drivers of risk

The most sophisticated power companies are now considering integrating their geopolitical risk management strategy along six pillars, helping people understand, protect, prevent, and respond to risks:

1. **People risk.** Safety and security issues can pose clear risks to employees. However, there are also risks associated with workforce management, including recruitment and retention, which must be understood and managed.
2. **Investment and return.** Exposure across multiple geographic locales means geopolitical drivers of risk can be diverse. In order to protect assets and investments this diversity of risk must be critically considered and appropriate risk management tools deployed.
3. **Business resilience and value chain.** When risks materialise as incidents and events it is crucial to have effective business continuity practices implemented. Response and recovery plans, which have been properly tested and exercised, can limit the impact of incidents and help companies quickly resume business operations.
4. **Climate and environmental.** The risks presented by climate and environmental factors, including storms and earthquakes, can be better understood with advanced analytics. By modelling environmental events and physical assets, risks to property and people can be quantified and managed.
5. **Cyber risk.** Digital ecosystems and connected devices fundamentally underpin the modern power sector. Having a comprehensive understanding of a company's cyber footprint is critical to managing this source of risk, including network outages and regulatory impositions.
6. **Reputational risk.** Impacts on brand and reputation can affect the ability of a company to attract customers, recruit talent, or even gain operating license in a country. Being attuned to the relationships between geopolitical drivers and reputation helps anticipate and mitigate these risks.

"The most sophisticated power companies are now considering integrating their geopolitical risk management strategy along six pillars, helping people understand, protect, prevent, and respond to risks."

Fig 1 – The six pillars of geopolitical risk



Source: Willis Towers Watson

Conclusion – need for a holistic approach

Geopolitical drivers of risk are recognised as a priority risk area because they have potentially wide ramifications for assets and people. By understanding these risks holistically and approaching them with an integrated toolkit, appropriate measures to manage the risks can be implemented.

Andreas Haggman is an emerging risk analyst heading up our newly-established Emerging Risks research hub at the Willis Research Network.

Contract certainty: risk implications of carelessly worded power contracts

Introduction – the handshake seals the contract, from the contract there's no turning back...

It's a safe bet that when negotiating financing agreements, Operational & Maintenance (O&M) contracts, long term service agreements or any of the other contracts that are among the necessary evils for the power generation business in the 21st century, insurance is not one of the first areas to which the contracting parties turn their attention.

Yet most of these contracts will contain insurance or related provisions, for example:

- requirements on the contracting parties to effect specified types of insurance to prescribed levels
- liability and indemnification clauses which can have a material impact on the circumstances in which these insurance policies can be triggered, and insurers' rights under them
- the steps which an Insured would be wise to take to minimise the risk that insurers might be able to deny coverage in the event of a claim

Sometimes lack of care or precision, or the absence of input from an insurance specialist at the drafting stage, can create:

- unnecessary cost or other burden for the Insured
- contractual obligations that are impossible to comply with or may not have the effect that is intended
- the need for specific disclosure to underwriters in order to protect the Insured's position under the insurance contract

This article examines some of the commonly seen areas where better contract drafting would benefit all parties.

Absolute obligations which are dependent on the acquiescence of third parties

Contracts may place an absolute obligation to do something which is beyond a party's ultimate ability to deliver. An example is the common requirement of lenders for the borrower to procure that its insurance broker signs a broker's letter of undertaking ('BLU') in the form set out in the finance agreement.

Brokers will usually do their best to help their client comply with this obligation, but ultimately they are not a party to the contract and have their own interests to consider. Signing a BLU will usually expose a broker to potential liabilities that would not otherwise exist, and there might be sound business, regulatory or compliance reasons why they cannot sign the BLU in the form presented – which would put their client in breach of an absolute contractual obligation to procure that they do. While reasonable variances in the presented BLU can usually be agreed with the lenders, the possibility of the borrower being in breach can be mitigated if the obligation to procure the BLU is expressed in 'reasonable endeavours' (or similar) language.

Impossible obligations

Some contracts require the lenders or other contractual party to be given a prescribed period of notice (usually between 30 and 60 days) if an insurer intends to cancel. While it is usually possible to obtain insurers' agreement to give this notice, they will usually not agree to a period of this length in the event of non-payment of premium. Non-

payment should therefore be stated as an exception from the general 30/60 day notice period in the contract.

Contracts often also contain provisions relating to non-renewal, for example:

"Failure to renew all policies at least 30 calendar days prior to their respective renewal dates shall constitute an Event of Default."

Experience suggests that this type of provision is one of those that are more honoured in the breach than the observance. It is rare for renewals, especially for the more complex and challenging types of insurance, to be concluded this far in advance – the Insured would be giving up some of his negotiating leverage with insurers by doing so, while for their part insurers may be reluctant to bind this far ahead of renewal date.

Waivers of subrogation

Requirements under contracts for subrogation waivers to be included under insurance policies are ubiquitous, but are often superfluous. When insurers seek to subrogate against a third party they do so in the name of the Insured, and 'step into the shoes' of the Insured, acquiring the same rights of recovery as the Insured. So if rights of recovery have already been ceded under contract between the Insured and the culpable party, the insurer has no right of subrogation against that party to waive.

If rights of recovery have not already been waived under contract, an insurer could reasonably ask why the insurance policy, rather than the liability clause in the contract, is being used to effectively determine the parties' liabilities. Having a properly worded liability clause in the contract removes the need for awkward discussions with underwriters about waiving rights that they might be expecting to retain.

Subrogation waivers and limitations of liability should also be treated with care in a couple of other aspects:

- Under Long Term Service Agreements and similar contracts, the LTSA contractor is often a subsidiary or associated company of the original equipment manufacturer ('OEM'). The wording of the kind of subrogation waiver that is usually required under an LTSA should be clear that subrogation is waived only in respect of the LTSA entity and its activities under the LTSA, not the wider company – otherwise the waiver could inadvertently prevent insurers from subrogating for losses that are covered under the OEM's warranty.
- Insureds should consider whether any contractual waivers of rights go beyond what would normally be expected in contracts of a similar nature, and/or would be considered material by a prudent underwriter. If so, they should be disclosed to insurers when negotiating the terms of the insurance. This illustrates the fact that it is not just the contractual insurance clauses that need to be reviewed when taking out insurance – the liability clauses can be just as relevant.

Linking liability with insurance provisions

A contract may attempt to link the extent of a party's liability to the provisions of the other party's insurance contract. One example is where a contractor accepts liability under an LTSA or other contract for damage that he may cause to the owner's property, up to a limit that is intended to reflect the deductible in the owner's Property insurance. The idea is that the owner will be indemnified for the bulk of his loss by his insurers, and the contractor will pay him the amount that the insurers dock from the claim as the deductible, thereby making the owner 'whole'.

In practice, this may not work in the way that the contractual parties intend. The owner's policy may exclude losses to the extent that the Insured has collected, or is entitled to collect, from others. Consequently, insurers may consider that the amount for which the contractor is liable is excluded from the claim; they will therefore reduce the claim by the amount payable by the contractor, and then apply the deductible, ensuring that they, and not the owner, get the benefit of the contractual liability provision. The owner should therefore make sure that the wording of his policy is consistent with the intention of the contract, or seek to include a specific provision to this effect in the policy.

Contradictory obligations

As noted at the start of this article, many types of contract contain insurance requirements. What happens when the requirements of one contract are not consistent with the requirements of another? If the lenders' Facility Agreement requires a minimum insurer rating of A- but the O&M Agreement stipulates a minimum rating of A, the lowest (or in this case highest) common denominator might have to apply (unless a dispensation is obtained under the O&M Agreement), limiting the Insured's options and probably adding to the insurance costs – even though the Facility Agreement might be considered the more important and authoritative contract.

Other contractual issues

Other examples of carelessly worded contractual conditions include:

- The absence of a 'Market Availability' clause from lenders' and other contracts that stipulate minimum insurance levels, which would mean that a party would not be in breach if the mandated insurance obligations are not achievable in the commercial insurance market, at least at commercially reasonable term – given that there are likely to be significant fluctuations in insurance market conditions over the term of a multi-year contract, such a provision is essential.
- Obligations to buy insurance for non-existent or negligible exposures, such as professional indemnity insurance for an independent power producer, which provide no benefit to anyone except the insurer who receives a premium to cover a risk from which the chance of a claim arising is close to zero.
- Clauses stipulating minimum levels of insurer or reinsurer security which only reference one rating agency; for example, a requirement to utilise carriers rated no lower than A- by S&P means that any that do not have an S&P rating would not meet this criterion, even if they carry a perfectly respectable rating from AM Best or another reputable agency, and so could not be used without obtaining specific dispensation from the lenders or other counterparty.
- Circular provisions, for example liability clauses which make one party liable to indemnify the other for third party claims to the extent that he obtains indemnity under his liability policy; a liability policy generally responds insofar as the Insured is legally liable, but here his liability is to be determined by the policy, a kind of Catch-22.

Conclusion – early engagement of insurance specialists essential

The involvement of the Insured's risk manager and/or their insurance broker at the time these contracts are being negotiated will allow for a coordinated approach and minimises the risk of agreements being signed which contain impossible, contradictory, unnecessary or other disadvantageous insurance-related clauses with which the Insured will then be contractually obliged to comply, or for which time and effort will be needed to be spent agreeing waivers. Although many of the issues discussed arise during the operation of a power plant or other facility, many of the contracts themselves are signed before the project has even commenced construction. Early engagement from both construction and operational perspectives is therefore essential.

As a general rule of thumb, the looser and less specific the contractual insurance requirements, the better it will usually be for the Insured – they will have greater flexibility over securing the best value for money coverage, and the risk of a clash between specific contract conditions will be reduced.

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Engineering: profitability through Risk Based Inspection (RBI)

Introduction – why RBI?

The deregulation of the power industry over the past few decades has created a competitive environment where there is a continual drive to increase profitability by reducing operating costs. This is not a new challenge, yet plant managers have to achieve this with limited resources, ageing plant and demanding operating regimes, whilst also trying to meet ever more stringent environmental and safety standards.

Whilst traditional maintenance strategies have, on the whole, provided adequate safety, reliability and availability, there is an increasing interest and trend towards Risk Based Inspection (RBI). It's been around for many decades, but it is only in recent years that operators of traditional thermal power plants have been looking at RBI as a way of optimising their maintenance strategy, to lower operating costs and increase plant performance and profitability.

By using RBI to augment maintenance and inspections plans, focusing finite resources on operational elements that could result in the most significant facility loss events, plant managers can ensure that their assets will have more availability, leading to greater opportunities to generate revenue. Furthermore, implementation of RBI generates a greater understanding of operating equipment' strengths and weaknesses, thus avoiding many previously unforeseen and usually costly plant shutdowns from occurring.

Traditional maintenance strategies

Traditional maintenance strategies are a combination of statutory, preventative and predictive maintenance practices that are used in an overall programme to maintain performance and avoid costly reactive maintenance and unsafe operating conditions. Traditional maintenance techniques can be summarised as:

- **Statutory Maintenance -** fixed inspection frequencies based on regulatory legislation
- **Preventive Maintenance -** a systematic time-based maintenance programme
- **Predictive Maintenance -** a condition based maintenance programme using condition monitoring data to determine the health of equipment
- **Reactive Maintenance** - a run-to-failure, breakdown or corrective maintenance approach

This combined maintenance strategy is commonplace and provides adequate levels of equipment reliability and safety. However, it doesn't always target resources at the most critical high risk plant equipment and can be wasteful when targeted at lower risk plant equipment.

RBI Overview

As is common in an operating plant, a relatively large percentage of reliability issues are often associated with a small percentage of plant equipment. The aim of RBI is to evaluate the level of risk and optimise maintenance resources in order to provide the appropriate level of treatment for high risk and low risk plant equipment.

Although beyond the scope of this article, an RBI project has the following main steps:

- preliminary analysis
- failure probability assessment
- consequence evaluation
- risk ranking
- maintenance programme optimisation

In general, the level of risk is calculated in terms of the likelihood of an undetected failure occurring and the consequence of such a failure.

To evaluate and prioritise plant equipment according to the level of risk, an understanding of the criticality, design life, condition, operating life, ageing mechanisms, modifications and current inspection and maintenance programme results is required. This should be set against the estimated loss value which takes into account the asset value, loss of production and reactive maintenance costs.

Having prioritised the plant equipment according to level of risk, the maintenance programme can be optimised in terms of inspection interval, duration, scope and resource allocation. The objective is not necessarily to reduce maintenance costs (although this can be achieved) but to refocus efforts to improve plant performance and profitability.

Therefore when implementing an RBI programme, the following points should be observed:

- RBI should be implemented based on a detailed knowledge of existing plant conditions.
- RBI is not a tool to reduce maintenance activities; instead it should be used to identify high risk plant equipment and to put an appropriate inspection programme in place.
- RBI should be used to identify the required work scope, but should not be used to fit the critical inspection activities into a predetermined outage window.
- A periodic re-evaluation of low risk plant equipment should be undertaken to ensure the original RBI assumptions remain valid.
- The RBI methodology should have a feedback loop so that inspection and maintenance activities can be revised when found ineffective, or when new best practice or plant experience is available.
- The RBI methodology, decision making and outcomes should be auditable.

An insurer's view of RBI

The RBI methodology was first developed in the petroleum and petrochemical industry in the early 1990s, with the nuclear power industry also being an early adopter. After decades of implementation in these industries, insurance risk engineers and underwriters are familiar with the RBI methodology, and when implemented effectively it is seen as a positive risk feature.

Insurers are concerned with the reasons for and results of implementing an RBI programme. The most common concern is a plant owner implementing RBI as a way to reduce maintenance activities to save money. Whilst this can be achieved over a period of time, the implementation and initial transition to an RBI programme can result in increased inspection work and resource requirements.

So no matter what combination of maintenance practices are adopted, the prudent risk engineer and underwriter will place the quality of the maintenance strategy at the top of their list of priorities. The key driver is not the combination of maintenance practices adopted, but how effective the strategy is in preventing losses - particularly large losses - that could significantly impact plant owners and insurers.

The final point which is frequently cited from Health & Safety Executive (HSE) literature is that in any implementation of RBI, "the safety concerns need to take precedence over other influences such as business interruption and loss of earnings".

What next? Three key steps to effective RBI deployment

As a risk manager or a senior facility manager, it makes good business practice to implement RBI. In order to develop or evaluate an existing programme there are three key initial steps that are recommended:

1. **Evaluation criteria -** It is important that the benefits of implementing the RBI programmes are structured to recognise the value of longer operational availability and resilience (i.e. reduced number of shutdowns) and to balance this against potential short-term operational budget savings.
2. **RBI competence and resources -** RBI programme development is a complex and man-power intensive process. Therefore, ensure that your organisation has a good level of skills and knowledge in the subject - this is not as simple as it may sound. Furthermore,

ensure that you have sufficient personnel to undertake programme development and implementation, plus the capacity to continue with existing maintenance and inspection activities until you are ready to embrace RBI completely. In some instances, it may be necessary to consider a team of contract specialists to support full-time personnel for a short period to effectively manage workloads.

3. **Governance structure -** it is important that personnel charged with developing and implementing RBI have a direct reporting line to senior facility management; it also needs to have its own operating budget. These two elements ensure that RBI programmes can be properly implemented and have the same level of "air-time" with senior management as Operations and Maintenance. It avoids RBI programmes being undermined by funding issues such as lack of scaffolding to access specific elements of the plant, or being over-ruled by Operations/ Maintenance managers who may place more emphasis on short-term results against longer term availability.

Addressing these three points will create a platform for success and set your organisation in strong shape to realise the full benefits of RBI.

Paul Watson is a Risk Control Engineer at Willis Towers Watson Natural Resources in London.

"So no matter what combination of maintenance practices are adopted, the prudent risk engineer and underwriter will place the quality of the maintenance strategy at the top of their list of priorities."

Part two - renewable energy industry issues

Australia: why it's such a hot market

Introduction – will Australia go "pure green"?

The current level of investment in Australian renewable energy - nearly AU$ 12.5billion and in excess of 1GW of new utility scale power projects coming on line since 2017[1] - is unprecedented and has made the sector one of the most sought after investment territories for the green dollar. It appears that a combination of factors, including:

- high irradiance
- consistent wind resources
- an abundance of greenfield development locations
- good grid connections
- supportive governmental policies
- high demand

has created ideal conditions for investment.

Although there is some uncertainty around continuing strength of political support – given the country's historically heavy dependence on coal - it's now become a real possibility that renewable energy could replace many coal fired power stations as they reach the end of their natural operational life over the next decades and further frustrate investment in new carbon infrastructure.

Indeed, an analysis by the Australian National University Australia indicates that if this trend continues for the next 5-10 years, Australia could become a pure green economy with 100% reliance on Renewable Energy[2].

Australia embraces BESS

In addition to the large swathes of open land and considerable levels of irradiance associated with Australia, in 2017 in excess of 1 gigawatt of roof mounted solar photovoltaic was added to the grid - in addition to more than 700MW of renewable energy projects being completed and successfully commissioned, with a further 2.5 GW under construction[3]. Australia has also fully embraced large scale Battery Energy Storage Systems (BESS), becoming a global leader in this previously nascent technology with the successful commissioning of the 100MW Hornsdale Power Reserve that was famously delivered by Tesla to owner Neoen.

Positive government approaches

The positive domestic approach of by individual state governments introducing various initiatives with targets has played an important role in the strength and speed of deployment of renewable energy in Australia:

- The Australian Capital Territory government legislated a target to achieve 100% of its energy from renewable energy sources by 2020[4]
- Similarly, Tasmania's Government States has set goals to achieve 100% of its power from only renewable energy sources by 2022[5]
- South Australia has certainly led the charge, and is now one of the leading States with nearly 45% of all electricity being produced from renewable energy sources towards the end of 2017[6] - however with a change in government, many investors are keenly waiting to see what impacts may be felt to the current trajectory being followed
- The recent approval of the 800MW Clarkes onshore windfarm in late 2018[7] demonstrates how the market and infrastructure remains supportive of ever larger utility scale systems

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1 https://assets.cleanenergycouncil.org.au/documents/resources/reports/clean-energy-australia/clean-energy-australia-report-2018.pdf

2 https://www.researchgate.net/publication/315745952_Burden_of_proof_A_comprehensive_review_of_the_feasibility_of_100_renewable-electricity_systems

3 Source: Clean Energy Australia report 2018

4 https://www.environment.act.gov.au/energy/cleaner-energy/renewable-energy-target-legislation-reporting

5 https://www.climatecouncil.org.au/uploads/9a3734e82574546679510bdc99d57847.pdf

6 http://arena.gov.au/blog/booming-renewables-breaking-records/?utm_medium=email&utm_campaign=ARENA%20WIRE%20210618&utm_content=ARENA%20WIRE%20210618+CID_2c905b9d042d25823fc3c810793d6588&utm_source=enews&utm_term=Read%20more and https://www.abc.net.au/news/2017-02-13/sa-liberals-pledge-to-scrap-renewable-target/8264704

7 http://www.goldwindaustralia.com/national-environmental-approval-secured-billion-dollar-800-mw-clarke-creek-wind-farm-central-queensland/

OEM interest – but domestic insurance market faces capital challenges

The new unbridled market opportunities are attracting keen investment from the Original Equipment Manufacturers who are keen to deploy their latest operating platforms, especially where new design efficiencies are anticipated or streamlined supply chains are established from Asia. However, this has coincided with a broad hardening (due to restrictions capital supply) within the Australian insurance markets which, together with a limited experience of underwriting renewable energy on profitable terms and conditions supported by deep engineering data, has created an opportunity for the more developed European insurance markets to seek out projects offering preferential terms.

Conclusion – leading by example

Moving into 2019, the success and optimism of 2018 is being carried through with developers, investors and the government remaining confident that the current investment trend will continue at the current pace. As the effects of climate changes becomes even more apparent, despite some challenges Australia is leading by example, embracing the principles of COP 21 and has rapidly embarked on a new journey plotting its course away from historical reliance on fossil fuels to a cleaner future.

John Abraham is an Account Executive in the Renewable Energy division at Willis Towers Watson in London.

"The positive domestic approach of by individual state governments introducing various initiatives with targets has played an important role in the strength and speed of deployment of renewable energy in Australia"

The “Rise of the Titans”: the growth in the size of wind turbines

Introduction – bigger is better!

When it comes to wind turbines, there is little debate in regard to size: bigger is most certainly better. The reason behind this is two-fold:

- Firstly, larger rotors and blades range across a much wider swept area which enhances the capacity of the turbine and consequently its total production.
- Additionally, the wind blows more consistently the higher one goes. Therefore ensuring that wind turbine blades are positioned as high as possible boosts the ultimate power ratio which can be extracted from the equipment relative to its potential.

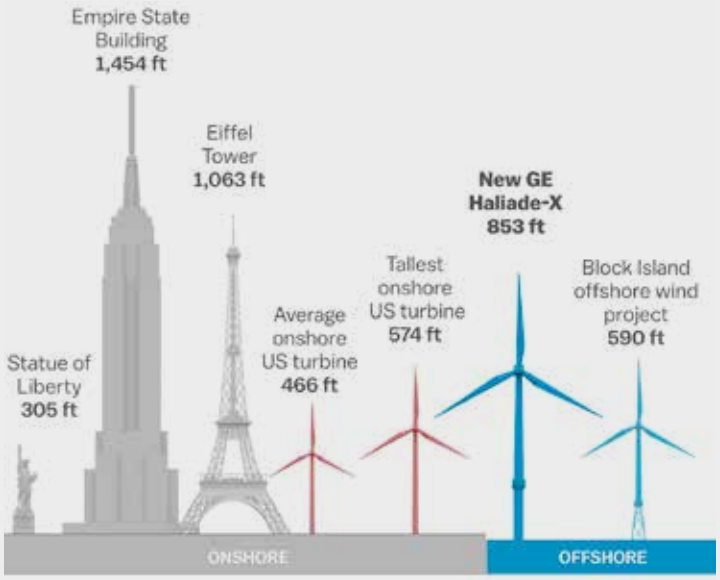
But do larger turbines bring more risk?

The challenge to continual growth in size and power output is only limited by mechanical engineering. As we dream of ever-larger wind turbines bringing an increased and less volatile revenue stream, it is easy to lose focus on the increasing fatigue stresses which these turbines can be exposed to at increased wind speeds. For example, longer blades will bend and flex, which can cause associated damage.

The Haliade-X

Nothing reflects the rapid upscaling in technology size more than General Electric’s (GE) announcement of their new offshore turbine, the 12 MW Haliade-X. This wind turbine is of titanic proportions, with rotor blades measuring 351 feet long (longer than a football pitch) and a rotor diameter of 722 feet. This enormous diameter will drive a high capacity factor of 63%, which is five to seven points above industry standard. GE states that ‘each incremental point in capacity factor represents around US$7 million in revenue over the life of a windfarm’.[1]

Fig 1 – The Halliade-X



The Haliade-X is almost as tall as the Eiffel tower

Source: www.box.com

[1] https://www.ge.com/renewableenergy/wind-energy/turbines/haliade-x-offshore-turbine

Insurance implications

Whilst the growing turbine sizes from various manufacturers are exciting for developers, it is worth considering their impact on securing cover and the associated cost of insurance. No developer is going to be in a position to raise project finance to commercialise a project if the financial risks associated with the operation of new technology cannot be mitigated in a meaningful way by an insurance policy.

To achieve the required level of risk transfer to make the new technology bankable, international insurers commonly expect new technology (new operating platforms or evolutionary developments) to have achieved:

- a type certification, through an acceptable trouble-free operating period
- a technical diligence process, by a qualified body that assesses that the design is fit for purpose and meets certain international specifications

Procurement challenges

With the rapid deployment of new technology, it is common for procurement orders to be submitted and substantial down-payments before the new technology has left the factory, or achieved any operating experience. Essentially this is the same as buying a house from a design website, with the assurance that it will meet all your specified design requirements.

This process is facilitated by type certification only being required by insurers to achieve the required level of design exclusion cover for a project to be broadly accepted as bankable (London Engineering Group (LEG 2/96). This is an internationally accepted exclusion clause defining the level of insurance cover available following defects in design, plan, specification, materials or workmanship which result in physical loss or damage and any ensuing loss of advanced loss of revenue for construction by projects before commencement of the hot testing and commissioning phase. This can be a substantial time after the procurement purchase order has been submitted and the fleet leader of the new technology has achieved the requisite experience.

Potential coverage restrictions can slow deployment of new technology

If type certification cannot be achieved before the first turbine is 'switched on', then it is likely that insurers will restrict their cover to a lesser form of cover (London Engineering Group) LEG1/96 which is an outright exclusion of physical damage consequences of any defects in design, plan, specification and materials and does not cover ensuing advanced loss of revenue. While most large scale commercial projects involve debt financing, the requirement to achieve the required level of comfort through insurance risk transfer mechanisms can slow the early deployment of technology while lessons are learned (and corrected if required with the fleet leader) or trouble-free experience is achieved.

Conclusion – can the insurance market keep up with the pace?

The insurance market is grappling with the fast pace of upscaling, evolutionary design improvements and outright new designs. Insurers have to assess each design evolution and its effect on risk exposure, which may or may not impact the profitable performance of their underwriting portfolio.

Insurers will often comment that they are not in the business of bankrolling research and development but delivering value to their shareholders. This dynamic is creating an increase in the value to the buyer of the insurance market, which has the technical risk engineering teams capable of making informed assessments and who regularly participate in and review technology advances, supported by close relationships with the manufacturers.

Conversely, it is increasingly important for project developers to work with risk advisors/brokers who are dedicated to operating in this technical space, to present and position their technology and project in the best possible way with potential insurers.

Freddie Cox is an Account Executive in the Renewable Energy division at Willis Towers Watson in London.

Contract for differences: the value of subsidies and their insurability

Introduction – government subsidies becoming increasingly popular worldwide

Global energy usage is predicted to rise between 25% and 35% by 2040, due to the ever-increasing population and higher global GDP[1]. Projections show that renewable energy sources must increase in order for countries to meet their COP 21 and individual low carbon electricity generation targets[2].

With this in mind, governmental energy subsidies have become increasingly popular in recent years, stimulating and stabilising investment in developing technologies with an estimated US$40 billion currently being spent on subsidies globally each year. In the US for example, $18.4 billion was spent on energy subsidies in 2016, of which US$11 billion was awarded to renewable energy sources.

Contract for Differences – how it works

The UK in particular has used subsidies as a method of bringing forward the investment needed to sustainably deliver its target of 20% renewable energy by 2020, and 80% carbon reduction by 2050[3]. For instance, the UK established the Low Carbon Contracts Company (LCCC) as the government-owned counterparty to Contract for Differences (CFD) – a private law contract between a low carbon electricity generator and the LCCC that essentially pays the difference between:

- the **strike price** (a price for electricity reflecting the cost of investing in a particular low carbon technology); and
- the **reference price** (a measure of the average market price for electricity in the UK market).[4]

Though the revenue generated from the electricity will be sold to the National Grid as usual, if the market reference price falls below the strike price, the LCCC will top up the payment to reach the strike price. Conversely, the generator must pay any revenue received above the strike price if the market reference is higher. Traditional renewable technologies, such as solar PV and onshore wind, have been restricted from entering the CFD process since the auctions started in 2015, with preference being given to less established technologies such as offshore wind and dedicated biomass.

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[1] https://cdn.exxonmobil.com/~/media/global/files/outlook-for-energy/2016/2016-outlook-for-energy.pdf

[2] Maloney, B., 2018. Renewable Energy Subsidies - Yes or No? Available at: https://www.forbes.com/sites/uhenergy/2018/03/23/renewable-energy-subsidies-yes-or-no/#1b80b68e6e23

[3] LCCC, 2016. Contracts for Difference (CFD) Booklet 2016/17: Overview of the CFD mechanism and Delivery Partners. Available at: https://www.lowcarboncontracts.uk/sites/default/files/CFD%20Booklet%202016-17.pdf

[4] LCCC, 2016. Contracts for Difference (CFD) Booklet 2016/17: Overview of the CFD mechanism and Delivery Partners. Available at: https://www.lowcarboncontracts.uk/sites/default/files/CFD%20Booklet%202016-17.pdf

Result 1 – reduced exposure to price volatility

In regards to the value of energy subsidies such as the CFD incentive, it is argued that this finance support mechanism reduces generators' exposure to volatile wholesale prices by ensuring the bankability of a project's revenue, by pre-agreeing a fixed price for the duration of the contract.

Meanwhile, in doing so consumers are also awarded a level of protection in terms of electricity price fluctuations.

Result 2 – the industry grows still further

The clear, stable and predictable revenue streams have undeniably helped the Renewable Energy industry thrive, particularly providing Offshore Wind developers with access to a huge pool of capital.

But is it still necessary?

However, with the cost of this capital falling consistently and wholesale pricing playing a growing role, the question can be asked as to whether the same level of support that CFDs provide is still necessary within the industry. Moreover, the rationale for subsidies used to be centred round the fact that the investment needed to develop a renewable energy project was not financially feasible if the remuneration was subject to the standard market price.

However, the drop in supply chain cost and the uptake in production have left many with the opinion that seems to have coalesced around the need for a change in the current process. Spain, for example, took this opinion into action when it awarded 8.7 GW of renewables in 2017 - none of which will necessarily receive any government subsidies.[5]

Government protection measures

Additionally, the value of the energy subsidy mechanism has previously encountered other issues centred round the protection measures in place for changes to the relevant country's legal system. In the UK, the LCCC provides the developer with the security of either party having limited termination rights, as well as having provisions in place to protect the value of the CFD to developers, should any change in legislation occur.

Political risk vulnerability: an example from Spain

However other countries have arguably less sophisticated processes, which can leave the developers vulnerable to political risks. Using Spain as an example, the approval of the Royal Decree 661/2007 brought about a guaranteed profitability to both domestic and foreign investors in renewables, causing a 'photovoltaic boom' to take place in a matter of months. This huge success was far higher than the Spanish government anticipated, and unfortunately led to the need for remuneration cuts and maximum production hours being put in place – a change that a stipulation in the current legislation allowed for. This development, together with the introduction of a 7% electricity generation tax, undoubtedly caused significant losses to the sector and arguably more so to the investors who no longer possessed a guaranteed profit.

Subsequently, these cuts in renewables incentives led to over 40 different investors filing claims against the Spanish Government to the International Centre for Settlement of Investment Disputes, arguing that they had violated Article 10 of the Energy Charter Treaty by depriving the

[5] https://www.windpowerengineering.com/business-news-projects/business-issues/end-subsidies-spain-beginning-new-era-renewables/

plaintiffs of fair and equitable treatment[6]. Although to date they have tended to rule in the plaintiffs favour (currently two arbitral awards have been won by Spain, four to the various plaintiffs), the fact still remains that not knowing the security of your investment, despite signing a contract to determine specifically that, is hardly an attractive feature of a subsidy in the eyes of a developer. In addition, as investors that continue to choose subsidies have to hedge against potential future losses of income due to regulatory uncertainty, the price of the projects themselves are likely to increase as a result – a factor that almost goes against the aim of a subsidy in the first place.

The value of political risk insurance and other risk mitigation measures

With governments potentially having the power to eliminate a favourable regulatory regime and replace it with a less favourable one that affects the developers pre-agreed investment, it appears renewable energy projects are particularly exposed to changes in law and an additional form of financial guarantee may be deemed necessary. Political risk insurance, bilateral investment treaties and stabilisation clauses are potential mechanisms to be explored.

Indeed, the World Bank's Multilateral Investment Guarantee Agency (MIGA) provided political risk insurance to the shareholders loans to the 47 MW Rajamandala Hydropower Project in Indonesia in 2014, which provides coverage against the risks of transfer restriction, expropriation, war and civil disturbance, and breach of contract[7]. Alternatively, the renewables feed-in tariff in Ukraine is an example of stabilisation clause providing an indemnification to investors as a result in the change to the law. Though these mechanisms can raise challenges in themselves, such as limited coverage, ambiguous policy language, and expensive and complex application processes, the question remains as to whether these processes are growing to be significantly important for developers in a subsidy contract.

Is the current subsidy process fit for purpose?

To summarise, though the value of subsidies in the growth of the renewable energy market has been undeniably successful, industry changes now raise the question as to whether the current process is fit for purpose. Are renewable energy generators transitioning away from subsidies into a more merchant risk future? Furthermore, is the financial guarantee of a subsidy proving to be stable enough for investors, or should we consider it necessary that political risk insurance is provided in parallel?

Here in the UK, the Department of Business, Energy and Industrial Strategy (BEIS) estimates that investment of around £100 billion is required in electricity generation and transmission in the UK in this decade alone, and we need to ensure investors have security in the mechanisms in place to provide profitable, yet affordable, sustainable electricity[8].

Conclusion – the challenge for the insurance community

Be that as it may, the ability to trade this macro political risk for loss of anticipated subsidies following a change in legislation with the insurance markets is still frustrated by insurers' lack of appetite, potential aggregation of exposure and inability to broadly deliver long term insurance policies which provide equivalent certainty. It is therefore critical for risk intermediaries to challenge insurers to deliver innovative, long term non-cancellable products which can respond to loss of subsidy or other financial support mechanism where delays are achieved resulting from physical loss or damage triggers.

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"The ability to trade this macro political risk for loss of anticipated subsidies following a change in legislation with the insurance markets is still frustrated by insurers' lack of appetite, potential aggregation of exposure and inability to broadly deliver long term insurance policies which provide equivalent certainty."

[6] 2014. THE ENERGY CHARTER TREATY (WITH INCORPORATED TRADE AMENDMENT) and Related Documents. Available at: http://www.europarl.europa.eu/meetdocs/2014_2019/documents/itre/dv/energy_charter_/energy_charter_en.pdf

[7] MIGA, 2014. Rajamandala Hydropower Project. Available at: https://www.miga.org/project/rajamandala-hydropower-project

[8] Maloney, B., 2018. Renewable Energy Subsidies - Yes Or No?. [Online] Available at: https://www.forbes.com/sites/uhenergy/2018/03/23/renewable-energy-subsidies-yes-or-no/

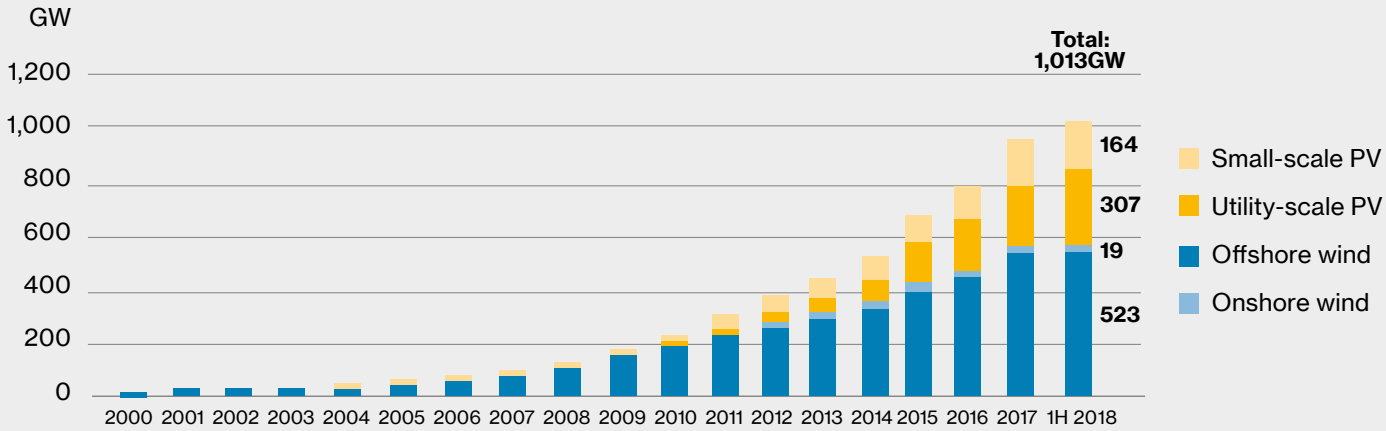
Decommissioning: a necessary evil?

Introduction – increased generation from wind and solar around the globe

The latest official statistics published by the UK government show that during the second quarter of 2018 a record 31.7% of electricity generation came from renewable sources, a three percentage point increase from the same period last year.[1]

Bloomberg New Energy Finance (BNEF) data in August 2018 showed the world has attained the landmark figure of 1TW of wind and solar generation capacity installed with 1,013GW of wind and solar PV generating capacity installed worldwide as of June 30, 2018. The total is finely balanced between wind (54%) and solar (46%)[2].

Fig 1 – Global wind and solar installations, cumulative to June 30 2018

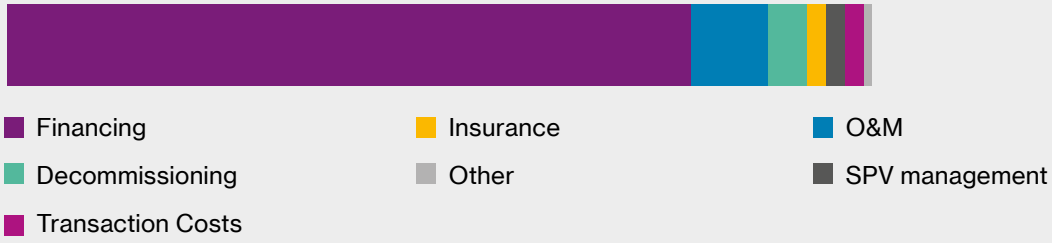


The growth in solar and wind installations during the last decade has been exponential

Source: Bloomberg NEF. Note: 1H 2018 figures for Onshore Wind are based on a conservative estimate; the true figure will be higher. BNEF typically does not publish mid-year installation numbers.

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/743757/Press_Notice_September_2018.pdf
[2] https://about.bnef.com/blog/world-reaches-1000gw-wind-solar-keeps-going/

Fig 2: Generator build tender revenue stream breakdown



Decommissioning comprises at least 5% of the total generator build

Source: OFGEM

BNEF estimate that the second terawatt of wind and solar will arrive by mid-2023 and cost 46% less than the first.

Wind and solar are not the only technologies grabbing the headlines; battery storage is quickly becoming an important component in the renewable energy mix and in South Australia it made news with Elon Musk's Tesla company installing a 100MW battery and already providing energy security and savings to the State.

Return on investment planning

Return on Investment (ROI) planning and reaching financial close on any new renewable energy deal relies on a myriad of factors, including the above mentioned technologies, their performance, the weather (enough sun and wind) and of course the period of time that the technology will be operating for. This period in turn is determined by the licence to operate, the permit to operate or indeed the rental agreement with the landowner. This naturally varies by territory and technology.

Typically, the period of the lease is 20 -25 years, again depending on the technology, onshore or offshore and the country. The earliest windfarms in the UK called Brocklock Rig 1, Dumfries and Galloway, Scotland and which became fully operational in November 1996 consisting of 36 Nordtank wind turbines each of 600 kilowatts (kW), providing a maximum power of 21.6 megawatts (MW), is nearing its original lease date.

Decommissioning or repowering?

Planning permissions for onshore wind farms in the UK generally require decommissioning and restoration after 25 years. Decommissioning means the removal of turbines and other infrastructure and includes the restoration of the site where required.

The alternative to decommissioning is repowering. This is the process of replacing the original turbines with new ones, and reconfiguring the layout. It may mean fewer, but larger or more efficient turbines. Delabole was the first commercial wind farm in the U.K; it opened in 1991 with 10 turbines of 400kw each. In 2011, those turbines were replaced with four turbines totalling 10MW.

UK decommissioning obligations

Sections 105 to 114 of the Energy Act 2004 introduce a decommissioning scheme for offshore wind and marine energy installations. Under the terms of the Act, the Secretary of State may require a person who is responsible for one of these installations to submit (and eventually carry out) a decommissioning programme for the installation. They should also be responsible for meeting the costs of decommissioning – the 'polluter pays' principle.

What does decommissioning cost?

The cost of decommissioning will clearly vary by the technology (wind, solar of battery storage, hydro and whether onshore or offshore). For wind, the key components could include turbines, turbines base, transformers, buildings, substation and cables. A recent estimate from Scottish examples suggested that the decommissioning cost is approximately £80k per megawatt. Offshore costs will undoubtedly be higher because the CAPEX is always significantly more than onshore; indeed, a recent study by OFGEM has suggested decommissioning could be at least 5% of the total investment[3].

Initial summary - and some key questions for the developer!

For any developer or partnership reviewing new onshore or offshore opportunities in any major renewable energy territory, the financial model will need to anticipate that, in 20-25 years' time, the project will need to fund decommissioning. It may be asked to demonstrate by the authorities it has the funds and the plans on how to implement this. This cost impacts the financial viability and profitability of a project and for Offshore bids can be a critical cost and determine winning of losing a bid.

So there are some key questions for the developer to answer:

- What security needs to be shown by the developer that they will decommission in 20 years to 25 years' time?
- Does all of this amount need to be set aside?
- How does the landowner know the developer really will decommission?
- What happens if the developer becomes insolvent or is sold?

Clearly there needs to be certainty for the landowner, the Council, the Crown Estate or the Department for Business Energy & Industrial Strategy.

Financial securities, bonds, guarantees and parental guarantees

Typical financial security instruments have taken the form of bonds which the developer is obliged to purchase and evidence to the authority, landowner or Crown Estate. Banks and insurance companies will typically provide these types of securities; they might be typically valid for 3-5 years but annually renewable.

Cash Escrow

The developer is required to place actual cash into an escrow account, with little or no investment interest added for the term of the lease. This cash is only released by the landlord when decommissioning takes place. While attractive to the public authority or landowner, this is not attractive to the developer as it would typically be funded through equity. The opportunity cost of not being able to use this cash during the term of the lease will be multiples of the original cash amount. An additional concern is that some territories have experienced negative interest rates which will reduce the escrow cash and therefore will need to be topped up.

Surety Bonds

These are "on demand" and are provided by insurance companies. They have a maximum term of up to 5 years, usually with the developer required to post collateral. The fees are usually payable annually. In the event that decommissioning is required and developer is insolvent, the public authority or landowner can call the bond and the surety will be obliged to settle the demand within the agreed time period, usually 5 days. The surety provider will then seek reimbursement from the developer and/or its' parent.

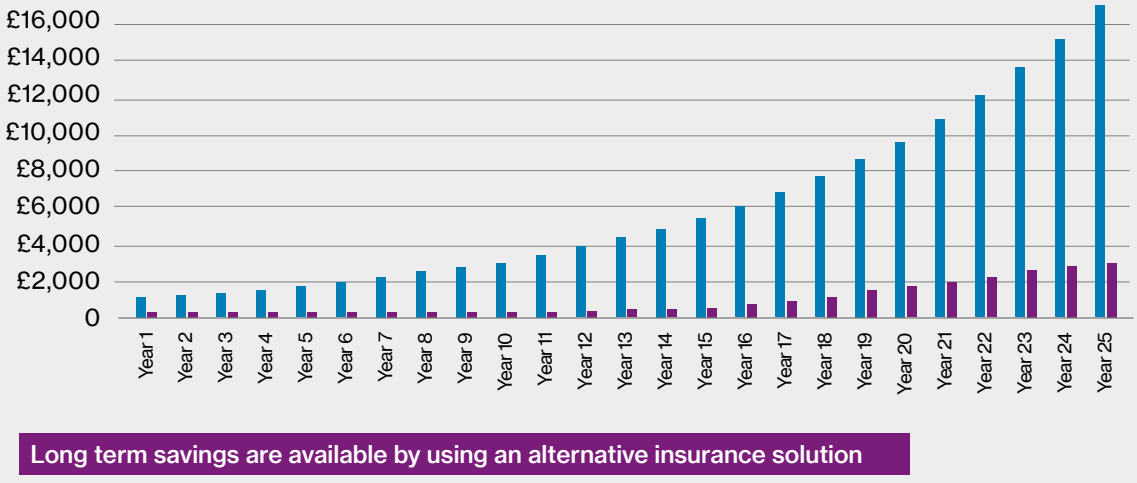
Bank Letter of Credit ("LoC")

Similar to the Surety Bond, bank Letters of Credit (LoC) are "on demand". The bank will always require collateral or security equal to the amount of the LoC. This reduces the available borrowings to develop the site, thereby increasing the amount of capital required resulting in a reduction in the project's expected returns.

"For any developer or partnership reviewing new onshore or offshore opportunities in any major renewable energy territory, the financial model will need to anticipate that in 20-25 years' time the project will need to fund decommissioning."

[3] https://www.ofgem.gov.uk/system/files/docs/2017/08/new_donagh_report.pdf

Fig 3: Defined future liability: Escrow v Insurance



Assumptions

1. Risk Limit £1m year 1
2. Cost of Capital 12%
3. Escrow funded OpEX 5%
4. ROL 10%
5. Escorw Profile years 16-23 straight line

Financial

1. Saving 90% over 15 years & 82% over the full term of 25 years

Long term savings are available by using an alternative insurance solution

Source: Lime Risk Agency

Parent Company Guarantees

These are provided by the parent company of the developer and guarantee the financial security obligation to the public authority and/or landowner. This is a more cost effective method to provide security for future obligations but in reality these are only open to large creditworthy organisations due to the long term nature of the leases and may impact the parent company's ability to raise debt.

An alternative solution – Decommissioning & Reinstatement Insurance

Is there an alternative to the current range of financial securities? Can the developer's long term cost be reduced? Major risk intermediaries are working with the insurance market to provide more efficient tools and a more effective mechanism.

Working closely with the insurance markets, an alternative insurance market solution - Decommissioning & Reinstatement Insurance - has been developed, which may result in long-term savings being achieved. The following is a summary of the solution and its benefits:

- The policy protects the landlord and/or public authority against the risk that the Operator fails to fulfil its decommissioning obligations at the end of the lease term, usually as a result of default of the Operator.
- The limit of indemnity is agreed and fixed at the outset; accommodation is made for inflation at this time. Revisions can be made during the term but it is usually better for all parties to fix this at the outset.
- The Operator is required to enter into an escrow agreement with the landlord/public authority and the Insurer. The escrow account builds slowly over the life of the field until it equals the required financial security amount (usually 2 to 5 years before abandonment).
- The insured is the landlord/public authority. The Operator pays into the escrow account.

Product benefits

- The policy is not cancellable by the Insurer.
- There is no renewal; it is a long-term policy (maximum period of insurance of 30 years).
- It provides certainty to the landlord/public authority over the term of the lease with a combination of cash escrow and a strong AA rated Insurer.
- It provides a significant saving to the Operator of the cost of the financing of the financial security when considered over the life of the project - approximately 80%.
- It frees up capital, as the policy not a liability on Operator/partners' balance sheet.
- Significant capacity is available.

Evidence that long term savings are available by using an alternative insurance solution is provided by Fig 3 on the previous page. In this example:

- the blue bars represent the opportunity cost of utilising cash from day one
- the purple bars represent the opportunity cost of using the alternative solution

Conclusion – towards a more efficient solution

As concluded by Enercon, tens of thousands of turbines will be reaching the end of their useful life between now and 2030[4]. Local planners, law makers and authorities are waking up to the costs and logistics of addressing the decommissioning issue. More focus is being given to the security requirements of developers to guarantee projects will be effectively decommissioned, or repowered at the end of the lease period. New projects are therefore also being challenged to detail their decommissioning plans and demonstrate financial security. The cost of decommissioning can impact the viability and profitability of a project long term over 25 years. Any savings on this core cost can mean the difference in a 'go' or 'no go' on a project and or a successful bid.

Risk intermediaries such as Willis Towers Watson have led the way in educating developers and landlords alike to how this more efficient solution will deliver long term benefits to all parties. This solution can be used for both onshore and offshore projects; to estimate the extent of the savings potential, intermediaries will need to agree the assumptions, understand the full risk profile of the project and the decommissioning requirements and timings. This process is risk free and will quickly demonstrate that by reducing the long term cost of the decommissioning bill, the overall profitability of the project will be enhanced.

Adam Piper is an Executive Director in Willis Towers Watson's Renewable Energy team in London.

[4] https://www.enercon.de/en/home/

Solar power: why your assets may be over-valued

Introduction – Chinese action prompts fall in solar panel prices

Recent years have seen record-low energy price bids from solar projects, from 5.71 cents/kWh in the USA to 2.42 cents/kWh in Dubai[1]. With solar energy costs now frequently lower than fossil fuels, it should come as no surprise that a key driver behind the success of the technology is the continually falling cost of solar panels.

In June China issued a bulletin which stated that, with immediate effect, the allocation of quotes for new solar projects was halted until further notice. The intention of that curtailment was, among other things, "promoting the solar energy sector's sustainable development". Following this announcement some 20GW of planned solar capacity in China is expected to be scrapped. The knock on effect: the cost of panels from China has dropped substantially.

Nine of the top ten suppliers in the world are Chinese run companies. In 2017 alone China brought online 53GW of new solar capacity - five times more than the next largest market (the US)[2]. JinkoSolar, the number one global supplier, has tripled its in-house production capacity since 2015, with other major suppliers expanding in a similar fashion. Understandably, manufacturing expansion is long-tail, and despite signs that future investment is falling away, it is expected that there will be a glut of excess capacity for some time yet.

Economies of scale benefits

The industry is seeing the benefit of economies of scale in all aspects of the supply chain. Driven by expansions in manufacturing, the cost of polysilicon has hit a record low and is expected to stay that way. In addition to this, the technology itself continues to be refined, with panels now being lighter and more energy efficient than ever before.

Owners and operators of solar parks stand to benefit from this situation. The cost of panels as a percentage of total build cost can be anywhere between 25% and 45% of a projects total cost. A plant built only 1 year ago could be over-insured by as much as 30%, and a plant which has not been valued for 5 year could be over-insured by up to 2.5 times the necessary amount.

Even sites which are subject to project finance can, through employing a party valuation service, reduce the insured value of their site, resulting in premium savings.

Conclusion – the insurer challenge

The challenge for insurers will be to ensure that the way they model and rate solar parks continues to be sustainable. Whilst panels make up the majority of the value of solar parks, they do not necessarily make up the majority of claims.

Oliver Warren is an Account Executive in the Renewable Energy division at Willis Towers Watson in London.

[1] https://cleantechnica.com/2016/09/20/lowest-ever-solar-price-bid-2-42%C2%A2kwh-dropped-abu-dhabi-jinkosolar-marubeni-score/

[2] https://www.cnbc.com/2018/04/06/china-becomes-a-driving-power-for-solar-energy-with-86-point-5-billion-invested-last-year.html

Mexico: risk management challenges for the renewables industry

Introduction – "Another Mexico now"?

'There is another Mexico now'. This is the bold statement from Mexico's new President Andres Manual Lopez Obrador, who promises to end corruption, reduce violence and address Mexico's poverty.

But what does this mean for renewables in the country? Mexico is emerging rapidly as a world leader on energy reform and renewables, through its long term auctions and the introduction of Clean Energy Certificates (CECs) in 2018. These energy reforms aim to increase the amount of electricity generated from clean sources, including nuclear energy, to 35% by 2024 and 50% by 2050. It is anticipated that the Mexican market will add approximately 15GW of solar PV by 2022, placing it in the top 10 markets worldwide.

For the moment, it appears that Lopez Obrador is supportive of the clean energy agenda and has indicated his intention to accelerate Mexico's transition to renewable energies through several means, including connecting 45,000 rural areas to electricity through renewable sources, and giving tax incentives and credits to firms that run on renewable energies.

Natural catastrophe vulnerability

But the growth and opportunity which has characterised the last decade of Mexico's history is of course threatened by its vulnerability to natural catastrophe. The threat is only going to intensify as a consequence of climate change, growing populations, urbanisation and increased wealth (and therefore higher values at risk). Without a doubt, insurance has responded to protect economies and communities from these risks. The 2017 record natural catastrophe losses, three Category 4 Hurricanes and two earthquakes, cost the insurance industry approximately US$135 million.

The insurance market reaction

As a consequence, and in a generally hardening market, insurers are taking steps to reduce their exposures through imposing higher premiums (particularly for those clients dealing with pending claims), deductibles (typically US$250,000) and coverage restrictions (for instance, an annual aggregate limit and/or sub-limit). In fact, it is becoming the norm for underwriters to either decline business or offer smaller lines in territories with higher natural catastrophe exposures, such as Mexico, which clearly demonstrates the impact these losses have had on the insurance market.

"Mexico is emerging rapidly as a world leader on energy reform and renewables, through its long term auctions and the introduction of Clean Energy Certificates (CECs) in 2018."

Cargo theft increases insurance rating levels as Delay in Start-Up capacity pulled

Whilst the threat of natural disaster has always been present in Mexico, cargo theft has become a sudden major concern in recent years, with more than 4,000 thefts in 2017, and a 108% increase in cargo thefts in the first quarter of 2018. The biggest impact of the robbery surge on logistics companies and project developers has been the increase in insurance costs. As a result of several fairly large claims paid for theft of containers of solar panels and other key equipment whilst en route from port to project site in Mexico, many (re)insurers are withdrawing their Marine Cargo / Marine Delay In Start Up capacity, and/or imposing a higher premium rate and/or higher deductibles for theft or hijacking (typically between US$50,000 – 100,000).

New security conditions

It is becoming common place for (re)insurers to impose security conditions when offering marine cargo coverage, such as:

- No night time transportations
- GPS trackers to be installed
- Vehicles to travel in convoy to the site where possible but at least for the initial 100km from port
- Vehicles not be left unattended

Alternative solutions

As traditional Marine (re)insurers seem more and more reluctant to accept more theft exposure in these high risk areas, it is becoming increasingly necessary to investigate alternative solutions, such as purchasing a Terrorism policy with an Organised Crime extension, including such cover for project equipment in (inland) transit to the project site. However, depending on the risk, this can be an expensive alternative solution.

Conclusion – problem set to intensify

The problem is only set to intensify, since port cargo volumes are ever increasing year after year and the country's ports and highways are being heavily invested in to support the fast-growing manufacturing sector. Mexican shippers and transportation providers have called for a reduction in the country's deadly violence and cargo theft; it remains to be seen whether President Lopez Obrador can address Mexico's deepening security crisis through his plans for 'another Mexico'. Until then, policy holders can expect growing insurance costs and a focus on transportation security.

"Whilst the threat of natural disaster has always been present in Mexico, cargo theft has become a sudden major concern in recent years."

Melanie Carter is an Account Executive in the Renewable Energy division at Willis Towers Watson in London

All sources for this article are from the following websites:

https://www.joc.com/rail-intermodal/mexican-cargo-theft-spike-rattles-shippers_20180601.html

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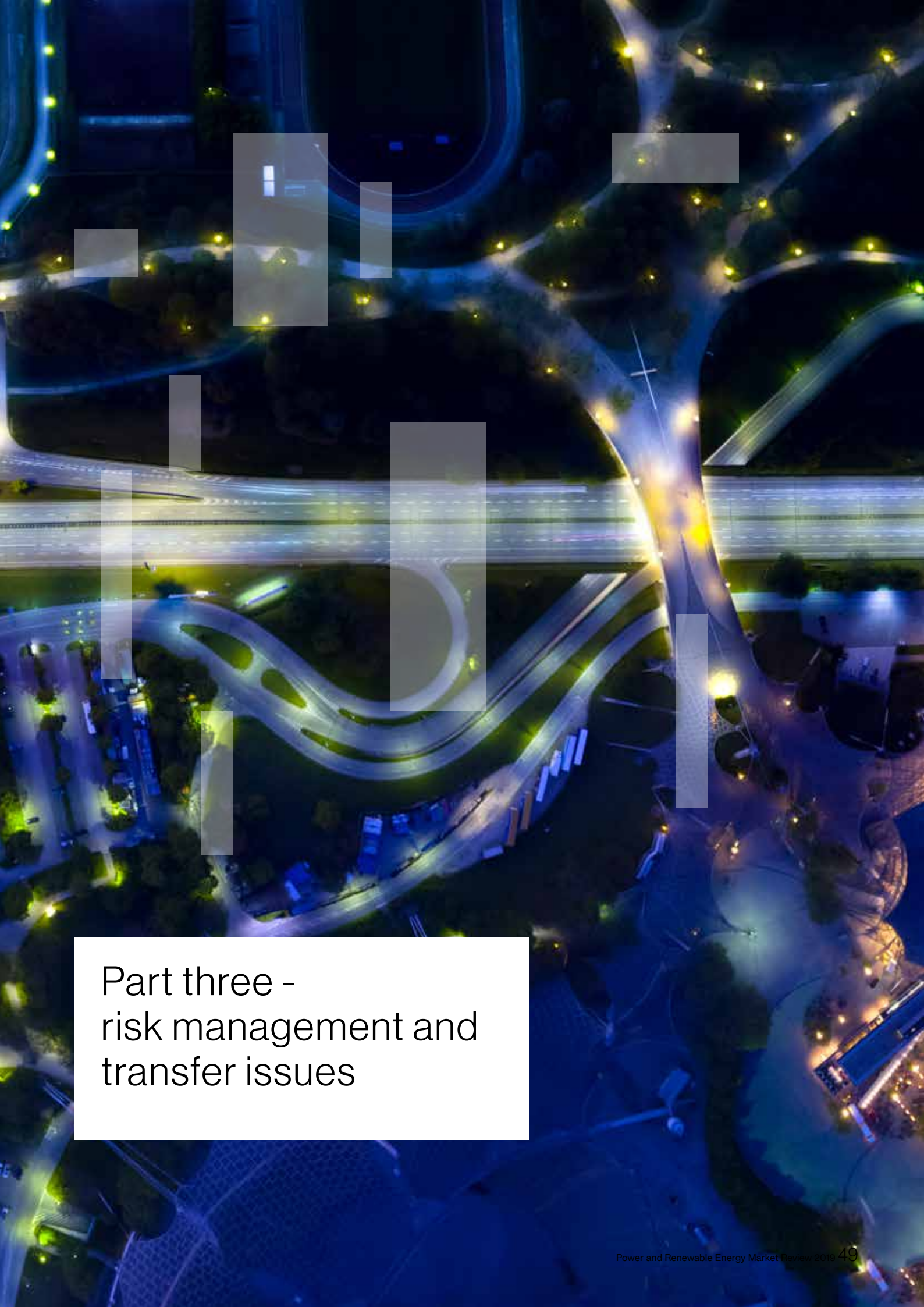


Part three - risk management and transfer issues

Cyber: the risk to power & renewable energy companies

Introduction – effective cyber risk management no longer optional!

Delivering cyber resilience is a core part of effective corporate governance for power and renewable energy companies. Senior management needs to understand the importance of a cyber strategy, and that any failure to properly address this evolving issue can lead to corporate risk management failure and ramifications at board level.

We are beginning to see more cyber-attacks in the news, and this is cause for concern. These incidents have been unpredictable and quick to develop, while at the same time growing in sophistication. Physical damage, business interruption (damage and non-damage related) and breaches of data resulting from cyber-attacks are a reality. No matter if you are involved in generation, distribution or retailing – you should be aware of your exposure and have a plan in place to manage it.

A physical risk – "it'll never happen to me"

The specific evidence for real world physical damage and the resulting business interruption from a cyber incident in the power industry is hotly debated. However the Stuxnet computer virus and the recent attack on a German steel mill showed that physical damage is possible through affecting operational technologies.

Even now some view the risk as negligible, that it won't happen to them, or their controls are too strong. Certainly critical power assets have control islanding that is independent from enterprise systems. But now, as The Industrial Internet of Things (TIIoT) network grows, we are seeing greater interconnectedness at all levels and between organisations. This is being enabled through the growth of Supervisory Control and Data Acquisition/ Industrial Control Systems (SCADA/ICS) sensors and operational technology devices which have internet connections or are linked to enterprise networks.

Non-physical risks: a warning from Ukraine

There does not need to be physical damage for significant losses to be incurred from a cyber-attack. In 2015, an attack on Ukraine targeted power stations, grid connections and industrial SCADA systems, resulting in large scale blackouts for over 6 hours. The following year Ukraine was targeted again with malware – this time through infected tax software. This malware spread and migrated out of the country to many different industries and countries around the world, causing monumental disruption and financial loss.

93 million people without power?

A Lloyd's of London study[1] further brought cyber closer to home, albeit in a theoretical sense. The report depicted a cyber scenario whereby hackers shut down parts of the US power grid, causing 93 million people to lose access to power – a doomsday scenario but a possibility. Even this year the FBI and the department of Homeland Security warned of increasing cyber-security risks to the US energy system.

What is concerning is that cyber experts expect companies to get attacked and barriers breached. They advise of a need to focus on tracking and stopping attackers when they are in. No matter how good firewalls and security are, controls will at some point fail.

[1] https://www.lloyds.com/news/national/2015/07/08/374402.htm

Surely renewables aren't a target?

A common misconception is that you need to be targeted for cyber risk to materialise. This is not the case; as we saw with malware weapons WannaCry and NotPetya, cyber-attacks are often untargeted.

But should we consider renewable energy assets as a primary target by threat actors? Renewable energy companies may take the position that cyber risk is primarily stemming from political issues and hackers wouldn't have interest in directly targeting their assets; they'd rather go for a conventional power plant. However this year we have seen activist groups physically attacking wind turbines and burning them to the ground. It's doubtful that many people expected that - what's to stop them taking the cyber route? Why not take down the entire farm in one go?

Researchers have already developed three proof-of-concept attacks (types of malware), demonstrating how hackers could exploit wind farm systems. The question is: once they have control, what can they do? They could over-speed the turbine by adjusting operating parameters, turn off the brakes in a storm, even apply the brakes aggressively to build up heat and start a fire.

Fig 1 – Recent cyber-attacks around the world

USA & Canada - Power Generation

Hacking // 2013-2015

- Energy Corporation attacked through information stolen from a contractor
- Hackers stole power plant designs and system passwords
- The victim operates 82 power plants in the US and Canada – potentially huge ramifications

Ukraine - Power Grid

Hacking // 2015

- Power stations and the grid was attached through a spear-phishing campaign and sophisticated malware called "BlackEnergy" and "KillDisk."
- Left 225,000 customers in the dark and caused severe software damage
- The electricity grid took months to recover

South Korea - Nuclear Power Plant

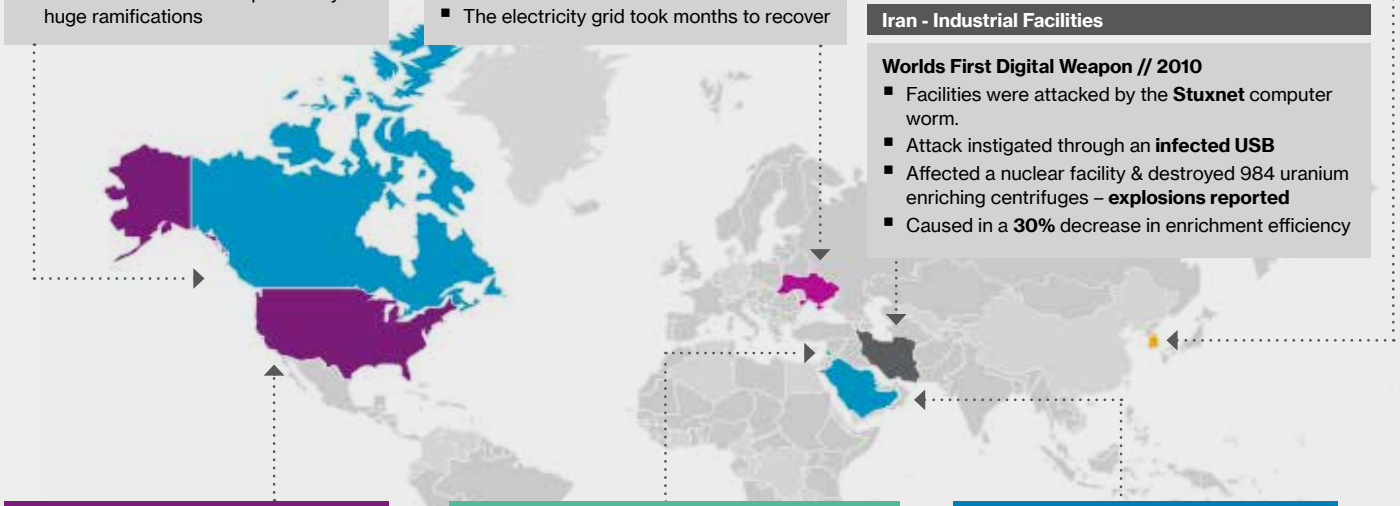
Hacking // 2015

- A Nuclear power plant suffered a series of cyber attacks.
- The attacks only succeeded in **leaking non-classified documents**

Iran - Industrial Facilities

Worlds First Digital Weapon // 2010

- Facilities were attacked by the **Stuxnet** computer worm.
- Attack instigated through an **infected USB**
- Affected a nuclear facility & destroyed 984 uranium enriching centrifuges – **explosions reported**
- Caused in a **30%** decrease in enrichment efficiency



USA - Power Generation

Virus // 2012

- Power utility's ICS was infected with the **Mariposa virus**
- Instigated though an infected 3rd-party technicians USB
- Resulted in downtime for the plant of approximately 3 weeks

Israel - Electric Authority

Malware // 2016

- Employee fell for a phishing attack
- Infected computers on the network with malware.
- Department chose to take **all computers offline,** some for up to 2 days
- However media reported larger implications on the power grid

Saudi Arabia - Petrochemicals

Hacking // 2017

- Highly sophisticated Cyber assault
- Unsuccessful
- **Designed to sabotage operations and trigger an explosion**

Renewable energy companies cannot ignore the recent evidence of increased cyber-attack activity

Source: Willis Towers Watson

Concerns around the supply chain

New suppliers and entrants to the renewable energy market have introduced new access points for cyber risk into the industry. Developers of renewable energy projects are facing the realisation of this risk in their supply chain across both their suppliers and customers. Examples to consider are the outsourcing of O&M services, and reliance on third party substations to export power. There is a need to ensure that these are operating with top quality cyber hygiene. Otherwise an incident could result in unexpected downtime to the asset and subsequent financial loss.

In last year's Power Market Review we stated that cyber risk, at its core, is a people risk. But this is not just a risk with your own workforce; it's a people problem across your supply chain. As such, companies need to beware direct infiltration via contractors where systems are vulnerable to both malicious and accidental intervention.

For example, a disruption and resulting physical damage during the construction of a concentrated solar power plant was the result of a failure in the ICS, allowing a contractor to bypass critical control features. This was blamed on a lack of coordination between the owner and contractor teams.

Getting to grips with cyber risk

For power companies, the challenge of cyber risk begins with understanding the different cyber triggers and each step of the ensuing process that could eventually cause physical and/or financial loss. The question then arises of whether they have the plan and insurance programme in place to mitigate this.

A further challenge is that companies often don't know how best to allocate resources to a cyber resilience strategy. In general terms, there needs to be a mix of technical partners to collaborate and deliver solutions, and no one company is equipped to do all of this. A robust cyber strategy needs an integrated and technical approach, complementing consulting with transfer.

Of course, power companies have different operating business models and the approach needs to be bespoke. A pure power generating company such as a gas fired power plant or wind farm will be primarily exposed to operational impacts and therefore concerned around the security assets and the ability to supply energy to the grid. A retail energy company with extensive customer operations should be concerned with servicing its customer base, and the personal information which is held on its systems. Diversified power companies are more complex, but the fundamentals are the same.

The five key steps

We would suggest that key steps to approaching cyber risk are:

1. Identification of exposure, vulnerabilities and cyber risk scenarios
2. PML quantification of main cyber risk scenario consequences
3. Advice on organizational and technical risk treatment options
4. Identification of insurable consequences and design of optimal insurance coverage
5. Advice on best-practices to enhance people risk awareness

Clients in both renewables and conventional power are already engaging with their risk intermediaries to:

- identify and understand their cyber risk profile;
- identify how a cyber incident may impact them, their partners, and vice-versa;
- understand how their current insurance program may respond.

Insurance market cyber cover

In conventional insurance policies, cyber risk is current being excluded through a variety of different clauses, each with a different intent and impact on the cover to a power company. If a renewable energy company is relying on its current insurance policies to react in the event of a major cyber incident, it will be critical that it knows if it has a cyber exclusion and what it would mean for its business in the event of a cyber-attack.

"For power companies, the challenge of cyber risk begins with understanding the different cyber triggers and each step of the ensuing process that could eventually cause physical and/or financial loss."

Fig 2 - Key cyber insurance market statistics, 2018

GWP	MARKETS	MARKETS
$3.5bn	**60+**	**$600m+**
Estimated global Gross Written Premium from cyber insurance 2017	**Insurance companies with a cyber product offering**	**Total aggregate capacity for a single risk**

The cyber insurance market is expanding rapidly – but is there enough capacity to protect a company from disaster?

Source: Willis Towers Watson

As a result of this stance from the conventional market, cyber is being pushed towards specialist insurers and products. Traditional cyber products are concerned with the data and privacy aspect, while the non-traditional focuses on the physical property damage and non-damage business interruption elements. These products further allow cover for fines and penalties (where insurable by law), the failure to supply and replacement power from the spot market.

From a capacity standpoint, the largest cyber structures (utilising specialist markets) have reportedly surpassed the US$600 million level across multiple covers. This may not seem like much, but it is growing quickly at around 10% year on year. However for the right risk, with an optimal structuring, and by utilizing the right combination both cyber and property markets, total achievable capacity could be close to the US$1 billion mark.

An enterprise approach to cyber resilience

Effectively addressing the challenge of cyber risk requires an enterprise wide approach. The risk exists across many different parts of the business, and this is part of the challenge - it cannot be looked at in isolation. A risk manager in the power industry needs to:

- consider the broader implications of cyber risk on the company;
- engage with the right technical partners;
- efficiently allocate spending on defence (across both people and technology); and
- optimise the insurance strategy for the residual risk.

Myles Milner is an Account Executive in the Renewable Energy division at Willis Towers Watson in London.

Combining data with analytics: a different view of your insurance programme

Introduction – the traditional single view of risk

These days data on many aspects of the performance of power and renewable energy companies is widely available, but many companies miss the insight contained within the data and as a result make sub-optimal decisions. So how are leading power and renewable energy companies combining data with focussed analytics and deep industry knowledge to view risk in a different way in order to make better quality risk financing decisions?

Too simplistic?

Traditionally, power and renewable energy companies have insured their risk exposures on an individual basis with reliance placed on historical losses to assess risk, usually by considering each class of insurance in isolation. Premium, market capacity, deductible and insurable limit were the main drivers, with only limited analytical decision support undertaken to assess placement outcome and pricing. This single view of risk does not take into account the true nature of risk, which is more complex and includes dependencies within and between risk exposures that can now be better understood by combining data with modern analytical capabilities.

"Many companies miss the insight contained within the data and as a result make sub-optimal decisions."

Too complex?

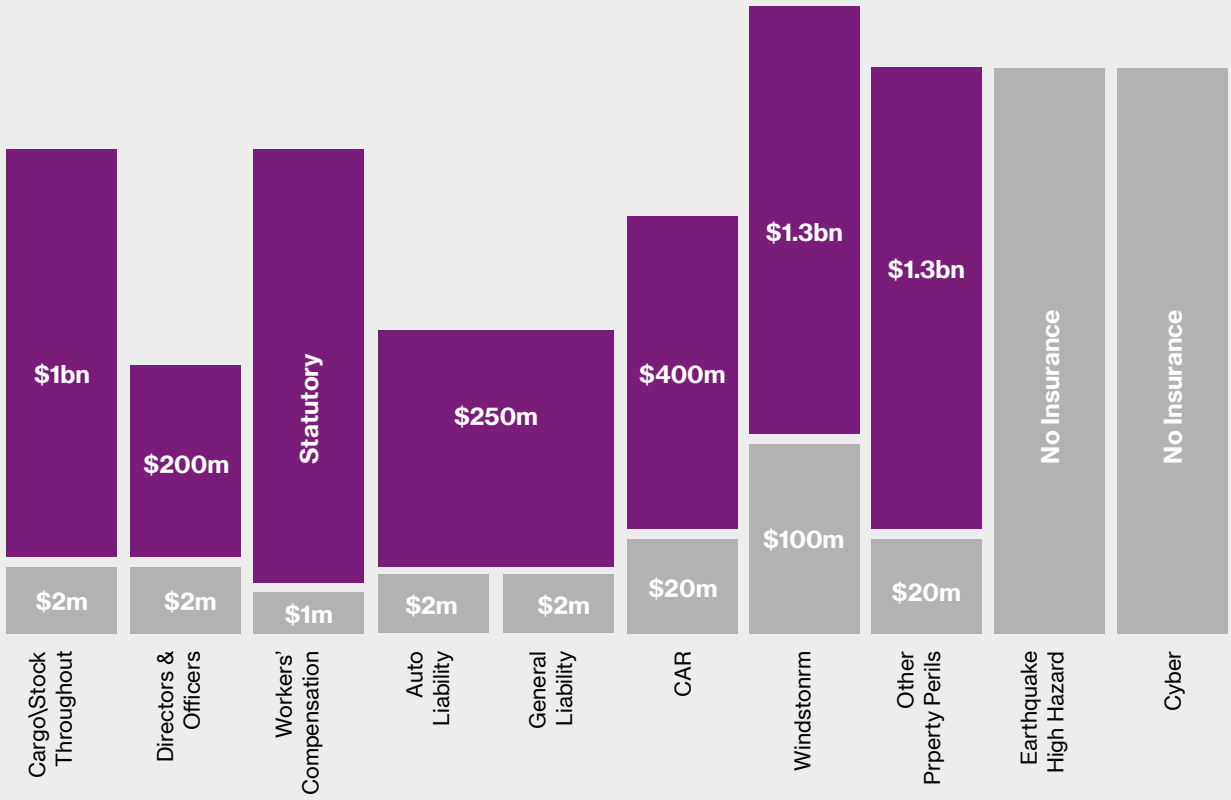
In addition to buying insurance as individual lines of cover, the various insurance lines are often bought with different renewal dates, with many local policies stretching across different geographies as well as varying levels of deductibles and limits. This complex structure of cover makes it difficult for key decision makers such as Treasurers and CFOs to understand precisely how their company is protected in the event of a series of losses, and as a result may lead them to underestimate the true value of insurance as a hedge.

Differences from other hedging strategies

This is in stark contrast to the value that power and renewable energy companies perceive from transferring risk by purchasing hedges in commodity markets, interest rate and currency markets. Due to the binary nature of such structures (there is only a pay-out if an index or a currency falls below a pre-agreed value) they are often viewed by Finance functions as simpler to understand than insurance.

Moreover, layers of hedges across different risk types may be bought to protect the organisation from scenarios that are deemed too risky without transfer of risk to the external market. It is this simplicity that is regarded as particularly attractive by CFOs and Treasurers, compared to the perception that insurance is more complex to understand and hence use as a hedge for effective risk transfer.

Fig 2 – A typical insurance programme structure



Source: Willis Towers Watson

Looking at risk through a different lens

Common insurance structure

How then should these different points of view be reconciled? A good place to start is a common representation of the insurance structure that is purchased by the organisation. The structure is often depicted as a series of bars or towers, where the height of each bar approximates to the amount of cover bought, and may look like this:

Does this structure work when the company is under stress?

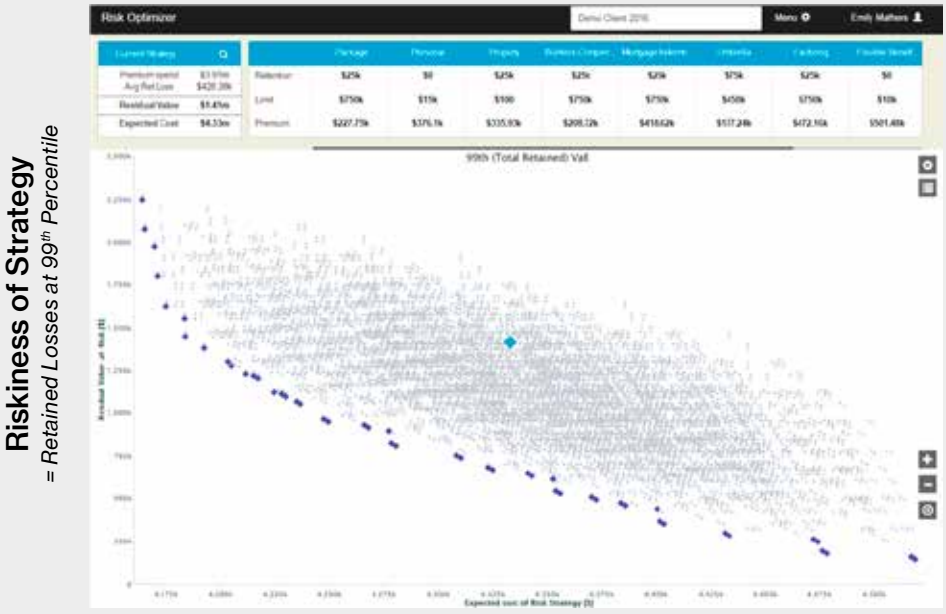
Whilst this depiction is helpful for understanding exactly what amount of cover has been purchased for each line of insurance, it is less helpful when seeking to understand the protection afforded to the organisation in times of financial stress. For this to become easier to understand, we need a different viewpoint.

Retained risk and expected cost

One viewpoint that CFOs and Finance teams will be familiar with is one that identifies the trade-off between risk and return. For our purposes we will amend this slightly to show the trade-off between retained risk and expected cost. This view has been designed so that it is easy to see the merits of different financing strategies as well as their impact of the organisation's bottom line.

"Complex structure of cover makes it difficult for key decision makers such as Treasurers and CFOs to understand precisely how their company is protected in the event of a series of losses, and as a result may lead them to underestimate the true value of insurance as a hedge."

Fig 3 – Establishing the efficient frontier



Source: Willis Towers Watson

In Figure 3 above:

- The horizontal axis shows the expected annual cost of the insurance strategy, which is made up of the premium spend and the cost of the retained losses.
- The vertical axis shows the amount of retained risk in a 'bad year'.

The objective is to reduce the amount of retained risk and at the same time reduce the expected annual cost and move to a more efficient programme, closer to the edge of the cloud in the above diagram.

Towards the efficient frontier – and a better understanding of risk

By combining data, industry knowledge and modern analytics, a better understanding of the company's risk exposures and their variability may be obtained. This insight will often reveal a very different picture from the traditional siloed view of considering different classes of risk in isolation. A significant benefit of this approach is to show where concentrations of risk occur as well as where there are currently inefficiencies in the transfer of risk off the balance sheet.

Combining analytics with industry data to identify trade-offs

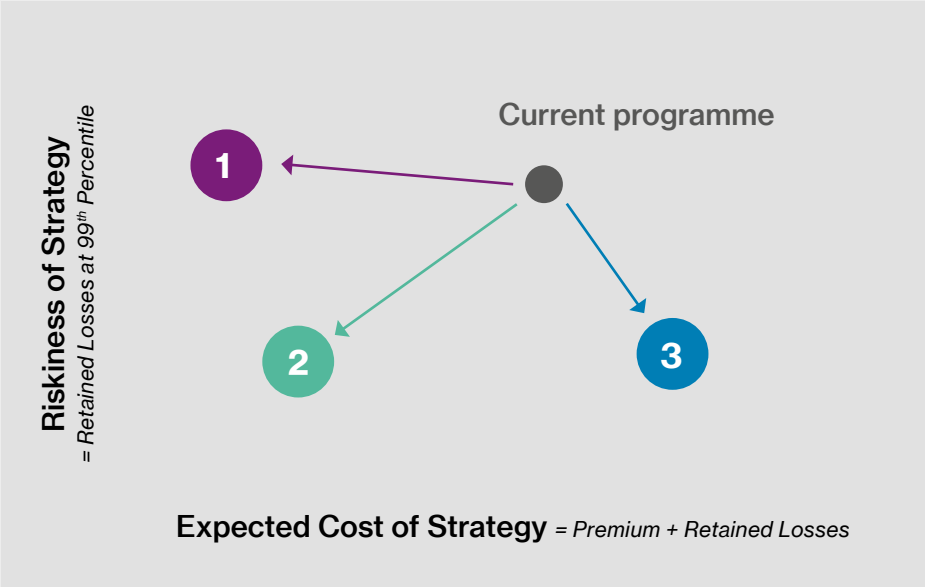
As a result, many leading companies are now beginning to embrace combining analytics with industry data to better understand risk at a portfolio level, and hence to understand the trade-off between the cost of retaining vs the cost of transferring risk.

This deeper understanding of the correlations of risk helps to identify ways to reduce volatility by measuring the effects of diversification, and may be used to develop alternative strategies. These strategies may then be assessed and compared using the lens of riskiness versus expected cost shown above.

Transferring volatility – a path to efficiency

This path to efficiency was highlighted to a recent client in the following diagram and shows three different options, all of which are more efficient than the current strategy. They represent an annual cost saving to the company, as well as significantly de-risking the balance sheet at the same time.

Fig 4 – The path to efficiency



Source: Willis Towers Watson

Advantages of optimization

The proposition for companies here is clear:

- Firstly, they will spend only what they need to on insurance - and not a penny more
- Secondly, they will effectively and efficiently protect the company against the insurable risks that matter most to them
- Finally, in our experience, optimization leads to a 10-30% reduction in risk and/or insurance cost savings

Methodology

In practice, this is carried out in 6 distinct steps:

1. Set key metrics for insurable risk
2. Define cost and risk profile of current insurance programme
3. Identify alternatives to optimise the cost/risk profile
4. Define insurable risk tolerance
5. Identify optimal insurances to stay within risk
6. Adjust programme as risk profile changes

Transferring volatility – parametric solutions

Developing tailored cover

The increased availability of data and use of analytical methods is also leading to the development of alternative forms of risk transfer, such as parametric solutions, which can transfer financial volatility arising from weather related events or natural catastrophes away from company balance sheets. By understanding the variability inherent in risk exposures that are not necessarily insurable, it is possible to use analytics to develop tailored cover based on measurable factors such as volume of rainfall, wind speed, footfall and temperature.

Decision making audit trail

Another important benefit of using an analytical approach is the creation of an audit trail of decision making for risk financing. By considering current risk exposures, the efficiency of both the existing risk transfer programme and of alternative structures, it can be shown that an objective and robust approach has been followed that takes into account the interdependencies of risk, and consideration of the merits of different strategies before a decision is taken.

Benefits of this approach

More generally, companies that use this approach find that they:

- Change the nature of conversation about risk
- Increase focus on the portfolio of risks rather than individual types of risk
- Recognise the value of transferring risk above their risk tolerance
- Save money through the process of optimising their insurable risk financing
- Improve their corporate governance with an audit trail of risk financing decision making

Conclusion – time for a new conversation?

To conclude, a couple of recent examples will help to show the breadth of questions that can be answered by this approach.

Large European public utility

The Strategic Risk Consulting team within Willis Towers Watson carried out a detailed analysis of both the global natural peril and man-made risks the utility is exposed to. The results and expert interpretation of this analysis provided the client with a significantly improved understanding of the size of potential losses from the portfolio for both property damage and business interruption, which was vital in helping to reset the insurance limits and deductibles as well as determine a fair allocation of premiums between the businesses units across the world.

Global Energy Company

This client carried out a comprehensive risk optimisation exercise to better understand their total risk exposures and to identify the key drivers of risk, by geography and class of risk. The risk profile of the company was quantified, which demonstrated significant inherent risk in a single business unit. As a result, the company decided to sell off the highest risk business unit, and optimized insurance program for remaining business units.

Andy Smyth is Senior Partner in Willis Towers Watson's Structured Risk Solutions division in London.

Power generation losses: the problem with Business Interruption (BI)

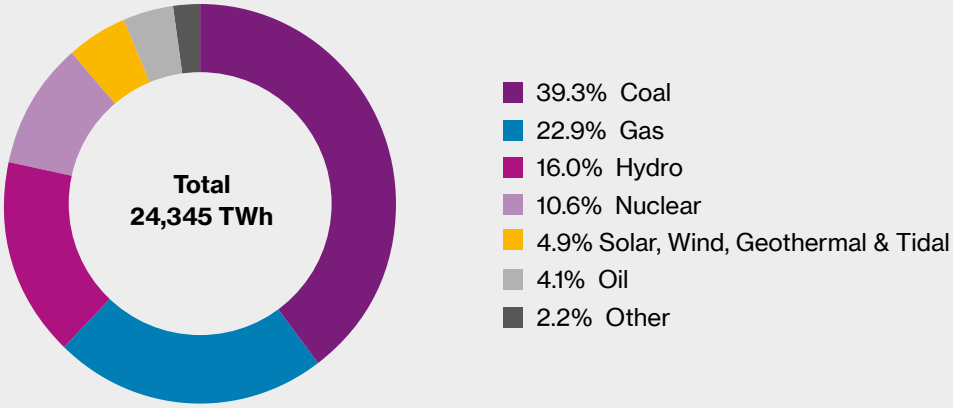
Introduction – conventional risks still to the forefront

According to figures produced by the International Energy Agency (IEA), world electricity production was circa 24.3TWh in 2017. Upon further analysis, the IEA figures also show that generation from combustible fuels continues to account for over 60% of the total production figure, as shown in Figure 1 below.

Whilst renewable forms of power generation worldwide continue their growth at an extraordinary pace against the backdrop of ongoing climate change policies and the resulting push for clean energy, the fact remains that conventional power will remain a significant source of electricity generation for the foreseeable future.

This presents ongoing challenges - not only for the industry itself, but also for the insurance market supporting the industry. Whilst projections predict a reduction year on year in generation from conventional power sources, in favour of renewable sources, the ongoing risks for insurance buyers remain as important as ever.

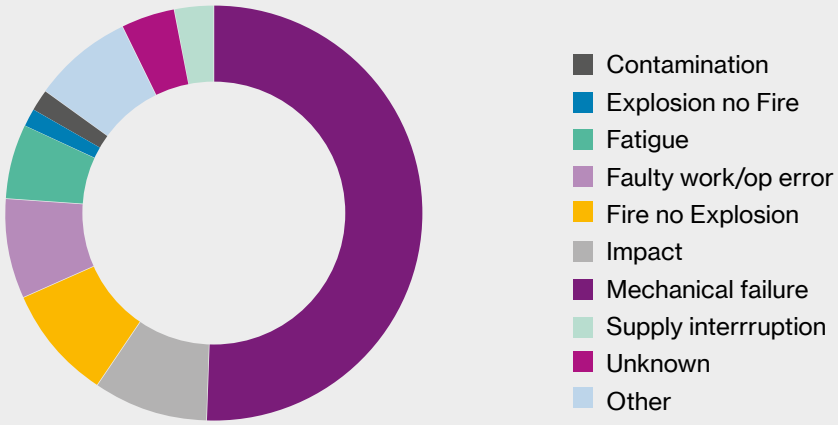
Fig 1 – World Electricity Production by source, 2017



Fossil fuels still dominate the global power generation mix in 2017 – keeping conventional risks still in the spotlight

Source: IEA Electricity Information 2017

Fig 2 – Power industry incidents by cause, 2015-18



Mechanical failure dominates the causes of power losses in 2017

Source: Willis Towers Watson Energy Loss Database

Underlying causes of power losses

An analysis of losses occurring globally since 2015, derived from our WTW Energy Loss database, have identified some interesting trends with regards to high level causes of losses.

Mechanical failure responsible for 50% of all losses

In almost all regions, mechanical failure is identified as the most significant cause of loss; this in itself is probably not surprising, given the age and operational parameters of generation equipment coupled with the ongoing increase in demand for power.

However, given this and the comparable values associated with these claims, insurers (both from an underwriting and claims handling perspective) will continue to be keen to fully understand the planned maintenance and outage schedules to ensure that the recommended requirements are complied with.

OEM/O&M contractual obligations critical

In parallel, the contractual obligations and responsibilities of the Original Equipment Manufacturers (OEM) and/or the Operations and Maintenance (O&M) Contractors remain a key component in assessing - and indeed limiting - insurers' potential exposures when failures do occur.

PD losses outstrip BI

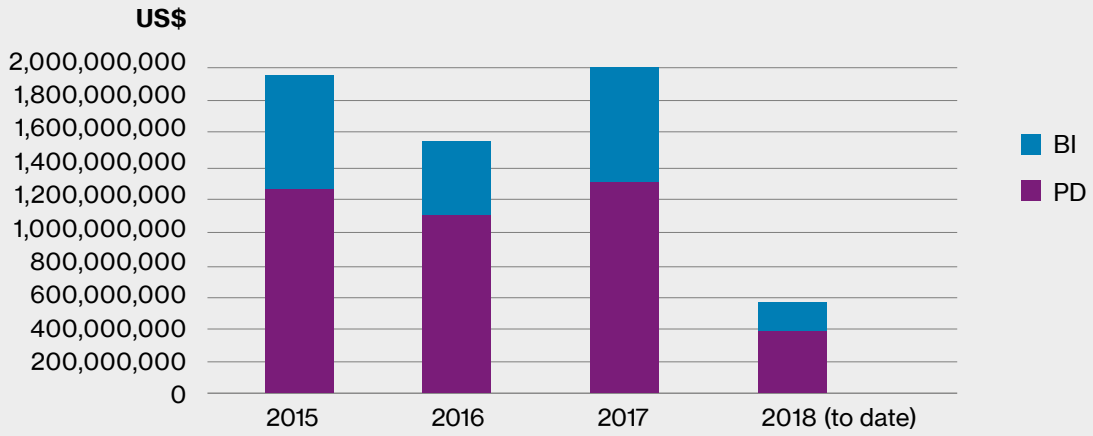
Since 2015, the value of global Physical Damage (PD) claim costs have exceeded Business Interruption (BI) costs in terms of overall quantum for losses. This may be put down to a number of factors, including the successful mitigation efforts on behalf of operators or simply that the reinstatement has taken place within uninsured waiting periods.

BI claim challenges

Of course it is well understood that for a BI claim to succeed there is a requirement for damage to be suffered as defined within the relevant damage section of the policy, irrespective of whether the quantum is within policy deductible levels. In our experience, this can cause issues where the root cause of a loss is unable to be determined easily or expediently.

Insurers' tendency is to wait for a conclusive position on cause prior to any admission of liability, even under an All Risks policy form. This in turn causes frustration for the Insured, who is trying to manage cash flows and projected insurance recoveries as part of their financial reporting, both internally and to external shareholders.

Fig 3 – PD/BI breakdown of power losses, 2015-18



Surprisingly, PD losses significantly outweigh BI losses over the last four years

Source : WillisTowersWatson Energy Loss Database

One way for all parties to try to reduce these concerns is to agree on a common expert to carry out the Root Cause Analysis, although the willingness and openness of the OEM/O&M plays a huge part in achieving a clear and agreed position.

Non-damage BI

However, there are many examples of Business Interruption losses suffered by power generation companies that have not been paid by insurers due to the absence of insured damage, or as a result of technical arguments on exclusions relating to defective parts or wear and tear, ultimately leading to a lack of policy response and significant uninsured losses.

This issue has provoked plenty of discussion within the insurance markets around the world as to whether buyers, their advisors and insurers should continue to explore the development of a form of non-damage business interruption cover which responds when the costs associated with repairs or rectification have been met under maintenance or warranty obligations.

Meanwhile, operators remain at the mercy of OEMs and O&Ms in terms of expediting effective solutions and any significant delays directly impacts the operators themselves and their bottom line.

Conclusion – same issues arising in the renewables sector?

As we approach the third decade of this century, the overriding question is perhaps this: will any of these issues diminish as we move further away from conventional thermal generation?

We are already seeing similar issues within the wind, solar and hydro sectors, with the same concerns and frustrations experienced by buyers and insurers alike. However, as generation from these alternative sources continue to expand and new generation sources develop further, the insurance industry needs also to remain open to explore alternative solutions to meet the buyer's needs. To quote Socrates: "The secret of change is to focus all of your energy not on fighting the old but on building the new."

Chris Ling is Claims Executive Director for Natural Resources at Willis Towers Watson in London.

Part four - global insurance market round-ups

Insurance market round-up: London

Property – the winds of change?

On the face of it, it might be argued that life in the London-based Power insurance market is carrying on in much the same way as it has done for many years. The glut of reinsurance market capital, referred to so often in our publications as the principal driver of soft market conditions, shows precious little sign of being withdrawn to be deployed elsewhere. As a result, reinsurance prices have remained low by historical standards, allowing direct insurers to compete more aggressively and fuelling the softening market conditions that we have experienced for the last ten years or so.

But as we have argued for some time now, logic dictates that this continual market softening has to break down eventually; at some stage, premium income levels become so low that it is just not worth underwriting a given portfolio anymore and loss ratios start to become unsustainable. In the past, we have been unable to say exactly when that point would be reached; only that further softening was showing that it had not been reached yet.

Is now the time? To answer that, let's have a look at some external factors which are influencing conditions in the London Power market.

The Lloyd's PMD initiative

While Lloyd's is by no means the only market underwriting Power, it is an important market for this sector. The widely reported prevailing circumstances at Lloyd's are therefore a useful place to start while we seek to develop the picture in terms of the challenges faced by global markets at the moment.

Under the leadership of John Hancock, the Lloyd's Performance Management Directive (PMD) put in place a process designed to bring significantly more rigour to the examination of individual syndicate business plans, following the overall underwriting loss made by the Corporation in 2017 (see Figure 1 overleaf). Syndicates which had made underwriting losses in each of the last three years received special attention.

Power was one of seven underperforming classes of business identified in a market-wide analysis of Lloyd's underwriting performance (the others being International Property Direct & Facultative; Overseas Motor; Marine Hull; Cargo; Yacht; and Protection & Indemnity).

"Logic dictates that this continual market softening has to break down eventually; at some stage, premium income levels become so low that it is just not worth underwriting a given portfolio anymore and loss ratios start to become unsustainable."

Fig 1 – 2017 catastrophes – the impact on Lloyd's

Loyd's aggregated results				
£m	**Dec 2015**	**Dec 2016**	**Dec 2017**	**Change from 2016**
Gross written premium	26,690	29,862	33,591	6% growth + 6% FX
Net earned premium	20,565	22,660	24,498	+8%
Net incurred claims	(10,262)	(12,987)	(18,250)	+41%
Operating expenses[1]	(8,256)	(9,205)	(9,669)	+5%
Underwriting result	**2,047**	**468**	**(3,421)**	-
Net investment income[2]	402	1,345	1,800	+34%
Foreign exchange gains/(losses)	(70)	578	(62)	-
Other expenses	(257)	(284)	(318)	+12%
Profit/(loss) before tax	2,122	2,107	(2,001)	-
Combined ratio	**90.0%**	**97.9%**	**114.0%**	-

Combined Ratio increases to 114% in 2017, driven by major claims and declining prices

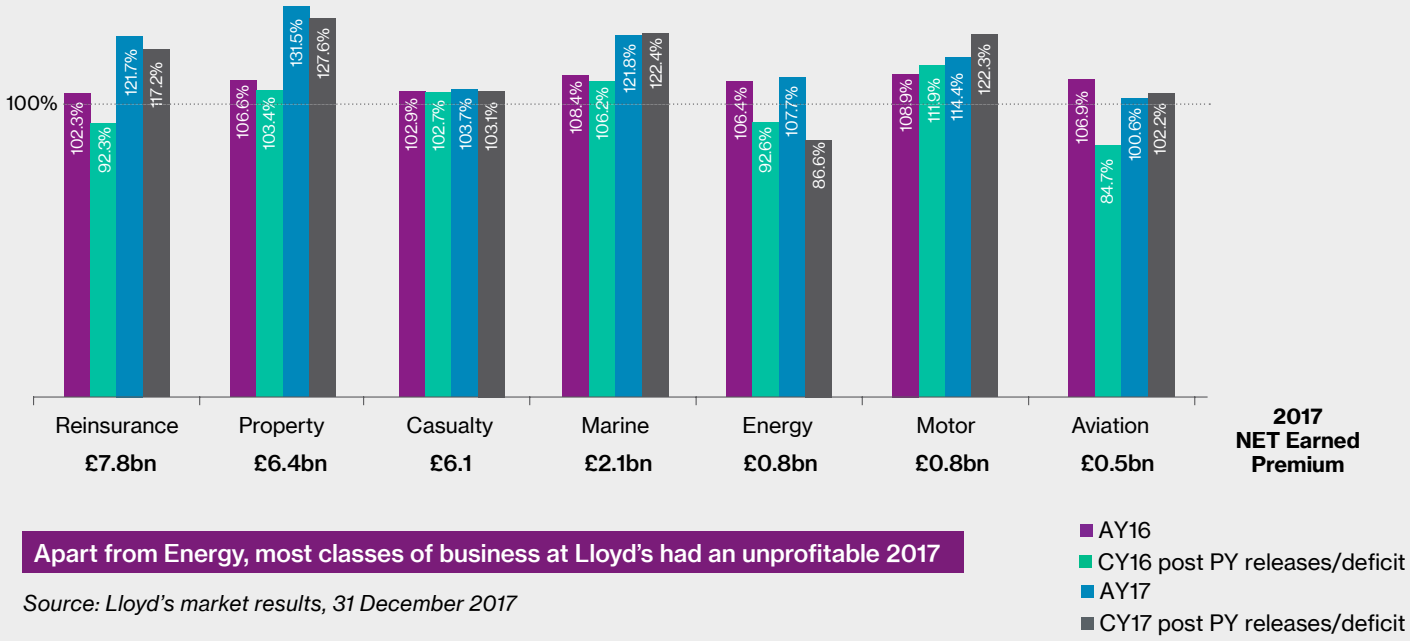
Source: Lloyd's market results

Of the 95 Lloyd's syndicates that presented business plans for 2019, two did not make the grade and have been put into an orderly run-off, 11 syndicates have approval to write more business in 2019 than they did in 2018, and all other business plans were approved, after thorough scrutiny and some refinement. The expected overall premium volume is likely to be down around 5% in 2019 over 2018, bringing it back to the 2017 premium volume of US$42.5bn.

Although it is not our place to comment directly on this process, it seems quite clear that this development is likely to put a break on individual syndicates' ability to compete in the market by driving down prices in order to achieve increased premium income streams. Given that power was one of the seven identified underperforming classes, we can expect this effect to be felt in the power insurance sector.

Fig 2 - Lloyd's: poor underwriting results in other classes

Combined ratios by class of business



Apart from Energy, most classes of business at Lloyd's had an unprofitable 2017

Source: Lloyd's market results, 31 December 2017

Unprofitability of other lines of business

As if this new degree of management scrutiny was not enough to change market dynamics, individual underwriting teams are also being forced onto the back foot by the results of other lines of business closely associated with their own portfolio (see Figure 2 above). Classes of business associated with power, such as Construction, Mining and Downstream Energy, have also been reporting negative underwriting results. The Insurance Insider reported in October that downstream property losses were estimated at US$2.3bn for the year to date, far in excess of the premium pool of around US$1.5bn, as a result of which underwriters in this segment of the market were reported to be seeking double-digit rate rises in 2019.[1]

Insurance company management pressures

In a truly competitive market, it might be thought that if one sector was being forced to pull back from competing at full throttle then another would be able to take full advantage. However, any notion that the company market might differentiate itself by continuing to offer increasingly competitive terms to buyers this year is almost certainly misplaced. If anything the major company market – including the likes of AIG, Swiss Re, Allianz, Munich and Chubb – have been hit more severely by last year's natural catastrophes and it is understood that their underwriters are under a similar pressure from senior management to scale back on premium income expansion and ensure that they "hold the line" on rating levels and other terms and conditions.

When Swiss Re announced its Q3 results it said that its "cumulative losses for the first nine months are broadly in line with year-to-date expectations".[2] This might suggest that 2018 was on course to be an average year for catastrophe losses.

However, Swiss Re commented that its Q3 losses were high for a single quarter. And Q4 will also be an above-average quarter for insured catastrophe losses, with the Californian wildfires and Hurricane Michael pushing the bill for the quarter towards US$30bn.3 Sure enough, Swiss Re reported in December that global insured catastrophe losses in 2018 were estimated to reach US$79bn, higher than the annual average of the previous decade of US$71bn.[4]

[1] https://www.insuranceinsider.com/articles/122529/downstream-market-looks-for-double-digit-rate-rises-in-2019

[2] "Swiss Re pegs Q3 cat and large losses at $1.4bn" - Insurance Insider, October 18 2018

[3] https://insuranceday.maritimeintelligence.informa.com/ID1124715/Industry-Q4-cat-bill-edges-towards-$30bn-as-loss-estimates-mount

[4] https://www.reinsurancene.ws/cat-losses-returned-to-normal-levels-over-2018-peel-hunt/

Speaking at the Baden-Baden reinsurance meeting (21-25 October 2018), a Munich Re executive observed that, given the overcapacity in the market, 2018's losses alone were not expected to increase rates at the 1 January renewals – although it should be noted that at the time this comment was made November's Camp Fire, the most destructive fire in Californian history[5], had not yet occurred. But they added that "underwriting discipline and the need for an adequate return on equity could have an upward impact on prices. The necessity and urgency to be disciplined in underwriting is increasing".[6]

Turning away from natural catastrophe losses and to the 'risk' experience in the Power sector, it would be reasonable to infer that if Lloyd's regards Power as an underperforming class then the company market will probably take a similar view. We have commented in previous Power Market Reviews on the continuing 'attritional' Machinery Breakdown and other losses typical of the power sector, which have severely challenged insurers' efforts to make their books profitable on a sustainable basis.

Result – a change of underwriting mood

As a result, we are seeing a change of mood amongst underwriters in virtually every line of business and geography. In very general terms, no longer is their overriding requirement meeting ambitious premium income targets; instead, the focus has generally switched to underwriting profitability. From our conversations in the market it seems that some underwriters are not far away from seeing their own positions coming under threat if they continue to ignore the underwriting criteria laid out by their management.

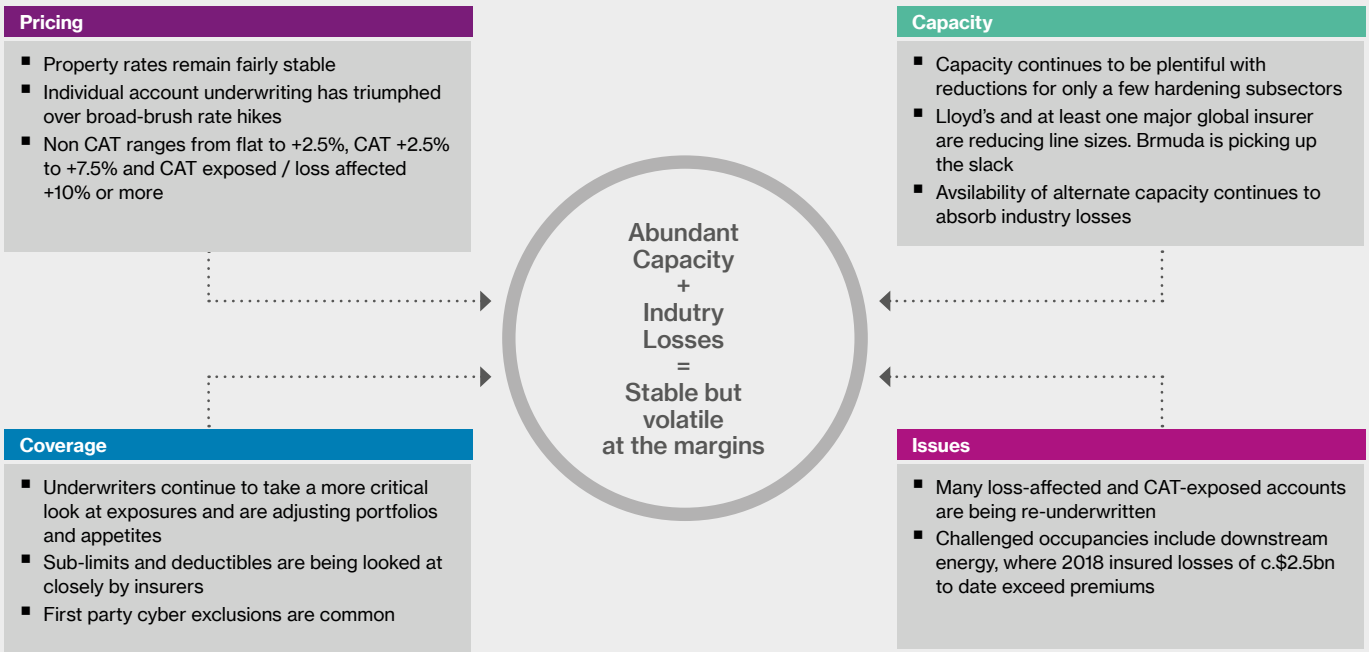
So although the overall theoretical capacity levels remain at record levels, brokers are finding it much more challenging to deliver the results that buyers have enjoyed now for so many years.

"We are seeing a change of mood amongst underwriters in virtually every line of business and geography. In very general terms, no longer is their overriding requirement meeting ambitious premium income targets; instead, the focus has generally switched to underwriting profitability."

[5] http://time.com/5470154/camp-fire-human-remains/

[6] "Reinsurers push for flat property cat renewal at Baden-Baden" - Insurance Insider, October 25 2018

Fig 3 – Current Property market landscape



Source: Willis Towers Watson

Result: a market turnaround is now a fact, not just an assertion

The Power market place has been a challenging environment for a number of years, due to the prolonged downward pressure on rates coupled with the annual losses equalling or surpassing the premium available for the class. The downward pressure has been in main due to the abundance of global capacity, coupled with the strength of offering regionally and internationally. The market had started to reach its breaking point towards the back end of 2016. Although reductions were still the starting point, they were mostly limited to single digit reductions compared to the wider Property market having double digit reductions.

The catastrophe events in the last quarter of 2017 saw the norm for renewals move from single digit rate reductions to flat rate as a starting point, with expectations the treaty renewals would further impact rate expectations going into 2018. Although the catastrophe events did not have the impact on treaty renewals that had been widely expected, the starting point has remained at flat rate renewals for non-loss making, low cat exposed territories.

Looking ahead to 2019 – five key dynamics

Figure 3 above provides an overview of a market that is no longer soft, but is still characterised by plentiful levels of capacity for most risks.

Going into 2019, there are five key market dynamics that continue to influence risk pricing for the sector that we touch on below:

1. **Lloyd's Review:** The management of Lloyd's has taken on an extensive exercise of reviewing the underwriting results and future plans of the Lloyd's syndicates in respect of the Power sector, which as mentioned above has been identified as underperforming. This review has been implemented due to the overall poor underwriting results of the class over the years. The review has put heavy impetus on the syndicates to improve these results and in some cases seen business plans rejected. The overall impact of the review has left the underwriters themselves nervous of the class and less likely to quote without increases in either the rate and/or the coverage. This attitude will be mirrored to an extent in the company market.

2. **Retreat from Coal:** As already discussed elsewhere in this Review, insurers' retreat from underwriting coal business has left coal-fired generators with a significant reduction in available capacity. This has various different parameters set by the individual carriers and although the carriers do not have knee jerk reaction on renewals they slowly look to remove themselves from programmes over an agreed period. This reduction in available capacity will invariably see upward pressure on rates and coverages as the competition for market share in this specific sector will be much more limited.

3. **M&A activity:** The impact of the M&A activity visible in the last couple of years invariably sees a tightening of the deployable capacity available. Whilst in many cases the available capacity is relatively unchanged, the appetites of the two merging companies often differ. As such, where you once had two options on pricing and coverages, you often now have one.

4. **Synergy of International offices' philosophy:** For a number of years markets have talked of philosophies being international but in practice has not entirely been the case. Whilst true for coverages which have in the main stayed consistent in the sector, pricing has always had wide discrepancy. 2018 has most certainly seen a stronger alignment and almost centralisation of underwriting philosophy in some of the major carriers. This alignment means that the options of utilising carriers in different regions to optimise marketing has been reduced and in effect again reduces the deployable capacity available.

5. **2018 loss experience:** Whilst 2018 has not been the worst year in terms of losses to the Power markets it, it is on track with the average year within the sector. This average when coupled with the deflated rates from a number of years of reductions has left the markets acting rather than simply complaining that conditions are unsustainable.

Carlos Wilkinson is Head of Power at Willis Towers Watson in London.

Ed Cooper is an Executive Director at Willis Towers Watson in London.

"The overall impact of the Lloyd's review has left the underwriters themselves nervous of the class and less likely to quote without increases in either the rate and/or the coverage. This attitude will be mirrored to an extent in the company market."

Liability – a year of two halves

Despite initial speculation that the market would harden at the start of the year, rate increases failed to materialise during the first half of 2018 as flat premiums became the norm for renewals in the absence of significant losses or meaningful changes to the risk exposure. Consequently, in the context of the overall renewal process risk adjusted premium increases could more often than not be consumed within the recent negotiation.

However as we approach the closing stages of the year we are witnessing a palpable shift in market conditions, with insurers now working under a mandate to obtain rate increases across their portfolios. In the main, underwriters are achieving this by targeting distressed and highly exposed accounts for significant rate increases; however, most recently insurers have demonstrated an intention to raise rates across the board, regardless of whether an account is performing well or not.

Corporate governance

A key contributing factor for this shift in market dynamics is the greater focus from Lloyd's on insurer profitability. Lloyd's' desire to arrest declining loss ratios by requiring syndicates to return unprofitable elements of their business to profitability (in conjunction with the 'Decile 10' initiative) has forced an unquestionable reaction from the market. As a result, technical pricing adequacy is very much under the spotlight and invariably rates are moving in a single, upwards, direction.

Capacity developments: a contraction on the horizon?

In tandem with applying upward pressure on rates, the greater regulatory scrutiny may also begin to play a part in restricting available capacity in the market. Whilst at present the total global Liability capacity remains relatively stable, total capacity in the market may begin to contract as we enter into 2019 and beyond. However such a contraction is unlikely to be consistent across the globe as certain regional markets such as Asia reap the rewards of more profitable underwriting performances. Nonetheless, the expertise and experience of the London market, especially amongst more complex sectors such as Power, remain paramount drivers for London retaining its value and attraction as a global insurance market.

Concurrently, whilst the position is by no means universal, the number of insurers exiting the coal sector is increasing and power companies purchasing high limits who are either solely or heavily involved in coal operations will be unable to avoid the effects of this capacity supply dropping out of the market.

Insurer retentions results in greater aggregation control

Reinsurance treaties have also played a part in influencing underwriter appetite. Increased insurer retentions have resulted in greater aggregation control and a reduction in the willingness for insurers to deploy large primary lines. Nevertheless at US$ 3.3bn there still remains ample capacity in the market for even the most significant of limits and programmes with more modest levels of indemnity continue to benefit from the healthy competition produced by the capacity available. If the circumstances allow for it, this surplus capacity can be used by brokers to restructure clients' insurance programmes to generate economic efficiency savings.

Consistent coverage

In terms of coverage, market conditions have remained largely consistent, except for an increasing pressure from insurers to exclude cyber liability from General Liability programmes. Common extensions such as Electromagnetic Fields (EMF) and Unmanned Aerial Vehicles (UAV) clauses continue to be accepted on a standard basis and Pure Financial Loss Failure to Supply extensions remain available, subject to meaningful additional premium and exposure information.

Riding the wave

Amongst all of this change and uncertainty, buyers are treading unchartered waters in terms of what this means for their insurance programmes. As a result, it is more important than ever that clients ensure that they not only nurture and build their longstanding relationships with markets, but that they also appoint a broker capable of assisting them ride the wave of market developments. Equipped with comprehensive underwriting information, a coherent marketing strategy and enough time to engage with insurers early, credible and experienced brokers should still be capable of arbitraging market relationships in order obtain successful results for their clients, albeit more likely in the form of structure and coverage improvements than rate discounts.

Matt Clissitt is an Executive Director at Willis Towers Watson in London.

Construction

Introduction – is a hard market for the Power Construction round the corner?

The recent high profile hydro claims continue to dominate the Power Construction insurance market. Rate reductions are tapering off as markets are pushing for price increases; insurers are also becoming more selective over offering the wider coverages obtained within the broader broker wordings when being presented with a new large scale power project. Natural catastrophe events are likely to further this decline and we are seeing some individual rate increases in exposed locations.

Within the last twelve months several recognised Power Construction insurers have closed or diluted their construction underwriting accounts; these markets include Beazley, Talbot, Hardy, MS Amlin and Tokio Marine Kiln. This has resulted in a reduction in combined capacity of circa US$ 325m from the Power Construction market and further rumours circulate that other insurers are to follow suit. However, capacity is still plentiful and the appetite to underwrite new power projects is still strong.

New gas turbine technology – some teething problems

The evolution of gas turbine technology appears to be showing no signs of slowing down, with the introduction of newer and more efficient machines many of which are now (or are close to) coming out of final validation and achieving a full first year's commercial operations.

However, as evidenced in some of the recent announcements, not all new models have achieved this milestone without some signs of initial teething problems which Original Equipment Manufacturers are now working hard to rectify, not just for all existing plants already under construction or now in operation but also those currently on order.

With virtually the full range of existing and more established models also undergoing continued enhancement, it is not easy for insurers to keep track of what unit is being presented to them when looking at a new risk for the first time. An early clarification of this and the other key features of the plant can only assist the broker when making his first approach to insurers.

Minimum deductible thresholds

With bigger machines potentially meaning a higher replacement value, insurers are keen to maintain a minimum threshold when it comes to the level of deductibles to be applied to large frame gas turbine and generator sets whilst at the same time seeking reassurance on the robustness of the Original Equipment Manufacturer warranty they expect to be in place. Insurers historically have been reluctant to assume the risk of design and manufacturing of such new and enhanced machines and will where possible continue to limit the scope of the cover they provide to what they perceive to be the "construction" risk when covering such projects. It is unlikely they will change this approach as the new and cutting edge technology continues to be rolled out.

IGCC resurgence as coal maintains its profile

Although coal continues to lose pace to gas in some parts of the world due to continued environmental concerns and pricing exposures (in particular in the US with the "fracking" and "shale gas" boom providing an abundance of gas supply) it is still a major if not dominating fuel for power in some parts of the world. Furthermore, a small but apparently growing resurgence in Integrated Gasification Combined Cycle (IGCC) assets, with new demonstration plants coming on line around the globe promoting the case for further clean coal research and development, adds fuel to the argument that coal can still be viewed as a growing factor in the overall generation mix.

Boiler design an insurer focus

Continued development in super and ultra-super critical boiler design using higher temperatures and pressures with the resulting need for newer and more exotic materials to be used in certain boiler sections remains a key area of focus for insurers. Some high profile losses at units using some of these materials has only increased the concern insurers and their engineers have and so design and composite make-up of the boiler continues to be at the forefront of insurers minds when presented with a new coal fired project.

QA/QC critical

When considering a new risk (gas or coal fired) insurers will also want to see evidence of a robust and comprehensive QA/QC programme, including a focus on Positive Materials Identification (PMI) and a detailed understanding of the planned inspection programme for the project, including details of the Owner Engineer's role in the QA/QC process.

New hydroelectric plants pose increased nat cat risk

Hydraulic energy accounts for a very significant percentage of the world's electricity produced from renewable sources. As demand for hydro projects grows, the need to find land suitably sited to build dams becomes more challenging in order to minimise disruption to the indigenous populations and also so as to not disrupt the water demands of local agriculture.

Consequently, hydroelectric dam projects are increasingly being developed in ever more remote locations. Due to the nature of these projects these locations are often in areas that have an increased natural catastrophe exposure and/or are being considered for fluvial water courses that have very large variations in seasonal river flow that can create significant challenges during construction.

Tunnel coverage restrictions

It's is often the case that hydroelectric plants will have large diameter tunnels constructed as part of the project. Depending on rock type and the degree of fracturing and faulting, these water transfer tunnels are often constructed by drill and blast. Regardless of the method of tunnelling proposed for the project, underwriters will seek to restrict insurance cover for loss/damage to tunnels under construction either to a percentage of the original linear construction cost (usually 150%) or a monetary limit of liability but less than the total value of the entire tunnel construction value. This is because the cost of repair and rectification of failed tunnels can sometimes significantly exceed the original construction cost due to issues related to access and also the associated cost of reinstating ground and/or profile around the original tunnel alignment.

Conclusion

The power generation industry has thrown up many challenges to the construction insurance market over the last 25 years, particularly as power generation technologies strive to keep pace with increasing demand for reliable power supply. The recent major losses in the hydro sector continue to be measured for potential impact on the way insurers evaluate similar projects in the future. New and more efficient gas turbine technology and boiler designs will be closely reviewed by specialist power markets as new projects are operated on a commercial basis.

David Forster is a Divisional Director at Willis Towers Watson in London.

Terrorism & Political Violence

Capacity stabilises

Over the last few years, the capacity for Property Terrorism has remained fairly stable at around US$ 4.5 billion, after years of dramatic growth. During that time, the market capacity for the sub-perils of Political Violence and Terrorism Liability has steadily grown to around US$ 1.9 billion and US$ 1.7 billion respectively, whilst NCBR (nuclear, chemical, biological and radiological) terrorism and "cyber physical damage" terrorism capacity have grown quite rapidly in the last two years to around US$ 600 million and US$ 1.3 billion respectively.[7]

Little fall-out from Lloyd's initiatives

Whilst the market is predominantly Lloyd's based, the performance reviews and extra scrutiny of business plans being undertaken by Lloyd's at present are not expected to have major impact on market capacity over the next year - only two syndicates with terrorism market capacity (The Standard 1884 and Advent 780 due to their integration into Brit 2987) have entered run-off. Some syndicates are closing their Marine or Property lines where they might have previously purchased combined treaty cover, but the impact is expected to be minimal due to most being able to move this Terrorism treaty cover into an alternative combined treaty programme with another line. Furthermore, whilst they are reducing line sizes in other classes, AIG's Terrorism capacity is not expected to reduce dramatically in 2019. However, as they continue to tighten underwriting principles there is some expectation that their capacity will not be as easily available on longer term deals or on more challenging risks.

Overall, it is therefore expected that the Terrorism market capacity across all sub-perils may see some flattening and stabilisation; there is potentially for some decrease in overall capacity but this is not expected to have any major impact on supply against general buyer demand.

Pricing: no dramatic changes anticipated

In line with the minimal impact expected from the Lloyd's and AIG performance reviews on capacity, pricing and rating is not expected to see any dramatic change either through 2019. Since the heavy natural catastrophe season of 2017, pricing has mostly flattened and this is expected to continue. Reductions are still possible in certain cases, but generally only up to around 5%, and in countries or regions where the security situation is deteriorating, rates are increasing in line with heightened risk.

Losses – attritional rather than catastrophic

In recent years the world has seen thousands of Terrorism and Political Violence events globally, but the majority of attacks against the power industry have mostly been seen in the Middle East, Africa and Central Asia, where the legacies of ongoing conflict perpetuate themselves. Whilst Europe and North America has seen an increase in attacks in recent years, along with the foiling of numerous planned attacks against the power industry, the majority of actual attacks have mostly been in city centres and have targeted mass casualties rather than infrastructure.

The Terrorism and Political Violence market has continued to pay a number of losses to the power industry; however, the majority of these are small and/or attritional rather than catastrophic. While these losses continue to be paid and may have some impact on renewals for those particular affected insurance buyers, this is not expected to have any major impact on general market capacity or pricing any further than the changes otherwise caused by any shift in the security environment in those regions.

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[7] Source: Willis Towers Watson

Insurance market round-up: International

North America

Rate increases the norm for 2019

Following an unprofitable 2017, US insurers pushed for rate increases in 2018. Ample market capacity remained, tempering these rate increases to single-digit level for most clients, and some enjoyed modest rate decreases. In our opinion, insurer performance in 2018 will be better than 2017, but still unprofitable following a few large risk losses, California wildfire losses, and another above-average hurricane season. Consequently, modest rate increases are expected to continue into 2019.

Key markets

Key markets for the thermal power sector in North America remain Associated Electric & Gas Insurance Services (AEGIS), FM Global, Munich Re, Swiss Re, Zurich, AIG and Liberty International (LIU). AIG has reduced its property capacity on many risks, including power generation, as it takes a fresh look at how it underwrites risk. There is still significant domestic North American capacity available, estimated at over US$3 billion for the right accounts, although this drops off significantly if the risk has extensive loss experience or catastrophe peril exposure. Less capacity is available for coal-fired generation as separately discussed elsewhere in this Review.

ILS: filling the Excess Liability gap

In recent years, Excess Liability carriers have reduced the amount of wildfire coverage they provide. To partially fill this gap, Investment-linked securities (ILS) have been developed to provide clients with limited coverage in place of - or in addition to - what their excess liability policies provide. The Camp Fire and Woolsey Fire of November of 2018 were expensive events for California clients and their insurers; these fires exhausted any coverage provided by these ILS products, and the cost to purchase wildfire coverage going forward will grow significantly.

Thermal and renewable assets: move to separate programs

Insurers writing thermal power generation also entertain renewable energy risks, along with HSB, AXIS, and MGAs GCube and PERse. In recent years, many large clients have looked to separately place insurance for thermal assets in one program and renewable assets in another. AEGIS and PERse partnered in 2018 to help facilitate this development in 2018 with AEGIS' blessing. Renewable programs typically are cheaper than thermal programs, with significantly lower deductibles; this trend is expected to continue as traditional insurers look to promote renewable energy for public relations reasons, as well as replace premium lost by exiting the coal-generation space.

Bad actors highlight cyber risk

Creative and persistent "bad actors" continue to present new challenges impacting Grid Security and Cyber Resilience. The proliferation of threatened and successful attacks on global power distribution systems has highlighted the fragility and susceptibility of the grid to malicious attack. Furthermore, the increasing decentralization of power distributions systems and interconnection of smart energy assets create more entry points for malevolent actors to enter utility systems.

Clients continue to invest in cybersecurity and cyber risk mitigation efforts, with most considering the purchase of cyber insurance, a product that has emerged in recent years. Insurers continue to struggle with "soft cyber" losses – cyber events covered in non-cyber policies. Underwriters are attempting to reduce or exclude "Soft cyber" in their renewal policies, and encourage their clients to purchase their stand-alone cyber policies to protect against this exposure. More work will be done to move coverage for cyber-related events to these cyber policies.

Uninsured exposures highlighted by RTOs and ISOs

Capacity Performance markets developed in recent years by Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs) present exposure to power generation clients that are not typically insured. Power producers who clear in the capacity auctions are contractually obligated to provide capacity on demand; when a power producer is unable to meet its obligation when called upon, these organizations assign steep non-performance charges.

Several carriers – namely Archer (an MGA), AEGIS, Swiss Re and Munich Re/HSB – offer stand-alone coverage to protect against this exposure. To date, most clients do not buy this coverage due to its relatively high cost. Limited coverage for this exposure is creeping into traditional policies, subject to high retentions, at more manageable cost.

Michael Perron is Power Generation Leader for North America, Willis Towers Watson.

"Creative and persistent "bad actors" continue to present new challenges impacting Grid Security and Cyber Resilience."

Latin America

Growth of clean power as shift from thermal to renewables continues

Latin America leads the world in clean power generation, producing over 50% of its power with clean energy. Hydro has historically been the main contributor to that, followed by wind, solar, bioenergy and geothermal. Specifically, wind and solar investment keeps on growing.

The main reasons to shift further away from thermal to renewables are the effects of climate change and the reduction of global emissions of carbon dioxide. Recent hurricanes (Caribbean) and floods (Peru/Colombia) have shown the negative effect of climate change. This has led local governments to support renewable projects, mainly through power auctions. In addition, the high cost and exposures of large hydro dam constructions and climate change impact (unpredictability of rainfall/water levels) and falling investment cost/MW makes alternative renewables such as wind and solar more attractive, with wind generation taking the predominant part in Latin America for new investments.

Brazil, Mexico and Argentina will continue to be leaders in terms of percentage MW investment in alternative renewables in Latin America. In terms of growth percentage, Chile is likely to outnumber other countries. Meanwhile Uruguay and Costa Rica continue to be the countries with the highest percentage of renewable installed capacity (nearly 100%).

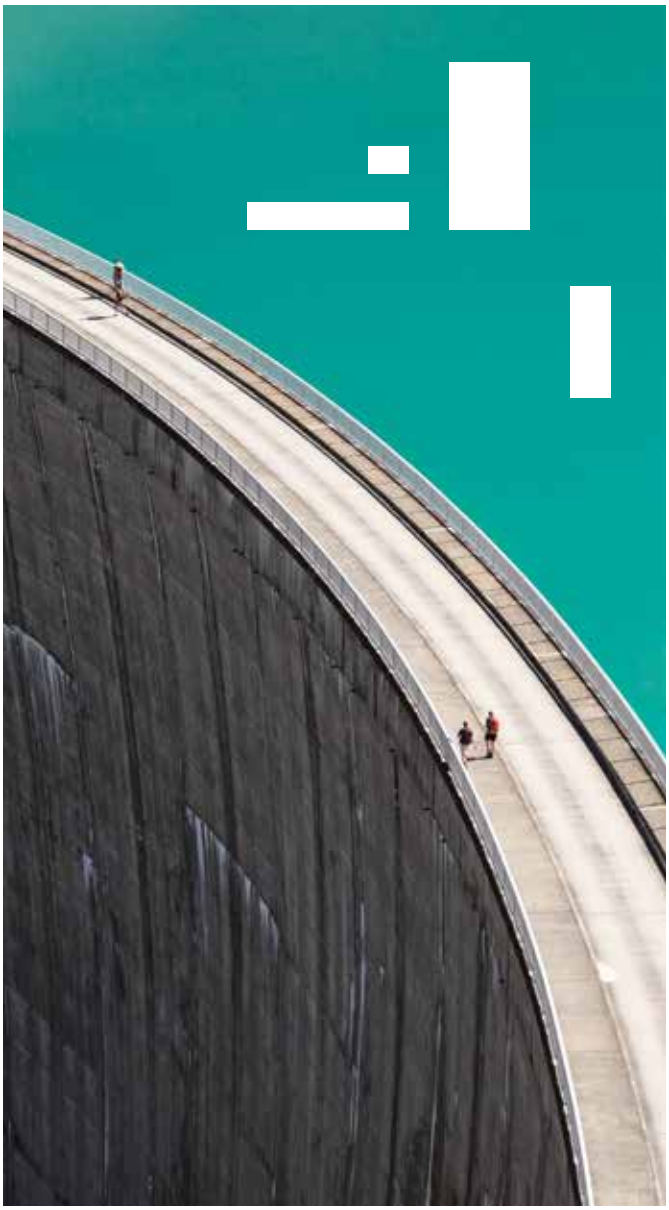
In respect of the insurance market, Latin America´s insurance capacity for large power projects remains the international markets in Miami, London and Spain. Some important global insurers also have underwriting capacity form other countries in Latin America, being Mexico, Colombia, Chile and Argentina. Brazil's insurance market remains strong for Brazilian power risks and is also expanding internationally (e.g. Instituto de Resseguros do Brasil (IRB).

Policy wording challenges

Wordings used in Latin American markets are often very limited in scope of cover and therefore need attention to provide adequate protection to power clients. In most countries, insurance regulation allows the use of tailor-made wordings; still often standard general forms are the norm. Brazil requires special attention in that respect because wordings are regulated and even the use of a specialist insurance consultancy is essential for buyers to make sure they have the quality product they are looking for.

The quality of the wording has also its bearing on bankability of projects. Renewable projects tend to have non-recourse finance and therefore require a tailor-made approach. Furthermore, an understanding of how direct assignment of reinsurance security to the lenders can be arranged is key to having the project reach its financial close in time.

Marc Vermeiren is Latin America Regional Industry leader for Power & Utilities, Willis Towers Watson.



Middle East

Background – a buyer's market

The Middle East (re)insurance hub has provided an interesting landscape for placement of technical Power, Utilities and wider onshore Natural Resources risks in recent years. As capacity has drifted towards the region, mainly in the form of new branches of international reinsurers as well as the Lloyd's platform and a number of MGAs, buyers have taken advantage of extremely soft market conditions, represented by a significant over supply of capacity, a drive for underwriters to focus on top line growth and generous percentage reductions on well performing business as well as competitive supply of capacity for business with less favourable claims histories.

Today – profitability challenges

The last twelve months have provided an unprecedented profitability challenge, as the Middle East marketplace struggles to assert its identity on the global (re)insurance landscape. Losses in the industry, both globally and regionally, continue to be significant and the rate of premium rate decline for the last few years has eroded any possible ability for (re)insurers to make a return on investment.

DIFC withdrawals as reinsurance capacity shrinks

The recent winding up of a number of "branch" and "MGA" operations in the Middle East (specifically the Dubai International Financial Centre) as well as company markets with branch operations in the wider Middle East (e.g. Bahrain) illustrates the current shift in the market. (Re) insurance capacity in the Middle East is shrinking, with a significant chunk of authority moving from the region back towards the centre (whether in London, Europe or the US). A number of reinsurers are demanding certain percentage rate increases and reductions or eradication of soft credits such as No Claims Bonus and Long Term Agreements - all as mandated by Head Office, in many cases with little room for interpretation or negotiation. This process seems to be geared towards a recalibration of rating within the sector rather than a knee jerk reaction.

Conclusion – buyer expectations should be managed!

The Middle East marketplace continues to have an important part to play in the rating of power and utility risks in the region but it will be even more important than ever for brokers to manage client expectations as well as judge the best access point for risks emanating from the region, specifically regarding those reinsurers who have multiple geographical branches e.g. London, Singapore or the Middle East.

Will Peilow is MEA Regional Leader - Downstream Natural Resources at Willis Towers Watson in London.

"The last twelve months have provided an unprecedented profitability challenge, as the Middle East marketplace struggles to assert its identity on the global (re) insurance landscape."

Asia Pacific

Notwithstanding a remarkable nine typhoons that made landfall in Asia in 2018, with the most severe, Typhoon Jebi, generating more than US$7bn in insured losses[1], the last twelve months have witnessed a very marginal market softening in Asia, as the oversupply of capacity has driven the market slightly lower. This is despite the power sector remaining challenging for insurers, who continue to incur high levels of attritional losses together with a number of individual loss events that have resulted in claims in excess of US$100 million. So while it can be considered to be a strain on insurer profitability, the Asia Power market remains well capitalized, with a blend of local and international insurers/reinsurers remaining committed to this sector.

Against this backdrop, Singapore's position as an insurance and reinsurance hub for the power sector in Asia continues to strengthen, with increased penetration from European insurers (including Allianz Global Corporate Solutions, Axa Corporate Solutions, Zurich Insurance and HDI) and other international reinsurers, who generally operate with full underwriting authority through their local subsidiaries. In addition we continue to see strong competition for domestic and regional business from Korean and Chinese insurers.

Risk selection continues to be a priority for insurers striving for profitability in this challenging sector, maintaining a high level of competition for those power companies who can demonstrate superior risk management and a good loss record. Those with significant losses and/or a poorer risk profile, on the other hand, are likely to have been subject to increased rates and premiums.

Looking into 2019, Asia is likely to be the part of the world most impacted by the negative position taken by reinsurers to coal fired power generation, discussed elsewhere in this Review, with 13 of the top 20 countries still building new coal capacity being located in the region[2]. This will inevitably give rise to challenges for many Asia Pacific power companies, and will require the deployment of innovative insurance placement strategies.

Steve Richardson is Head of Power at Willis Towers Watson Singapore.

[1] https://www.insuranceinsider.com/articles/122680/reinsurers-eyeing-rate-rises-in-asia-after-cat-struck-2018

[2] https://www.eco-business.com/news/coal-is-in-decline-globally-but-asia-is-driving-new-plant-development/

Australia

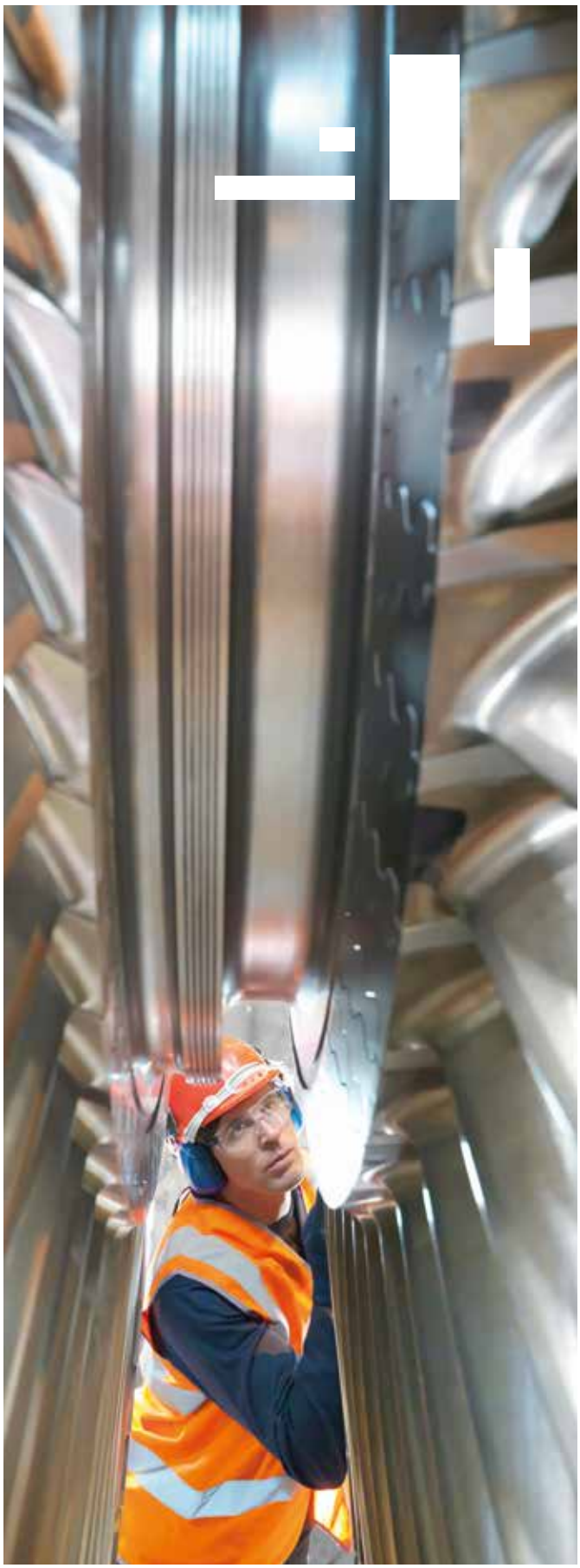
While significant capacity remains in the Australian market, there has been a shift in available capacity, particularly from European insurers as they have been reviewing their positions in providing capacity to coal fired power generation assets. These markets are tending to restrict, or no longer participate in, stand-alone assets or programmes that are dominated by coal generation.

For single site, or independent power producers, this reduces the potential number of lead insurers competing for business and could result in less favourable terms than what we've seen in recent, more competitive cycles.

As forecast in our last Review, rates have continued to increase as insurers seek to improve their underwriting results. They are looking to deploy their capacity to quality risks with sound risk management and good claims performance.

With the continued move towards a low carbon environment, the renewable sector has remained competitive as insurers seek alternative sources of premium income. With the withdrawal of certain capacity from coal operations, local Insurers are seeking increased involvement in renewable programmes which have traditionally flowed to overseas markets.

Stephen McDermott is Placement Services Director at Willis Towers Watson in Brisbane.



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