

An aerial photograph of a solar farm. The majority of the image is composed of a dense grid of solar panels. In the lower-left quadrant, there is a large, light-colored rectangular building with a flat roof. To the left of this building is a circular structure with a colorful, geometric pattern around its base. Further to the left, another circular structure is visible, containing several blue cylindrical objects. The solar panels are arranged in a grid that curves around the central building area.

Renewable Energy Market Review

After COP26:
risk implications for the
renewables industry

January 2022



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Style

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 lower case to describe various parts of the renewable energy industry itself.

Abbreviations

The following abbreviations have been used throughout this Review:

BESS	Battery Energy Storage Systems
BI	Business Interruption
CEO	Chief Executive Officer
CFO	Chief Financial Officer
COVID-19	Coronavirus disease 2019
CRO	Chief Risk Officer
DSU	Delay in Start-Up
EML	Estimated Maximum Loss
EPC	Engineering, Procurement and Construction
ESG	Environmental Social Governance
EU	European Union
FT	Financial Times
GDP	Gross Domestic Product
GW/h	Gigawatt/hour
IEA	International Energy Agency
LEG	London Engineering Group
IPP	Independent Power Producer
MFL	Maximum Foreseeable Loss
MW	Megawatt
Nat Cat	Natural Catastrophe
O&M	Operations & Maintenance
OEM	Original Equipment Manufacturer
OPEC	Organisation of Petroleum Exporting Countries
PD	Physical Damage
PML	Probable Maximum Loss
PPA	Power Purchase Agreement
PV	Photovoltaic
UN	United Nations
US	United States
WTG	Wind Turbine Generator
WTO	World Trade Organisation



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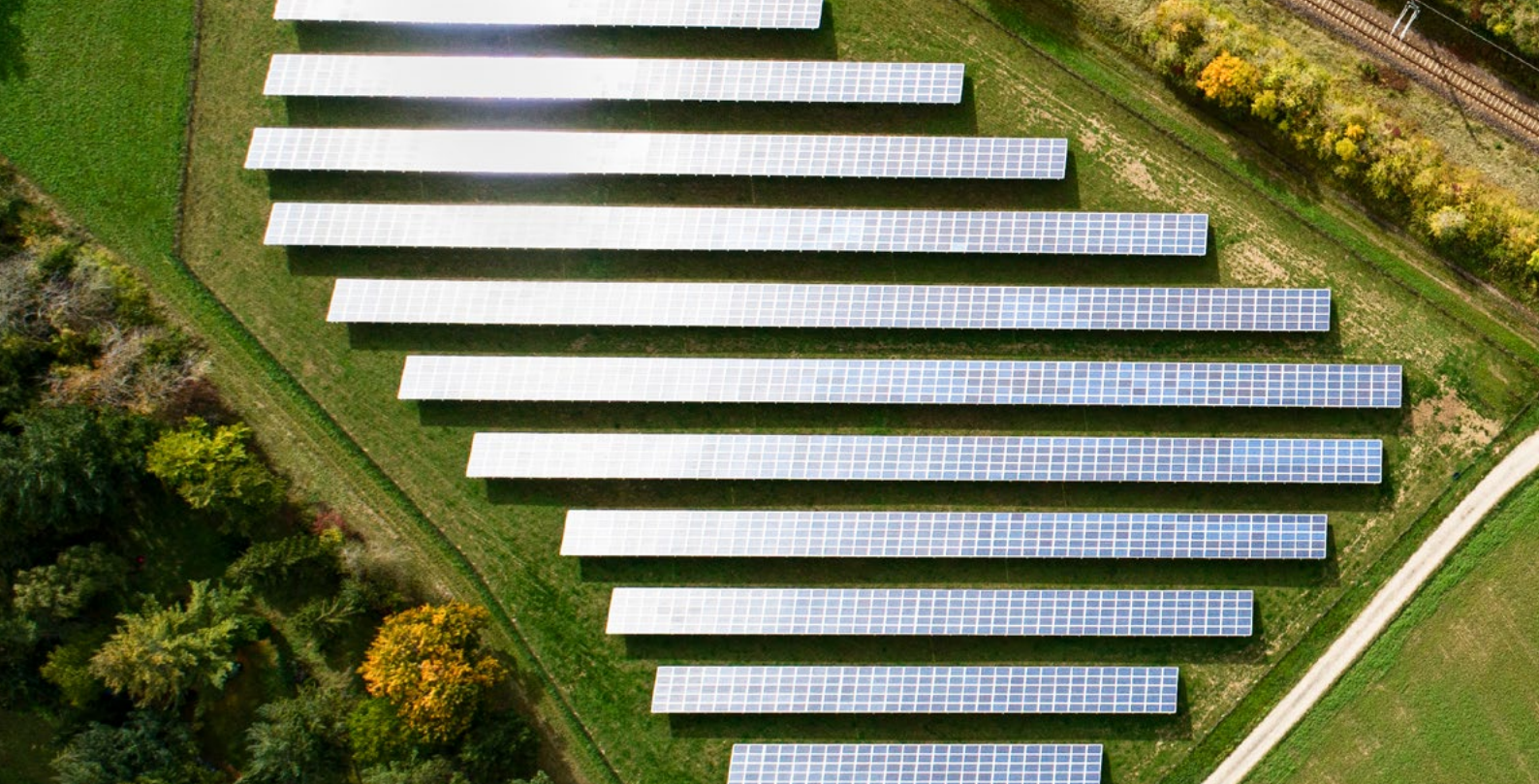
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Introduction

Welcome to this year's Renewable Energy Market Review. While we would all have hoped that by this stage the worst of the COVID-19 pandemic would be behind us, we sadly currently find ourselves beset by the Omicron variant; we just hope that all our readers are staying safe as this latest phase of the pandemic sweeps through the world.

In the meantime, we all continue to digest the implications of the recent COP26 summit in Glasgow held last year and the implications for the renewable energy industry. It's fair to say that although not everything was achieved at the summit that some might have hoped for, the 1.5 degrees Celsius target is still there – even if only on “life support”. But what is really striking, from a renewable energy industry perspective, are the changes in the risk landscape that are undoubtedly unfolding in the aftermath of the latest efforts to get the world to take action on climate change.

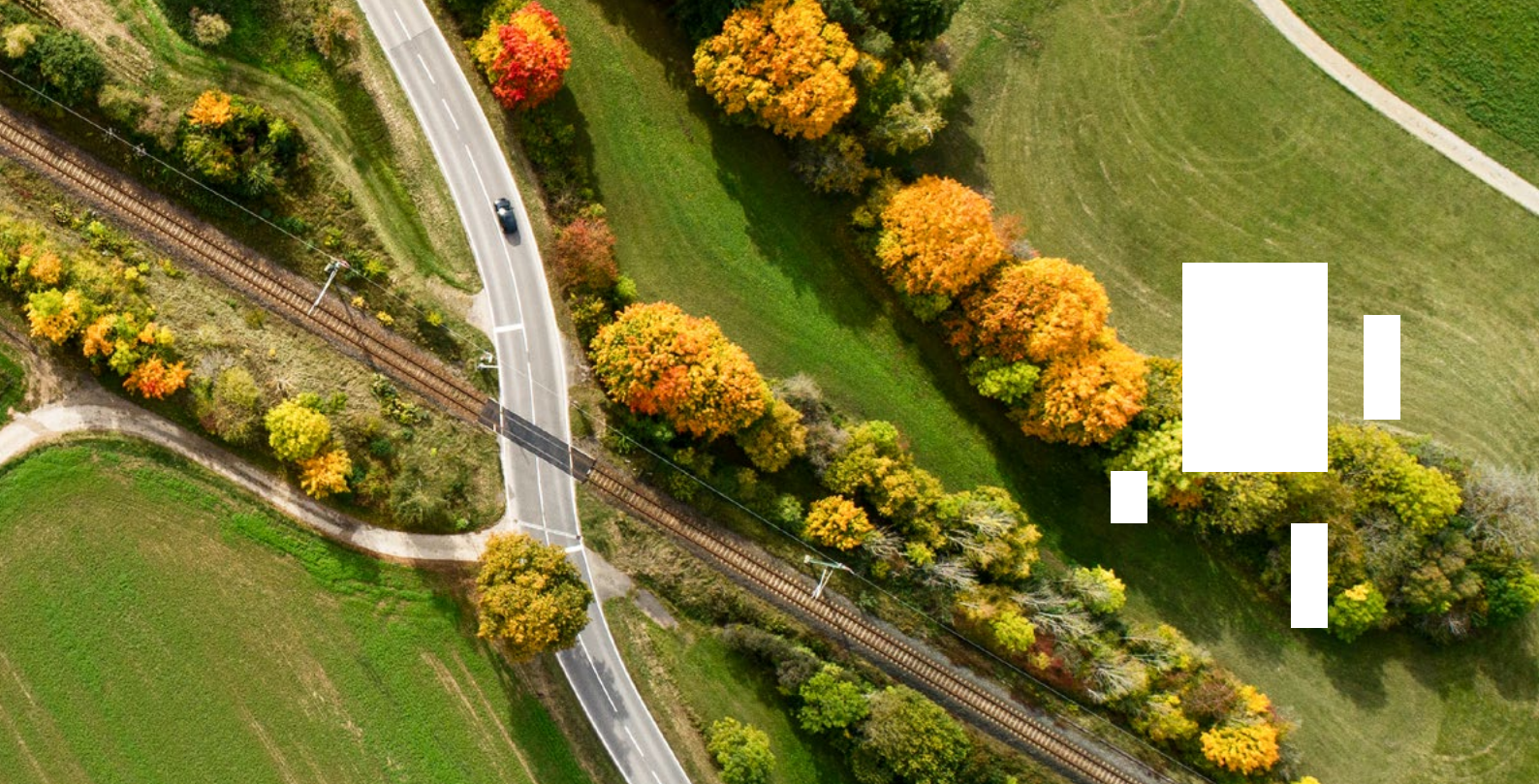
That's why this year we have entitled our Review “After COP26: risk implications for the renewables industry” because we wanted to provide a framework within which our readers could establish where their own organisation is positioned on their own journey towards a Net Zero future. Our leading article this year comes from Tony Rooke and Lucy Stanbrough of our Climate Resilience Hub and outlines the reasons why renewable energy companies need a climate transition plan to build their own resilience to their enhanced climate risk. This is especially relevant at a time when the global financial system, including private

investors, regulators and central banks, have started to acknowledge their role in aligning capital flows with the climate transition. Renewable energy companies will need to act fast to develop plans to ensure that these external stakeholders continue to support their organisation.

By implication, risk managers will begin to play a much more dynamic role in shaping climate risk responses within their companies – especially in relation to establishing improved ESG ratings, given the increased scrutiny from the financial industry. Our second article is written by climate change expert Margaret-Ann Splawn and outlines just what companies – and specifically risk managers - need to do now to improve their ESG standings. Despite their apparent green credentials, it's clear that renewable energy companies will be by no means exempt from what will be required by law in across the globe in the months and years ahead. And that means that building climate resilience within the renewable energy industry belongs firmly in the risk manager's in-tray.

In the meantime, the industry continues to grow exponentially. Tony Rooke points out that record growth in solar PV and wind capacity additions continued in 2021, beating the previous year's record. The IEA estimates this will accelerate to 2026, increasing electricity capacity by over 60% between 2020 and 2026. The leading four regions (China, Europe, USA and India) will account for 80% of this growth.¹

¹ <https://iea.blob.core.windows.net/assets/5ae32253-7409-4f9a-a91d-1493ffb9777a/Renewables2021-Analysisandforecastto2026.pdf>



So in Part Two of the review we take a closer look at developments in several parts of the industry. We primarily focus on the emergence of hydrogen - and specifically green hydrogen - as a possible “fuel of the future”, while we also take a look at the Solar, BESS and Hybrid industries, specifically in relation to some of the key risks that are emerging in these sectors.

In Part Three we take some time to examine some very significant risk management and insurance market issues which are currently challenging the industry; we’ve included articles on such diverse issues as parametric insurance, the Jones Act and the US offshore wind industry, Japanese offshore wind projects and emerging political risks. But there are perhaps two articles here that are worthy of special attention: one on innovation and one on natural catastrophe risk. Is it right that the insurance market should bear the brunt of the industry’s innovation risk? And following a month when US tornado losses have reached into the billions of dollars, and when Swiss Re have informed us that overall global Nat Cat losses for 2021 have now topped US\$110 billion², just how is the insurance market reacting to this enhanced natural catastrophe risk? Please read on to find out what our experts have to say on these issues.

Finally in Part Four we examine some good news from an insurance buyer perspective – we may have finally reached the peak of the hard phase of the insurance market cycle that has proved so challenging for the industry during

the last three years or so. Our Natural Resources Global Renewable Energy Leader, Steven Munday, provides a deep and thought-provoking analysis of the reasons for this change in underwriting climate, while concluding with some timely advice as to what buyers must now do to capitalise on the easing of market conditions. We’ve also included a round up on conditions in the major Renewables insurance markets outside London, including Beijing, Dubai, Miami, North America and Singapore.

In short: there is much for risk managers in the renewable energy industry to ponder on in the months and years ahead. As your industry continues to expand, we would be delighted to continue to help you navigate your way through what continues to be an evolving and challenging risk environment.



Graham Knight is Head of Global Natural Resources, Willis Towers Watson.

graham.knight@willistowerswatson.com

² “Global insured cat losses reach \$112bn in 2021: Swiss Re Institute” – Insurance Insider, December 14 2021
<https://www.insuranceinsider.com/article/29g3yb02y5xzg09zptwqo/global-insured-cat-losses-reach-112bn-in-2021-swiss-re-institute>



Jargon busting: unpacking energy transition phraseology

We've included this "Jargon Buster" at the beginning of this Review to provide readers with an easy to digest explanation of typical words and phrases used in the renewable energy industry.

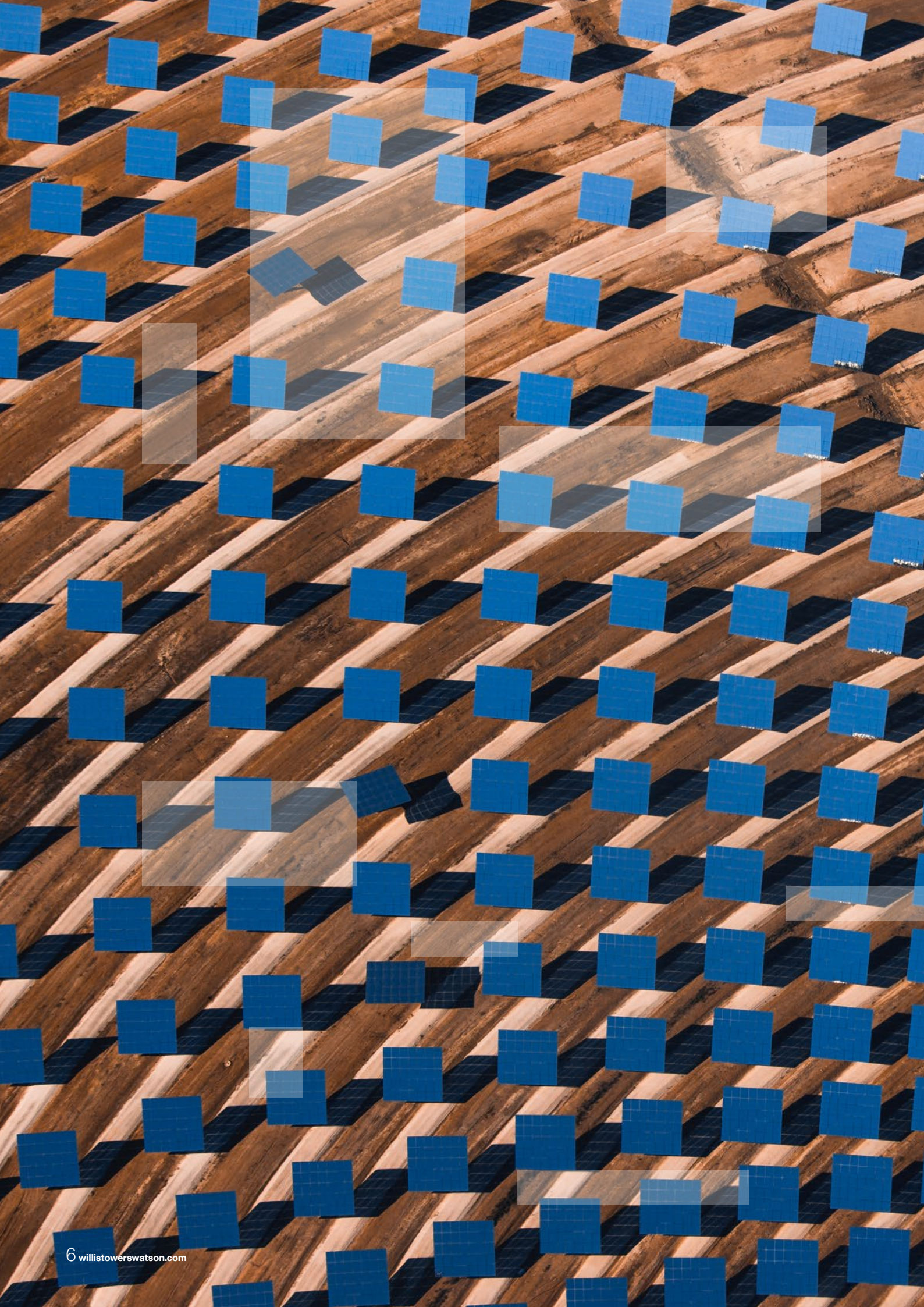
Battery Energy Storage Systems (BESS)	Devices which enable energy from renewables (such as wind and solar) to be stored; the batteries discharge the energy when it is needed. BESSs will play a key role in moving away from fossil fuels, as they allow green energy to be used - even when the wind isn't blowing or when the sun isn't shining.
Carbon Credits	Permits which allow a company to emit a certain amount of carbon dioxide or other greenhouse gases. To balance worldwide emissions, companies and governments are allocated a certain number of credits which they can trade. One credit permits the emission of one ton of carbon dioxide.
Carbon dioxide Capture & Storage (CCS)	A process of capturing carbon dioxide before it enters the atmosphere, transporting and storing it deep underground. This process is a way of reducing carbon emissions and could be key in tackling global warming.
Carbon Price	A cost applied to governments and businesses, based on the carbon dioxide they produce. This provides an economic incentive to cut carbon emissions and shifts the burden of damage from carbon emissions back to those who are responsible. Currently around 64 countries have some form of carbon pricing implemented.
Climate and Resilience Hub (CRH)	Willis Towers Watsons CRH is a focal point of climate expertise and capabilities, pooling knowledge from across the people, risk and capital businesses to deliver climate and resilience solutions in response to a range of regulatory, investor, consumer, employee and operating pressures.
Climate Transition Pathways (CTP)	Willis Towers Watson launched CTP which is an accreditation system established to help businesses transition to a low-carbon economy in return for continued access to insurance capacity and capital.

Cracking the hydrogen colour code	<p>We all know hydrogen as a colourless gas; however, there are an increasing number of colours associated with hydrogen, which relate to the way the hydrogen has been produced. The colours are highlighted below, beginning with the most damaging for the environment to the most environmentally friendly:</p> <ul style="list-style-type: none"> ▪ Brown/Black Hydrogen – coal is converted to hydrogen via gasification with carbon dioxide being produced as a by-product. ▪ Grey Hydrogen – created from natural gas or methane using steam methane reformation. Greenhouse gases made in the process are not captured. This is the most common way to produce hydrogen. ▪ Turquoise Hydrogen – made using a process called methane pyrolysis. This is currently in the experimental stages and produces solid carbon as a by-product. ▪ Yellow Hydrogen – made through electrolysis, using solar power. ▪ Pink Hydrogen – generated through electrolysis powered by nuclear energy. Sometimes pink hydrogen is referred to as purple or red hydrogen. ▪ Blue Hydrogen – produced via a process called steam reforming from natural gas. Carbon dioxide is produced as a by-product; however, using carbon capture and storage (CCS), the carbon dioxide is trapped and stored. ▪ Green Hydrogen – made by using renewable energy to electrolyse water, emitting zero-carbon dioxide. Currently only around 1% of hydrogen is produced this way.
Greenhouse gases	Gases which trap heat and slow the rate at which it is released to space, almost like a blanket wrapped around the earth. The main greenhouse gases are water vapour, carbon dioxide, methane, nitrous oxide and chlorofluorocarbons. The main source of greenhouse gases are fossil fuel combustion, agriculture and industrial processes.
Greenwashing	A term which describes a company which brands itself 'eco-friendly', 'sustainable' or 'organic' in order to make products more appealing to the consumer; however, the products or the company are not as environmentally friendly as they like to portray themselves.
LCOE (Levelized Cost of Energy)	A way of comparing the cost of generating energy across various technologies, expressed as a cost per unit of electricity generated. The calculation takes into consideration capital cost, O&M, performance and fuel costs.
Net Zero	A term that describes the point when a balance between the amount of greenhouse gas emissions produced and the amount removed from the atmosphere is achieved. This differs from Gross Zero, which means stopping all emissions. The latter is unrealistic, so countries, local governments and businesses around the world are increasingly committing to Net Zero targets to fight climate change. Net Zero can also be referred to as Carbon Neutral.
Power Purchase Agreements (PPAs)	An agreement between a generator of renewable energy and a buyer of such energy, usually on a long-term basis. A PPA provides a long-term supply contract for renewable energy at either a fixed or variable price and can be a key lever in securing project finance.
Terawatt (TW)	A watt is the International System unit of measure of power; a terawatt is equivalent to one trillion watts. The total power used by a whole country is commonly measured in terawatts.



Alice Sketcher is a Graduate Analyst at Willis Towers Watson, currently seconded to our London-based Renewables team.

alice.sketcher@willistowerswatson.com





Part One -
after COP26: risk
implications for the
renewables industry



Climate change challenges and opportunities: reflections post-COP26

Introduction: a significant year

2021 has been a significant year for the renewable energy industry, not only because of the increased focus on decarbonisation and transition but also because of the need for resilience in the face of more climate extremes. The year was rounded off with the UN's COP26 summit in Glasgow.

As the UN's flagship annual climate change forum, where countries debate and agree efforts to mitigate climate change through the reduction of greenhouse gases, every COP matters. But this COP mattered more than many before it, and finance showed up en masse. Countries were scheduled to submit carbon reduction targets for 2030 - a key milestone on the pathway to Net Zero - while ahead of COP, scientists published a critical study which warned of the dramatic intensification of the effects of climate change between 1.5°C and 2°C.

We have also seen:

- Unprecedented growth in renewable energy capacity additions in 2020 and 2021 - the additions rate will need to double in the short term to meet the IEA's Net Zero pathway.¹
- Climate-exacerbated risk events continuing, including the freeze that impacted renewable and non-renewable power systems in Texas.²
- Supply chain issues, such as higher materials prices and lower carbon production, are driving risk awareness and greater recognition of interconnections.
- Increasing interest in Net Zero and robust transition plans. These include the Net Zero benchmark from Climate Action 100+³, the climate & energy benchmark from the World Benchmarking Alliance⁴ and the Glasgow Finance Alliance for Net Zero (GFANZ).⁵ The insurance sector is also active, with the Net Zero Insurance Alliance (NZIA)⁶, ClimateWise's Net Zero Working Group⁷, the Sustainable Markets Initiative's insurance taskforce⁸ and the launch of the Climate Transition Pathways.⁹

¹ <https://www.iea.org/reports/renewables-2021/executive-summary>

² <https://www.nbcnews.com/news/us-news/9-months-texas-freeze-power-grid-remains-vulnerable-rcna6611>

³ <https://www.climateaction100.org/progress/net-zero-company-benchmark/>

⁴ <https://www.worldbenchmarkingalliance.org/climate-and-energy-benchmark/>

⁵ <https://www.gfanzero.com/>

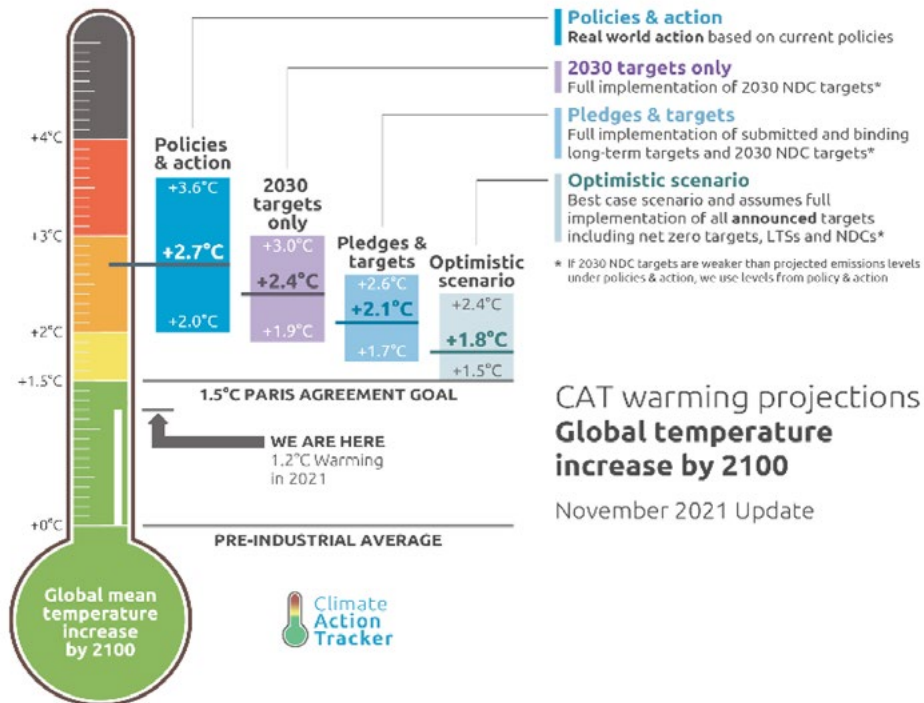
⁶ <https://www.unepfi.org/net-zero-insurance/>

⁷ <https://www.cisl.cam.ac.uk/business-action/sustainable-finance/climatewise>

⁸ <https://www.sustainable-markets.org/taskforces/insurance-taskforce/>

⁹ <https://www.climateactionpathways.com/>

Fig 1: CAT warming projections, November 2021



COP26 has brought the potential average temperature changes down to below 2 degrees but only if action is accelerated.

Source: Climate Action Tracker, Nov 2021
(<https://climateactiontracker.org/global/cat-thermometer/>)

COP26 – 1.5oC on life support

The UN Framework on Climate Change Convention (UNFCCC) Conference of Parties (COP26) in November 2021 was particularly significant for its attention on “coal, cars, cash and trees”¹⁰ and the number of bi- and multi-lateral agreements in addition to the UNFCCC process:

- 1. Coal:** The Glasgow Climate Pact¹¹ committing countries to keeping the 1.5°C target alive, including the “phase-down” of coal-fired power generation.
- 2. Cars:** Five of the largest car manufacturers working together to make all new car sales “zero emission” by 2040 and by 2035 in leading markets¹². Countries and cities are following suit, with ambitious petrol and diesel car phaseout dates.

3. Cash:

- The financial services industry and Net Zero targets: actors in the global financial system have committed their US\$130 trillion of financial assets to 1.5°C alignment through the Glasgow Financial Alliance for Net Zero (GFANZ).
- The financial services industry and carbon markets: stubborn sticking points under Article 6 of the Paris Agreement, particularly getting over issues of double counting; additionality, the Clean Development Mechanism carryover and adaptation & share of proceeds.

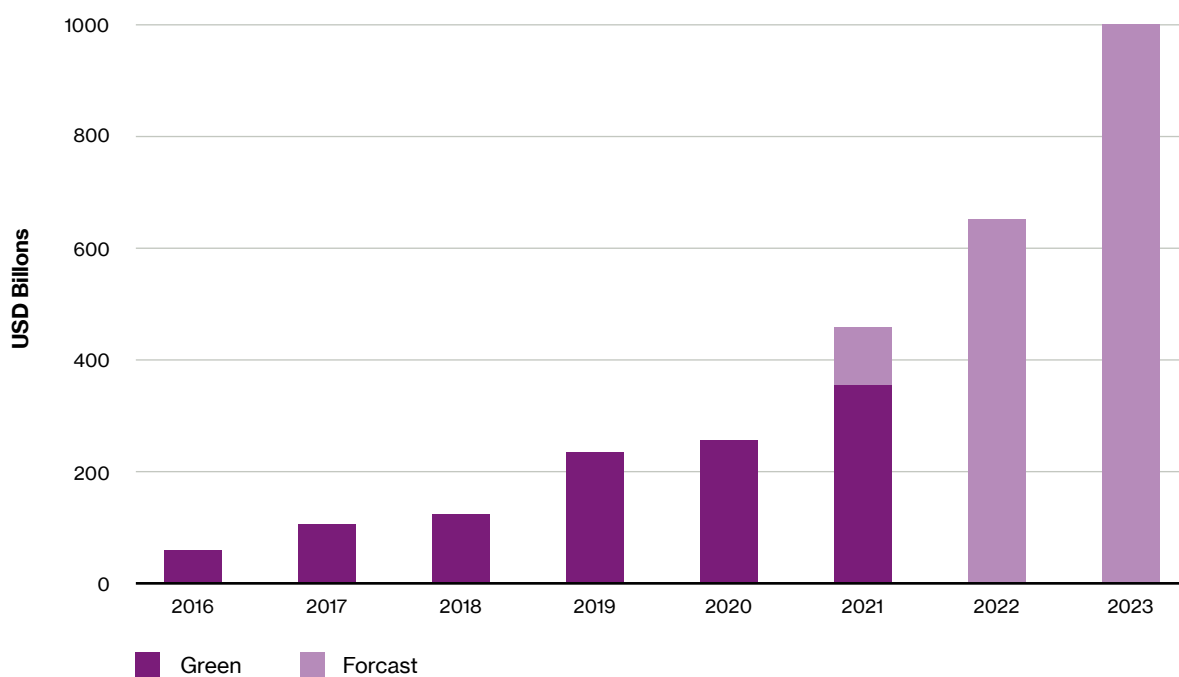
- 4. Trees:** The Glasgow leaders’ declaration on forests and land-use, signed by over 130 countries to halt and reverse forest loss and land degradation by 2030.

¹⁰ <https://www.reuters.com/world/uk/we-need-act-now-uks-johnson-sends-climate-alert-cop-2021-10-31/>

¹¹ https://unfccc.int/sites/default/files/resource/cma2021_L16_adv.pdf

¹² <https://www.gov.uk/government/publications/cop26-declaration-zero-emission-cars-and-vans/cop26-declaration-on-accelerating-the-transition-to-100-zero-emission-cars-and-vans>

Fig 2: Green bond issuances, 2016-23 (actual and forecast)



Source: Sustainable Debt Market Q3 2021 review, Climate Bonds Initiative
(https://www.climatebonds.net/files/reports/cbi_susdebtsum_q32021_03b.pdf)

The acceleration in growth of green bond issuance is just one example of how financial products are being aligned to low carbon investments by corporates, financial institutions and sovereign investors.

This, together with many other commitments, pledges and agreements, has meant that limiting average temperature rise to 1.5°C is still possible in the optimistic scenario - but would require rapid action that is not currently being taken.

All of these developments have a direct impact on companies investing in renewable energy solutions: more demand for renewable energy, green hydrogen, investment in existing asset decarbonisation (e.g. following on from the Global Methane Pledge to reduce methane emissions by 30% by 2030), carbon capture and storage solutions, renewable heat - and so on.

Continued demand for green investment

There is definitely no shortage of demand for green investments in project, corporate and sovereign bonds. Growth in green bond investment for renewable energy grew in 2020 by 19% despite the pandemic¹³.

Policy makers are also financing their green policies with several sovereign green bonds issued in the last year, notably in UK, France and Germany and representing 11% of the green debt market in the first half of 2021¹⁴.

However, the scale of finance is not yet at the levels needed, which are estimated to be between \$100 trillion and \$150 trillion over the next three decades¹⁵.

¹³ https://www.climatebonds.net/files/reports/cbi_sd_sotm_2020_04d.pdf
¹⁴ https://www.climatebonds.net/files/reports/cbi_susdebtsum_h12021_02b.pdf
¹⁵ <https://assets.bbhub.io/company/sites/63/2021/11/GFANZ-Progress-Report.pdf>

Scaling renewables and proving low carbon credentials

Record growth in solar PV and wind capacity additions continued in 2021, beating the previous year's record. The IEA estimates this will accelerate to 2026, increasing electricity capacity by over 60% between 2020 and 2026. The leading four regions (China, Europe, USA and India) will account for 80% of this growth.¹⁶

The race to increase renewable power brings with it a number of challenges, with supply chain issues being two of the most prominent:

- Sourcing materials and components
- Increased scrutiny of the lifecycle footprint of renewable energy and related projects

Demand for materials and components are putting strains on the supply chain. In 2021, prices for raw materials and components in renewable energy reversed the long-term downward trend. This was exemplified by the surge in prices of polysilicon off the back of surging demand and logistics challenges posed by the global pandemic¹⁷. Similarly, other material prices have increased since the start of 2020: steel by 50%, aluminium by 80%, copper by 60%, and freight fees by a six-fold increase¹⁸.

As suppliers expand in number and scale, another challenge is to secure the sourcing of materials and components without compromising the low carbon and environmental credentials of the project. For example, demand for balsa wood has driven the unintended environmental impacts of deforestation in Ecuador.

Hydrogen and ammonia production is also seen as underpinning decarbonisation of some of the hard to abate sectors (such as transport, steel, etc.). Demonstrating that production is truly low-carbon will be critical as this area grows from a relatively low baseline.

“All of these investments contribute to renewable energy projects, and the corporates behind them; they therefore need to account for them in their full value chain.”

Scrutiny from the financial services industry

Increased scrutiny is already here from the financial industry - and growing. Financial institutions representing over 40% of the world's assets are signed up to Net Zero goals¹⁹, and so will be seeking returns that also deliver emissions reductions in their portfolios in line with these targets. Insurers signed up to the UNEP-FI's Net Zero Insurance Alliance²⁰ (NZIA) are also committed to both Net Zero targets by 2050. The NZIA, in collaboration with the Partnership for Carbon Accounting Financials (PCAF), are due to release their methodology to calculate and disclose “insured emissions” in 2022²¹.

Regulators have also updated and tightened taxonomies and definitions of sustainable investment. This has had the impact of downscaling what could be counted as ESG in Europe and Australia in 2020 but the overall trend is still a large-scale increase in investments in transition, zero-carbon and ESG-compliant financial instruments.

Understanding the supply chain footprint

All of these investments contribute to renewable energy projects, and the corporates behind them; they therefore need to account for them in their full value chain. This requires an understanding of the footprint of materials and components of suppliers. For instance, many components for solar are made in regions supplied by unabated high-carbon power suppliers and/or may be at high risk of disruption from climate impacts. Understanding these impacts should then lead to engagements with suppliers to bring down carbon emissions and diversify sources where possible, to provide resilience to supply disruption. It will also identify opportunities for new clients: the logistics, mining and construction industries will require decarbonised sources of energy and hydrogen/ammonia fuels.

Another opportunity is to look at aligning investments and pensions with the strategy of the business. Pension investments in particular can also help drive demand for renewable energy projects and so provide employees with access to renewable energy. Climate transition index funds could also provide a more resilient future for employees, by reducing exposure to assets at risk from transition and support the financing of new renewable energy projects and their supporting infrastructure.

¹⁶ <https://iea.blob.core.windows.net/assets/5ae32253-7409-4f9a-a91d-1493ffb9777a/Renewables2021-Analysisandforecastto2026.pdf>

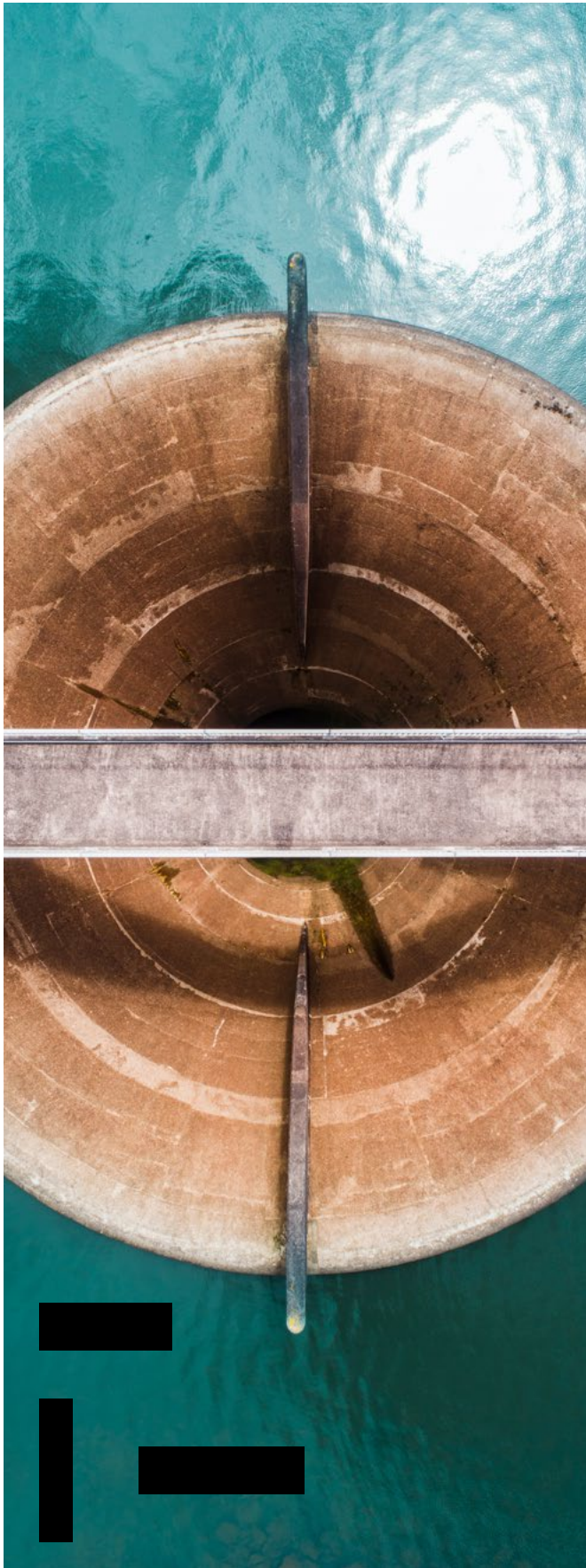
¹⁷ <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/solar-industry-will-face-surgings-polysilicon-prices-through-21-producer-says-66134488>

¹⁸ <https://iea.blob.core.windows.net/assets/5ae32253-7409-4f9a-a91d-1493ffb9777a/Renewables2021-Analysisandforecastto2026.pdf>

¹⁹ <https://www.gov.uk/government/news/chancellor-uk-will-be-the-worlds-first-net-zero-financial-centre>

²⁰ <https://www.unepfi.org/net-zero-insurance/>

²¹ <https://www.unepfi.org/psi/wp-content/uploads/2021/09/PCAF-NZIA-announcement.pdf>



Task force on Climate-Related Financial Disclosures (TCFD)

The TCFD is of growing importance as it is being embedded into regulatory reporting requirements in eight jurisdictions already: Brazil, the European Union, Hong Kong, Japan, New Zealand, Singapore, Switzerland and the UK. The G7 also made a statement supporting mandatory reporting based on the TCFD²¹.

At the heart of climate disclosure requirements is the need to understand whether the business risks and opportunities from climate change are adequately identified, assessed, managed, incorporated into strategy and governed appropriately. It also focusses much more attention on a forward-looking view of the corporate exposure to climate change. This has been exemplified by the inclusion of plans for “transitioning to the low carbon economy”²² into the expected strategy disclosures under the TCFD framework.

State of climate disclosure

The TCFD 2021 status report²³ shows that in the energy sector risks and opportunities are the highest-reported disclosures, whereas how climate risk influences strategy is the least disclosed. There is also a disparity between these disclosures and that of the risk management processes. This poses the question of whether climate risks (current or forward looking) are being accurately identified, assessed and managed.

Businesses that look at TCFD as a compliance only framework will not receive the full benefit from the effort involved. The emphasis on understanding how risk and opportunities from climate-related issues affects the strategy means that this can be used to devise resilient strategies at a time of significant change.

The use of scenario analyses is particularly important in constructing future risk exposure, together with opportunity identification and assessment; furthermore, it plays a central role in being able to understand the resiliency of an organisation's strategy. This is where transition and physical risk analyses need to be done together and inform each other, so that both transition and adaptation²⁴ plans are co-ordinated.

²¹ <https://www.gov.uk/government/publications/g7-finance-ministers-meeting-june-2021-communique/g7-finance-ministers-and-central-bank-governors-communique>

²² https://assets.bbhub.io/company/sites/60/2021/07/2021-TCFD-Implementing_Guidance.pdf

²³ TCFD 2021 Status report (<https://www.fsb-tcdf.org/publications/>)

²⁴ Adaptation plans demonstrate the business strategy for managing the increasing exposure of assets and value chains to climate hazards, and for increasing resiliency to the impacts of those hazards.

Fig 3: Disclosure by sector: 2020 reporting

Recommendation	Recommended Disclosure	Banking (282)	Insurance (132)	Energy (267)	Materials & Buildings (404)
Governance	a) Board Oversight	22%	35%	34%	27%
	b) Management's Role	17%	23%	20%	23%
Strategy	a) Risks and Opportunities	45%	52%	67%	61%
	b) Impact on Organisation	35%	36%	47%	49%
	c) Resilience of Strategy	15%	18%	18%	14%
Risk Management	a) Risk ID and Assessment Process	33%	37%	30%	33%
	b) Risk Management Process	32%	47%	32%	31%
	c) Integration into Overall Risk Management	29%	39%	31%	29%
Metrics and Targets	a) Climate-Related Metrics	35%	32%	44%	58%
	b) Scope 1, 2, 3 GHG Emissions	27%	30%	36%	52%
	c) Climate-Related Targets	22%	27%	41%	43%

Source: TCFD 2021 Status Report: <https://www.fsb.org/wp-content/uploads/P141021-1.pdf>

While risks and opportunities disclosure is the most frequently of all TCFD disclosures, the resiliency of the strategy to these risks is the least disclosed.

So how is the power industry's transition going to be judged?

The growth in Net Zero targets and in climate risk analysis by the financial services industry is driving an increased demand for quality disclosure data. Regulators are also stepping in to mandate climate related disclosure. This is focusing on risk assessment and management, portfolio alignment to Paris pathways and emissions, and use of benchmarks and indices as basis for financial products.

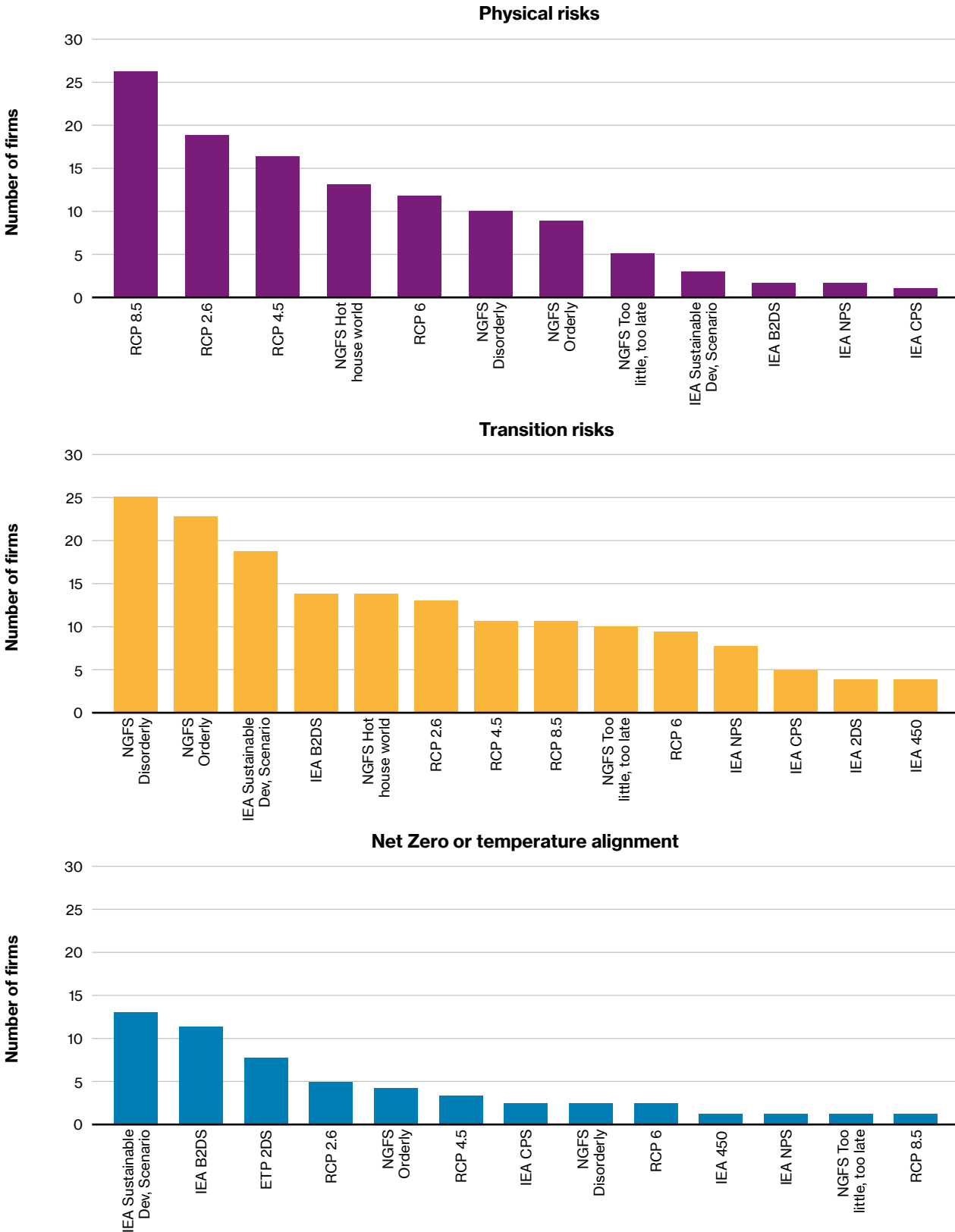
Climate risk as a management issue for financial institutions

The principle regulatory areas of international co-ordination come from the Network for Greening the Financial System (NGFS) and through the Task Force on Climate-Related Financial Disclosures (TCFD) with regulators aligning and incorporating this into mandatory reporting.

Businesses have been asked to voluntarily report their climate performance, strategy, governance and risk management for a while²⁵. Regulators are now asking financial institutions to stress test and identify their climate risks and opportunities so as to understand the potential contagion to the economy and organisational stability; these tests and risk assessments are based on climate scenario analysis. These institutions in turn are now asking for that level of data to inform their decisions on their portfolios of investment and underwriting.

²⁵ Through climate frameworks and sustainability standards such as CDP, SASB, GRI, etc.

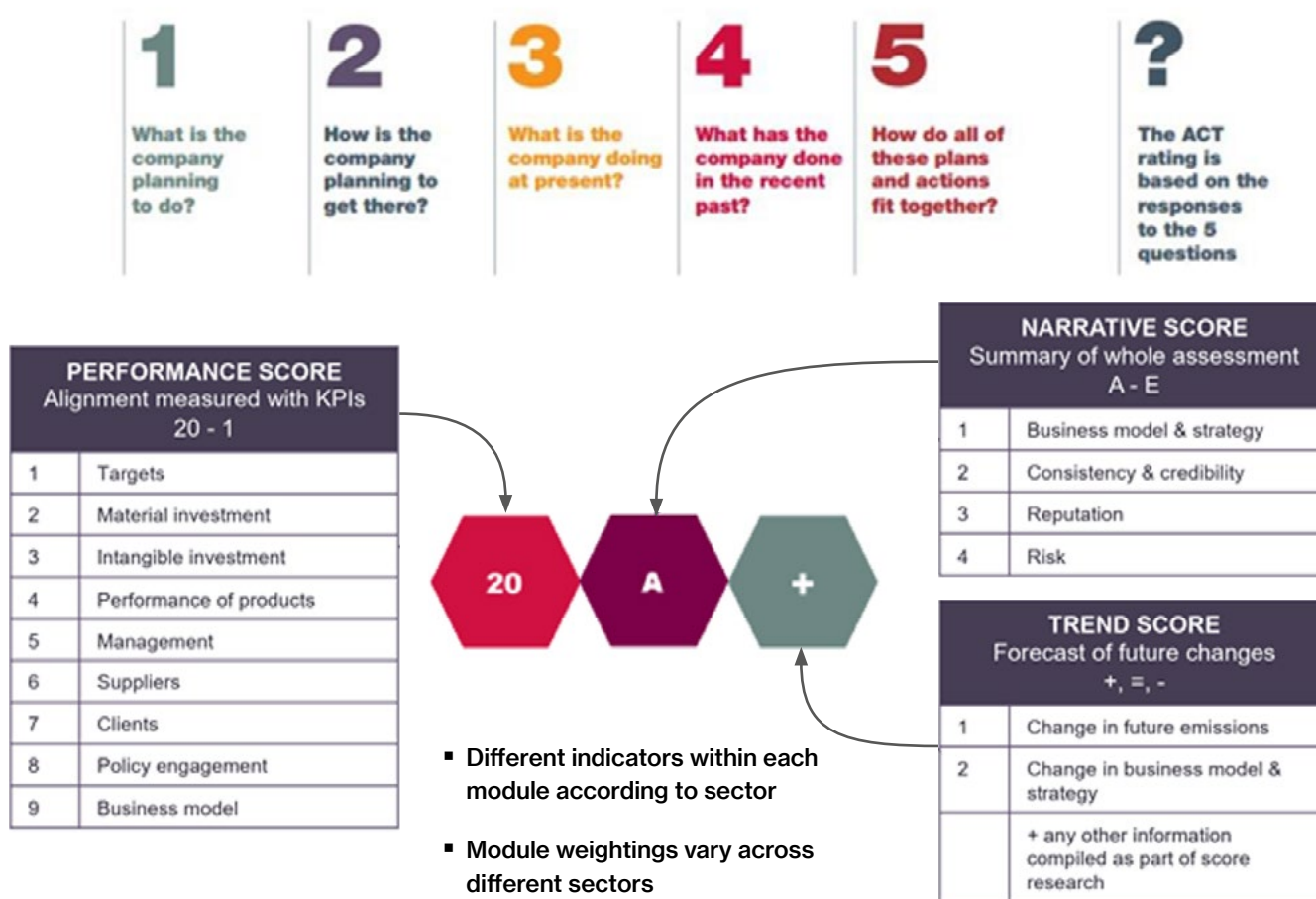
Fig 4: Most common climate scenarios used by purpose



Source: Climate Financial Risk Forum's Scenario Analysis guidance (<https://www.fca.org.uk/publication/corporate/climate-financial-risk-forum-guide-2021-scenario-analysis.pdf>)

Financial institutions are using climate scenario analysis to understand climate risks in stress testing, and in aligning investments to Net Zero and temperature pathways.

Fig 5: ACT Step by Step Prefiguration Study



The ACT initiative is a deep dive assessment of a company's transition plan and its alignment with the transition goals of the Paris Climate Agreement.

Source: ACT Step by Step prefiguration study <https://actinitiative.org/publications/>

Accounting for “financial emissions”

In addition, financial institutions are starting to account for their “financed emissions” and to demonstrate progress against their Net Zero portfolio targets through methodologies outlined by PCAF, Science-Based Targets for Financial Institutions, etc.

Accounting bodies are stepping up their efforts here to incorporate climate change issues into financial reporting. The formation of the International Sustainability Standards Board (ISSB) by the IFRS foundation will complete consolidation of the Climate Disclosure Standards Board (CDSB – an initiative of CDP) and the Value Reporting Foundation (VRF – which houses the Integrated Reporting Framework and the SASB Standards) by June 2022²⁶.

Climate risk and opportunity in financial products

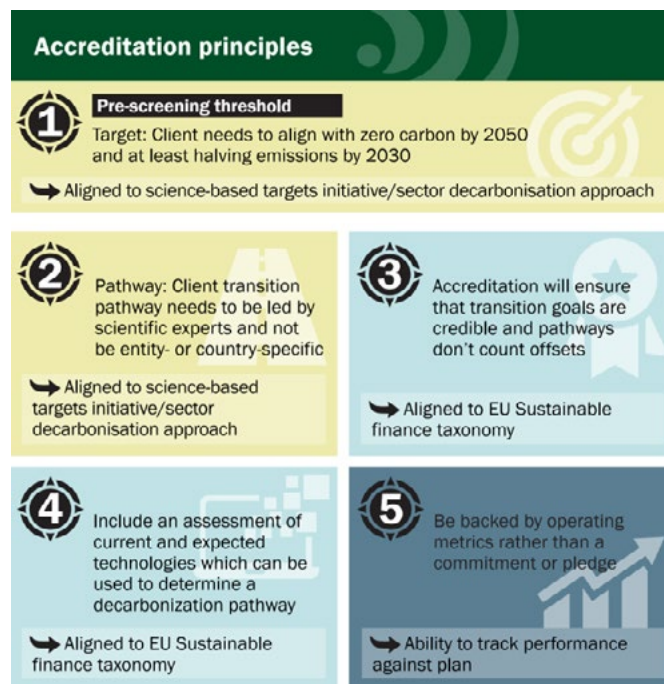
With the rise in sustainable finance taxonomies, financial products claiming ESG, climate, green and transition credentials need to provide proof. It is likely that these criteria will get embedded into all financial products over time.

Benchmarks are also being created and used to assess power and energy firms such as the Climate Action 100+ net zero benchmark and the World Benchmarking Alliance's climate and energy benchmark. Climate Transition Pathways, the climate transition accreditation for insurance and debt markets, uses the same transition assessment methodology as the World Benchmarking Alliance - Assessing Low Carbon Transition²⁷.

²⁶ <https://www.ifrs.org/news-and-events/news/2021/11/ifrs-foundation-announces-issb-consolidation-with-cdsb-vrf-publication-of-prototypes/>

²⁷ <https://actinitiative.org/>

Fig 6: Principles for the alignment to Paris of a company's transition plan



Source: Climate Transition Pathways (<https://www.climatetransitionpathways.com/accreditation/>)

What makes a good quality transition plan?

While there is not yet any standard view on what a good transition plan looks like, the leading methodologies have several common themes for assessment:

- 1. GHG emission reduction targets** that are aligned in short, medium and long term to the Paris agreement's goal of restricting climate change to well below 2°C and aiming for 1.5°C.
- 2. Capital expenditures** aligned to low carbon research and innovation, abating current emissions and investing in renewable generation assets.
- 3. Governance**, including accountability and remuneration of boards and management in delivering climate strategies and managing risks.
- 4. Strategy and business models** that align to the transition goals of the Paris agreement.
- 5. Engagement with policy makers** through trade bodies and lobbying.
- 6. Disclosure** against TCFD to demonstrate performance against climate strategy and transparency.

Climate risk assessment and strategy formulation

Willis Towers Watson brings together our deep weather and climate analytical experience from the (re)insurance and investment markets, our extensive academic, research and institutional investor relationships and our multi-discipline expertise and capabilities in transition, adaptation and decarbonisation into a fully integrated, strategic offering. Through our acquisitions of Acclimatise and the Climate Policy Initiative's Energy Finance team in 2020, we have added both climate adaptation and climate transition risk experience and expertise.

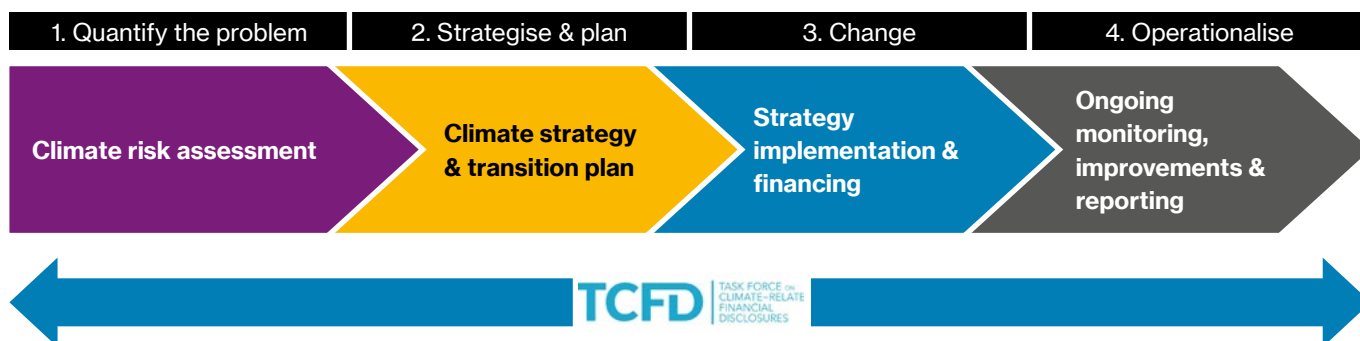
This is embodied into a proactive approach to helping shape the global community's response to climate risks and help implement strategy. For example, through our \$50 million investment in the award-winning Willis Research Network²⁸ to support open climate and natural hazard research, insights from our Thinking Ahead Institute²⁹ to influence change in the investment world, and our founding role, with the World Economic Forum, in the CCRI³⁰.

²⁸ <https://www.willistowerswatson.com/en-GB/Insights/research-programs-and-collaborations/willis-research-network>

²⁹ <https://www.thinkingaheadinstitute.org/>

³⁰ <https://www.willistowerswatson.com/en-GB/Insights/trending-topics/climate-risk-and-resilience>

Fig.7: Using climate risk as a foundation for climate strategy and transition planning



Helping clients to start, accelerate and capitalise on creating and implementing climate strategies



Starting: Establish your position to climate change



Accelerating: Embed climate strategy in your organisation



Capitalise: Embed strategic approach into your organisation

Source: Willis Towers Watson

Since the early 1990s, Willis Towers Watson has supported private and public sector organisations in enhancing their approach to managing climate-related risks in response to market and regulatory developments. Our heritage, skills and connections across markets help our clients quantify the financial risks and opportunities from a changing climate and develop a strategic response to supporting an orderly transition to a low-carbon and resilient economy.

We find the starting point for many clients is modelling the impact of both physical and transition climate risks and opportunities. We start with identifying and assessing the current physical risks from a changing climate, such as storms, floods, fire and other extreme weather events, on an operational site-by-site basis. We then use scenario analysis to understand the potential disruption in future from the increasing frequency and severity of extreme events to the potential viability of assets under chronic changes. This engagement focused on physical risks to assets and anticipated downtime following damage as

part of creating a common asset resilience language. We have helped numerous clients to understand the perils and probabilities involved, and to produce their adaptation strategies.

Increasingly our clients are also asking them to help them identify, quantify and provide input into managing transition risks and opportunities as we move further into the 2020s. This is a decade in which the transition will accelerate - possibly exponentially - across energy, transport, agriculture, manufacturing and finance systems. We have built in-depth research and analysis of transition risks and opportunities - building up both business activity level transition scenarios as well as commodity-based models.

This has been incorporated into a new Climate Transition Index with Qontigo, and into evaluations of climate risk and opportunities in whole economies and to the energy sector in particular. The fund – the STOXX Willis Towers Watson World Climate Transition Index - is anticipated to receive in the region of \$1bn by the end of 2021³¹.

³¹ <https://www.willistowerswatson.com/en-GB/News/2021/10/wtw-and-qontigo-launch-pioneering-stoxx-global-index-series-that-quantifies-the-climate-transition>



Modelling the likely amounts of damage or financial losses linked to future climate projections, i.e. at 2030, 2050 and 2100 under different climate scenarios, can help to make the impacts of possible future climate change more tangible. Knowledge fosters understanding, and then action; this might include modelling flooding risks to electric substations to estimate potential business interruption, or the impacts of extreme weather on the construction and ongoing maintenance of different types of turbines and solar panels – issues that can move from operational concerns to strategic imperatives.

Through this type of climate risk assessment, renewable energy companies will also be much better prepared to respond to increasing expectations of consumers, lenders and investors around climate disclosures and to guide future planning, risk management and strategy.

Risk managers are uniquely placed to ensure their companies are prepared to meet the increasing expectations of disclosure by investors and regulators, embed climate risk into existing frameworks and ensure Boards are taking a strategic approach.

Transitioning to low-carbon energy technology and considering sustainability in a holistic way represents a tangible opportunity for market differentiation and talent acquisition, and the renewable energy sector can take advantage of uncertainty to bring in longstanding workers whose knowledge can support the long-term management and processing of assets.

There are roles for everyone, and risk managers have a unique opportunity to facilitate them in key areas, including:

- Governance, including the board's role in providing oversight of climate risk responses and defining management responsibility for climate risk and ESG.
- Risk identification, identifying the key channels through which climate risks can impact the company.
- Risk appetite, including forming a view as to whether climate risk should be considered as a separate element or part of aggregate risk.
- Risk measurement and reporting, including how to incorporate climate risk into financial risk models and reports and deciding on relevant metrics for decision making, a key element of TCFD disclosure.
- Reputation risk, including identifying public communications needs and a strategy for communicating a firm's climate and ESG response.
- Opportunity identification, informing strategic decisions on changes (or not) to operations, products and services.

Having a solid understanding within the business will not only prepare you for the changes that are already happening, but also those that are coming down the pipeline. By engaging with risk based climate strategy approach, risk managers can benefit from a structured, data driven and strategic approach that delivers deeper insights into climate issues. And by being pro-active, risk managers can be far better prepared to meet the demands of their regulators, investors and Boards.

Conclusion: a risk-based approach to climate builds resilience

The 2020s are indeed a decade where we will see fundamental change, both to our economies and to our changing climate. This is not one transition but a series of transitions across many parts of the economy: in power, steel, cement, fuels, construction, chemicals, agriculture and transport. Renewable energy generation will be at the heart of this.



Tony Rooke is Director of Climate Transition Risk in the Climate and Resilience Hub at Willis Towers Watson in London.

Tony.Rooke@willistowerswatson.com



Lucy Stanbrough is Head of Emerging Risks research for the Willis Research Network at Willis Towers Watson in London.

Lucy.Stanbrough@willistowerswatson.com

WTW's own commitments to Net Zero

WTW joins Net Zero Asset Managers Initiative³²

WTW joins NZAMI together with 40 others³³, meaning that there are now 128 signatories managing US\$43 trillion, almost half of all assets managed by the global asset management industry. WTW's commitment applies a 2019 baseline³⁴ for calculations on halving GHG emissions by 2030, a slightly steeper trajectory compared with Paris aligned targets (from 2015).

Willis Towers Watson commits to Net Zero³⁵

Commitment to delivering net zero greenhouse gas emissions – in alignment with the Science Based Targets Initiative – by 2050 at the latest, with at least a 50% reduction by 2030, across the company's business operations. This includes a commitment to achieving 100% renewable energy supplies across the company's real estate portfolio.

Net Zero greenhouse gas emissions by 2050 for WTW discretionary investment portfolios³⁶

Discretion over US\$165bn delegated portfolio of investments and influence through advice on over US\$3.5trn (2019)³⁷

- Targeting net zero greenhouse gas emissions by 2050 at the latest
- At least a 50% reduction between 2015 and 2030
- Compliance with the principles in the Paris Agreement around the pace of the trajectory to net zero, with limited reliance on the use of Negative Emission Technologies
- Principles we follow and the measures we use to assess progress will be consistent with IIGCC's Net Zero Investment Framework³⁸
- Double our allocation to 'climate solutions' by 2030

³² <https://www.willistowerswatson.com/en-GB/News/2021/07/willis-towers-watson-joins-net-zero-asset-managers-initiative>

³³ <https://www.iigcc.org/news/net-zero-asset-managers-initiative-announces-41-new-signatories-with-sector-seeing-net-zero-tipping-point/>

³⁴ <https://wtwonline.sharepoint.com/sites/INV-BLOG-Global/SitePages/WTW-joins-Net-Zero-Asset-Managers-Initiative.aspx>

³⁵ <https://www.willistowerswatson.com/en-GB/News/2021/04/willis-towers-watson-commits-to-net-zero>

³⁶ <https://www.willistowerswatson.com/en-GB/News/2021/04/willis-towers-watson-commits-its-delegated-investment-portfolios-to-net-zero>

³⁷ <https://www.willistowerswatson.com/en-GB/Insights/campaigns/our-pledge-net-zero-greenhouse-gas-emissions-by-2050-for-our-discretionary-investment-portfolios>

³⁸ https://www.parisalignedinvestment.org/media/2021/03/PAII-Net-Zero-Investment-Framework_Implementation-Guide.pdf



ESG: what's in a rating?

Introduction: why the energy transition belongs in the risk manager's in-tray

The recent global renewable energy expansion is like a runaway train, whose exponential growth has confounded many and continues to cause multiple challenges, from grid flexibility to storage. But critically, there's no doubt that the risk management issues of digitalisation, decentralisation and decarbonization are driving continuous learning curves.

After spending two weeks at COP26 in Glasgow, what struck me most was how much more the finance and risk management departments need to know about developments in the energy transition. Net Zero targets were one of the key buzzwords at COP26, but exactly how to achieve these targets remains to be seen. What I do know is that the renewable energy industry is facing several simultaneous challenges: impending policy changes, increased regulation and an ever-increasing burden to manage Environmental, Social, and Corporate Governance (ESG) risk. Being in the clean energy camp is not enough anymore; each renewable energy company must advance its own ESG narrative.

Renewable energy companies that take a more proactive approach to ESG risk management are better long-term custodians of investor capital and can generate better long term adjusted returns. "ESG attracts money, there is just

so much attraction to a good ESG rating," says Laurent Segalen, a clean energy investment banker and co-host of the popular, award winning Redefining Energy podcast. Segalen has a point; the cost of capital is becoming intrinsically linked to ESG performance¹. And that means that ESG should be a "Big Kahuna" to any risk manager.

It really matters who manages ESG

Historically, managing ESG has been the responsibility of the Corporate Social Responsibility or Sustainability department. The lack of an agreed definition of ESG has perhaps caused it to be somewhat dismissed and considered a bit "loosey-goosey". However, there is a fundamental shift in market developments - such that I believe that the risk management and finance departments should be more involved in actively managing ESG risks.

Based on this premise, I am going to set out three things that risk managers need to take a look at:

- Transition risk and supply chain issues
- Money flowing into ESG and sustainable investing – and its impact on decision-making
- Policy and regulation changes on climate-related data and reporting

Let's take each of these in turn.

¹ <https://www.msci.com/www/blog-posts/esg-and-the-cost-of-capital/01726513589#>

Transition risk and the supply chain

While climate change represents the largest part of the “E” in ESG, the “S” and the “G” matter too. The “E” category measures the environmental impact and sustainability of a particular company or industry. Part of the reason that the “E” gets so much attention is because it is easier to measure a company’s carbon emissions than to track the social dimensions of a company. Furthermore, increasing regulation of carbon pricing and the associated rising costs for companies are other reasons why the “E” remains firmly in the spotlight.

But don’t be fooled into thinking of the “S” as the fluffy, cuddly side of ESG. The social component of ESG measures how a company interacts with and impacts employees, customers, suppliers and communities. The social element traditionally focuses on organisational policies and practices regarding human rights, diversity and inclusion, business ethics and social impacts resulting from corporate operations. However, supply chain management is playing a larger role than ever as we transition to a low carbon economy, much of which is being driven by new disclosure regulation.

The EU Sustainable Finance Disclosure Regulation (SFDR), introduced in March 2021, places more emphasis on disclosure and includes new rules that must identify any harmful impact made by the investee companies. The SFDR is part of the EU’s wider Sustainable Finance Framework, alongside the EU Sustainable Finance Action Plan, which promotes sustainable investment across the EU, and the EU Taxonomy, a classification system designed to clarify which investments are environmentally sustainable and help prevent greenwashing. Consider these new regulations as if they were different building blocks that fit together, established to support the European Green Deal which is designed to make Europe the first climate-neutral continent².

While Europe is leading the way in sustainable investment, other countries are sure to follow suit. For example, the US Securities and Exchange Commission (SEC) created a Climate and ESG Task Force in March 2021³ and issued a request for comment on climate disclosure from investors, registrants and other market participants. So it’s just a matter of time before the US decides on climate disclosure rules.

Increased disclosure regulation means supply chain management is now a material risk for renewable energy companies. The carbon content of materials, along with how ethically and where products are sourced, is gaining importance for procurement decision making. Demand for minerals such as lithium, cobalt, copper and nickel are expanding, as renewable energy companies build technology to support the energy transition. They also need to strategically think about how to de-risk the concentration risk of minerals in their supply chains⁴.

The cheapest and/or most cost-effective financial solutions might not turn out to be the best overall sustainability business decisions, which is why renewable energy risk and finance managers must do more to understand the ESG landscape in their industry. Furthermore, reputational risks relating to supply chain and procurement, including human rights and child labour issues, need to be carefully considered and factored into decision making.

ESG is impacting the cost of capital

Armand Ferreira, Director Sustainable Finance Lending at ING, a global bank with a strong European base, says that banks have been playing an additional role of structuring sustainable finance. “ING sees a lot of interest in sustainability-linked loans where the loan is linked to the sustainability targets of the borrower and is getting them to set out a pathway of how they can improve their sustainability. If the borrower reaches certain ESG targets, they will get a discount and if they do not reach the targets, they will pay a premium,” explains Ferreira.

The simplest way to do this is either to link targets to external ESG ratings or to link them to specific material ESG KPIs, the latter of which according to Ferreira is, “very interesting because we work closely with the client, get to know their sustainability ambitions and pathway, where their sustainability baseline is, and then collaborate and advise on what will be the ESG goals to move towards.” In addition, targets for each KPI need to be measured annually and externally assured. Furthermore, KPIs need to address a company’s material sustainability issues, be ambitious, and tackle the most pressing problems first.

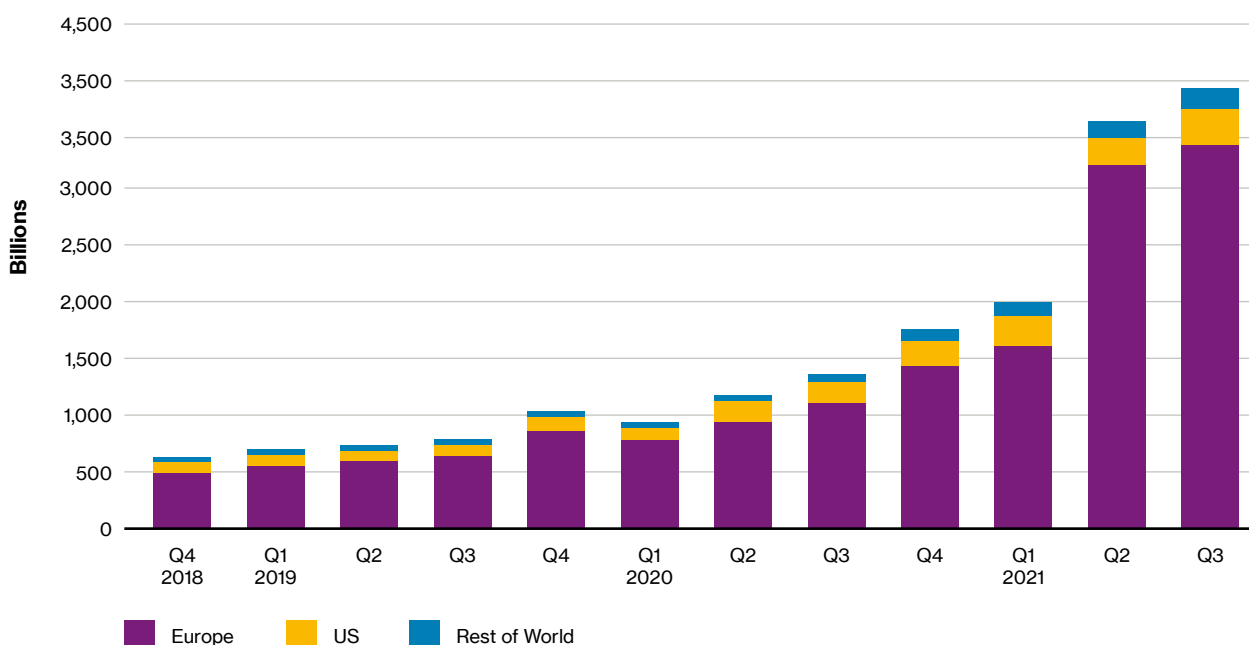
“Increasing regulation of carbon pricing and the associated rising costs for companies are other reasons why the “E” remains firmly in the spotlight.”

² https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

³ <https://www.sec.gov/news/press-release/2021-42>

⁴ <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions>

Fig 1: Quarterly Global Sustainable Fund Assets (US\$ billion)



Source: Morningstar Direct, Manager research. Data as of September 2021. *Q2 data has been restated because of new ESG language found in fund prospectuses following the introduction of SFDR on March 10. Figures include final Q3 data for China in Asia ex-Japan (<https://www.morningstar.com/content/dam/marketing/shared/pdfs/Research/Global-ESG-Q3-2021-Flows.pdf>)

Q2 and Q3 2021 have seen an exponential growth in global sustainable fund assets.

Many clean energy projects, especially larger generation ones, require significant up front capital investments. The growing demand for clean and renewable energy from corporates and consumers requires developers of clean energy projects to implement creative strategies that are sustainable and inclusive to meet this demand. In this way the integration of ESG practices in the investment and development of renewable energy projects is crucial for success and to attract capital.

ESG and sustainable investing

Money is ploughing into ESG and sustainable investing

While there is not one agreed definition of ESG and ratings can be varied, sustainable funds are multiplying. According to Morningstar, global sustainable fund assets almost doubled in six months, to reach US\$3.9 trillion at the end of Q3 2021⁵.

Morningstar tracks quarterly global sustainable fund assets and Figure 1 above shows Europe's dominance in the sustainable fund landscape, with 88% of sustainable funds being held in Europe.

According to the 2020 Global Sustainable Investment Review (GSIR), global sustainable investment reached US\$35.3 trillion at the start of 2020, representing a 15% increase in the past two years.⁶ Figure 2 overleaf provides a snapshot of sustainable investing assets from 2016 to 2020 and shows a more than doubling of growth over that period in the USA, Canada and Japan. The report cites ESG integration as the most common sustainable investment strategy.

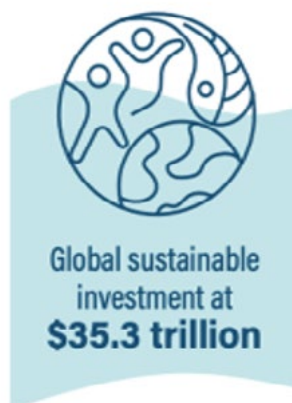
Europe remained relatively consistent between 2016-2020; however, it will be interesting to see how developments in the GSIR 2022 report as new regulations, such as the EU Sustainable Finance Disclosure Regulation, are driving more ESG investments in Europe (as Figure 1 above shows).

⁵ <https://www.morningstar.com/content/dam/marketing/shared/pdfs/Research/Global-ESG-Q3-2021-Flows.pdf>

⁶ <http://www.gsi-alliance.org/wp-content/uploads/2021/08/GSIR-20201.pdf>

Fig 2: Snapshot of global sustainable investing assets, 2016-2018-2020 (US\$ billions)

Region	2016	2018	2020
Europe	12,040	14,075	12,017
United States	8,723	11,995	17,081
Canada	1,086	1,699	2,423
Australasia	516	734	906
Japan	474	2,180	2,874
Total (USD billions)	22,839	30,683	35,301



Note: Asset values are expressed in billions of US dollars. Assets for 2016 were reported as of 31/12/2015 for all regions except for Japan as of 31/03/2016. Assets for 2018 were reported as of 31/12/2017 for all regions except for Japan, which reported as of 31/03/2018. Assets for 2020 were reported as of 31/12/2019 for all regions except Japan, which reported as of 31/03/2020. Conversions from local currencies to US dollars were at the exchange rates prevailing at the date of reporting. In 2020, Europe includes Austria, Belgium, Bulgaria, Denmark, France, Germany, Greece, Italy, Spain, Netherlands, Poland, Portugal, Slovenia, Sweden, the UK, Norway, Switzerland, Liechtenstein. *Europe and Australasia have enacted significant changes in the way sustainable investment is defined in these regions, so direct comparisons between regions and with previous versions of this report are not easily made.

Source: <http://www.gsi-alliance.org/wp-content/uploads/2021/08/GSIR-20201.pdf>

How ESG ratings can help measure long-term material risk

ESG ratings are not as straightforward as credit ratings. Capital markets use credit ratings to indicate if a debt has a low or high default risk, together with the financial strength and stability of companies; however, capital markets are not adequately pricing in the costs of sustainability, which is where ESG comes in. ESG ratings are intended to measure a company's resilience to long term material risks regarding environmental, social and governance issues. ESG ratings are therefore complimentary to credit ratings and are designed to help investors identify and understand the financially material ESG risks to a given business.

Some analysis shows that companies focusing on ESG issues are better equipped to anticipate risks and opportunities⁷. The ESG ecosystem is rapidly evolving, with new frameworks, standards and providers of ESG research/ratings.

There are several ESG ratings agencies, and a few have been acquired by larger credit ratings agencies or financial service companies. Each agency uses a different methodology to calculate their ratings, which makes for a confusing landscape (see Breakout Box overleaf).

⁷ <https://www.spglobal.com/en/research-insights/articles/the-esg-advantage-exploring-links-to-corporate-financial-performance>

Some of the current ESG ratings agencies and their methodologies

MSCI

Uses a rules-based methodology from AAA (the highest score) to CCC (the lowest score) and measures ratings on many different issues.

Vigeo Eiris

Rebranded to VE in 2020 and a part of credit ratings agency Moody's Investors Service since 2019. Applies a score from 0-100 analysing up to 38 different criteria framed from 40 industry specific models.

RobecoSAM

Acquired by S&P Global in 2019, a leading provider of transparent and independent ratings. Their smart methodology is designed to remove biases, combining past evidence with forward-looking views.

Sustainalytics ESG risk ratings

Acquired by financial services company Morningstar in 2020. Measures a company's exposure to industry-specific material ESG risks and identifies five categories of ESG risk severity ranking from negligible to severe.

FTSE Russell

IA subsidiary of the London Stock Exchange Group has both an ESG ratings and data model, assessing operational ESG risks and performance, and a Green Revenues data model, classifying and measuring revenue exposure to products that deliver environmental solutions. This provides users with a comprehensive taxonomy, granular data and tiered 'green', 'greener' and 'greenest' to identify ESG issues related to operational risk or product opportunities.⁸

While ESG ratings play an important role in how markets assess the ESG performance of companies, the myriad of methodologies and data can produce conflicting results⁹. Rating discrepancies can lead to market confusion - there is currently no clear ESG ratings market leader, which puts a burden on investors to understand each ratings methodology and data collection process to enable them to come to individual investment decisions.

Michael Wilkins, the new Executive Director of Imperial College's Centre for Climate Finance & Investment, and former Global Head of Sustainable Research with S&P Global Ratings, agrees that the landscape is a confusing one. "The whole ESG space is too noisy; there is a lack of confidence in what ESG scores mean and if they are linked to better value. It is likely that the ESG moniker will drop at some point, as it is confusing grouping the risks together in such a way. Sustainable finance evaluations, in contrast to an ESG investment tag, focus on how a company interacts with its wider stakeholders as well as the impact it has on externalities such as climate," says Wilkens.

"Rating discrepancies can lead to market confusion - there is currently no clear ESG ratings market leader, which puts a burden on investors to understand each ratings methodology and data collection process."

TPI - making sense of the noise and showing if a company aligns with the Paris Agreement

Making sense of this cluttered ESG landscape is not easy. While the intention of ESG is good, practical help to make sense of the noise remains to be seen. However, the Transition Pathway Initiative (TPI) has created a useful tool to assess companies' preparedness for the transition to a low-carbon economy.

TPI is a global initiative led by asset owners and supported by asset managers. To date, 118 global investors, representing over \$40 trillion in combined assets under management and advice, have pledged support for the TPI¹⁰. It is free to use and designed to empower investors to assess the alignment of their portfolios with the goals of the Paris Agreement.

Who are the electricity leaders & laggards?

Using publicly disclosed company information sourced and provided by TPI's data partner, FTSE Russell, the TPI tool evaluates how companies are on track to a low-carbon transition. It shows the leaders and laggards in various industries. For example, using the TPI tool to assess the carbon performance of the top 10 electricity utility emitters with large market capitalization shows their reported and targeted emissions pathway in Figure 3 on the next page:

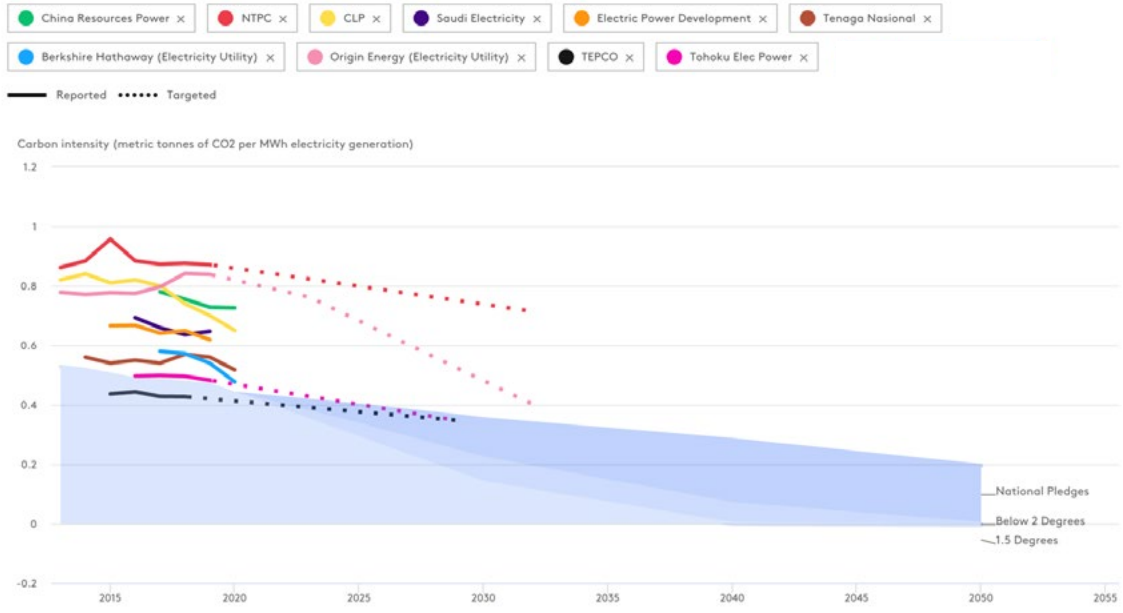
⁸ <https://www.ftserussell.com/data/sustainability-and-esg-data/green-revenues-data-model>

⁹ https://papers.ssrn.com/sol3/Papers.cfm?abstract_id=3438533

¹⁰ <https://www.transitionpathwayinitiative.org/overview>

Fig 3: Carbon Performance: Electricity Utilities

Showing: top 10 emitters, large market cap, sourced 28 Nov 2021¹¹



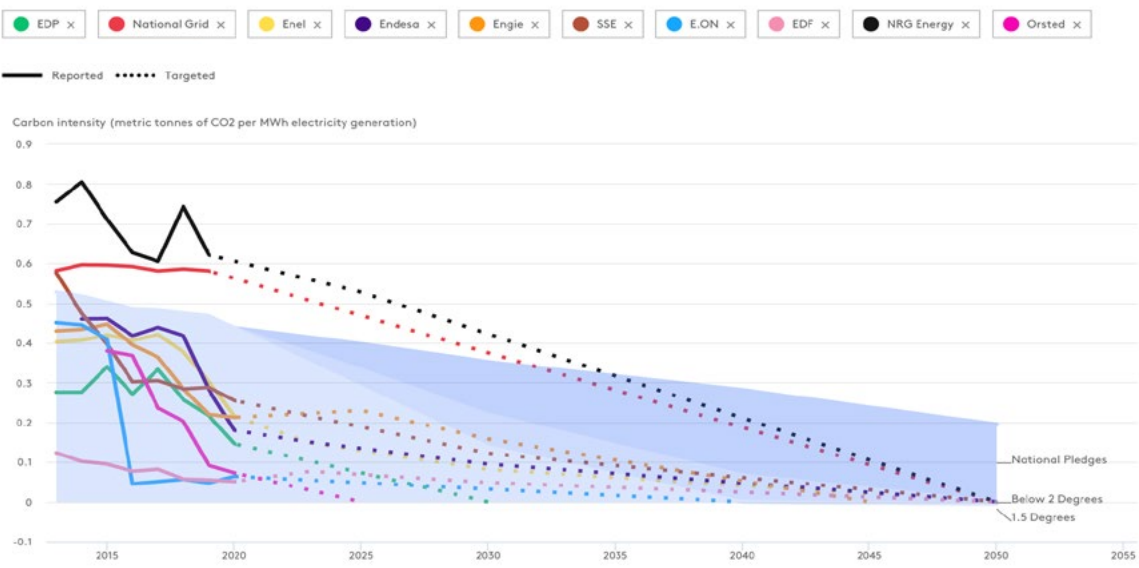
Source: Transition Pathways Initiative (<https://www.transitionpathwayinitiative.org/sectors/electricity-utilities>)

However, several utilities and renewable energy companies have set low carbon or Net Zero targets. Comparing 10 of these companies' reported emissions reductions is easy

to do with the TPI tool - it displays the targeted year when the company is expected to reach their Net Zero or 1.5°C Paris-aligned goals (see Figure 4 below).

Fig 4: Carbon Performance: Electricity Utilities

Showing: 10 electric utilities with low carbon or net zero targets, sourced 28 November 2021¹²



Source: Transition Pathways Initiative (<https://www.transitionpathwayinitiative.org/sectors/electricity-utilities>)

¹¹ <https://www.transitionpathwayinitiative.org/sectors/electricity-utilities>

¹² <https://www.transitionpathwayinitiative.org/sectors/electricity-utilities>

Tracking companies' low carbon transition pathway and targets will play an ever-greater role in investors decision making going forward. The recently launched TPI Global Climate Transition Centre is looking to play a key part of post-COP26 financial infrastructure to support investor action on climate change¹³.

Data, reporting and how to prepare

The "G" in ESG refers to the governance risks and opportunities in decision making. The purpose of a company, the role and composition of the boards of directors, compensation and oversight of top executives are fundamental components of ESG. Good governance requires a balance between maximizing financial returns for shareholders while driving the business forward in a sustainable manner.

Managing company exposure to the physical, transitional and liability risks of climate change must come from the top, and it's interesting that including ESG metrics in executive pay packages is on the rise¹⁴. Governance includes transparency and reporting, together with structure and systems as well as cyber risk; it is really about the values of the company.

Reporting on the rise for better climate-related data

Risk managers and the C-suite need to know that climate-related data and reporting is on the rise; renewable energy companies are by no means exempt from what will be required by law in the months and years ahead.

For example, new legislation in the UK, expected to become law in April 2022, will require the country's largest publicly listed companies and financial institutions to provide reporting in line with the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD). The TCFD was created by the UK Financial Stability Board (FSB) in 2015 to improve and increase reporting of climate-related financial information.

Meanwhile the EU Corporate Sustainability Reporting Directive (CSRD) is expected to come into effect in 2023, two years after it was first introduced. This measure will see 49,000 European and Europe-based disclosing sustainability information – a fourfold increase on current numbers¹⁵.

These new laws will lead to significant improvements in data availability, which until now has been a problem for many companies. How do businesses make decisions knowing that their data is incomplete? Uniform disclosure standards should help fill in some of these gaps by ensuring that companies provide more detailed sustainability information, but many companies are still finding their way. Furthermore, reporting to a regulator holds potential liability risk and/or potential fines if inaccurate data is provided - which is why such reporting is often delivered by the risk management and compliance departments rather than the CSR team.

Double materiality - twin climate related issues your business can face

One of the key accounting concepts of financial information is the notion of materiality. If information about a company is deemed important, it should therefore be disclosed. It is now recognised that climate-related impacts on a company can be material and therefore require disclosure. The idea of double materiality takes this further, such that the impacts of a company on the climate are also material. Defining what double materiality exactly means is still a work in progress; however, climate encompasses the notion of sustainability, which can be put under the ESG label at this time.

How to prepare for better ESG scores

What can renewable energy companies do to prepare for these changes and achieve better ESG scores?

- First, companies could better manage their ESG ratings, and the raw data being collected about them to improve ESG information available to investors.
- Second, they could use their existing ESG scores to identify inaccuracies and correct them with ratings providers. Companies do not have to engage with every rating agency but should focus on working with at least one or two to know how their scores are calculated and what to focus on for improvements within their company that will positively impact their ESG ratings.
- Third, renewable energy companies can get closer to their suppliers as well as from partnerships, work with their insurers to better manage their transition risks and join associations working on ESG or climate-related issues to build further capacity and knowledge.

¹³ <https://www.transitionpathwayinitiative.org/publications/89.pdf?type=Publication>

¹⁴ <https://www.pwc.com/gx/en/issues/esg/exec-pay-and-esg.html>

¹⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0189>

Conclusion – it's time to actively manage ESG risks

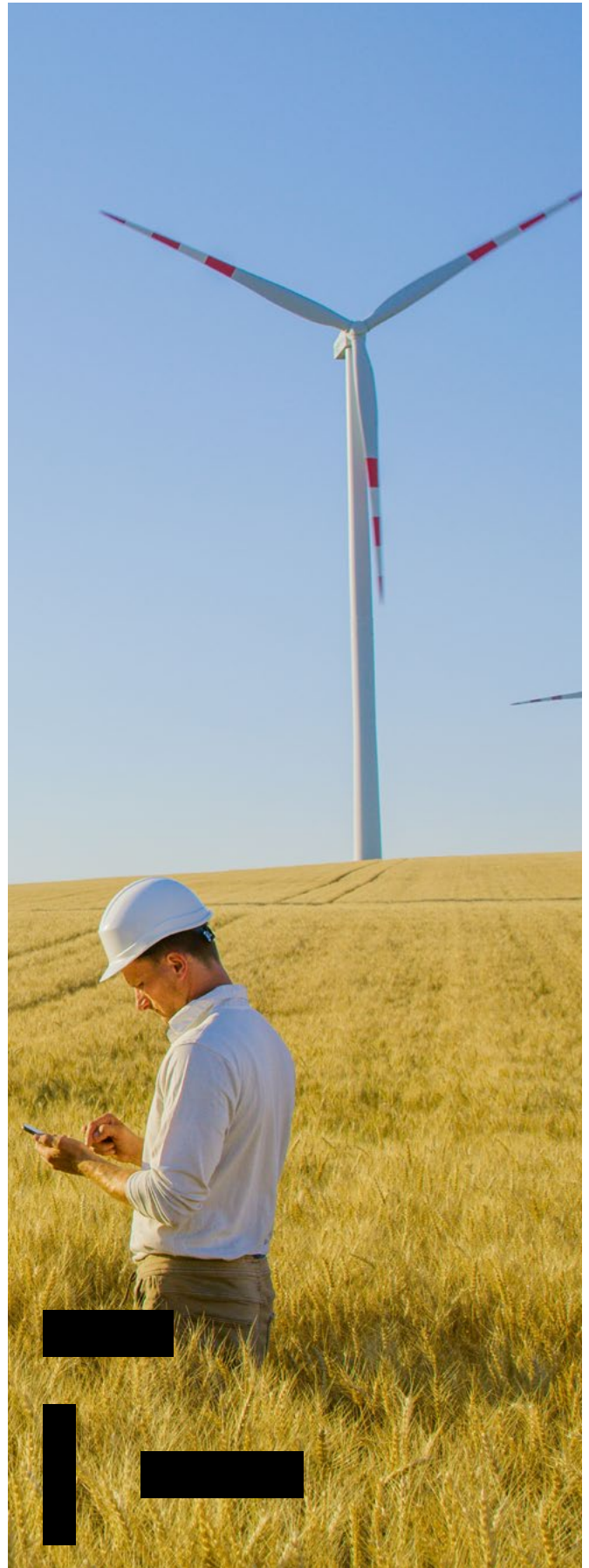
The link between sustainability and financial performance is ongoing, with the ESG tag currently serving as a bridge. Risk management does not currently make a difference between a traditional and a green transaction; however, new regulations coming in means that it is just a matter of time before there will be a gap between the two. I'd like to finish by making the following observations in summary:

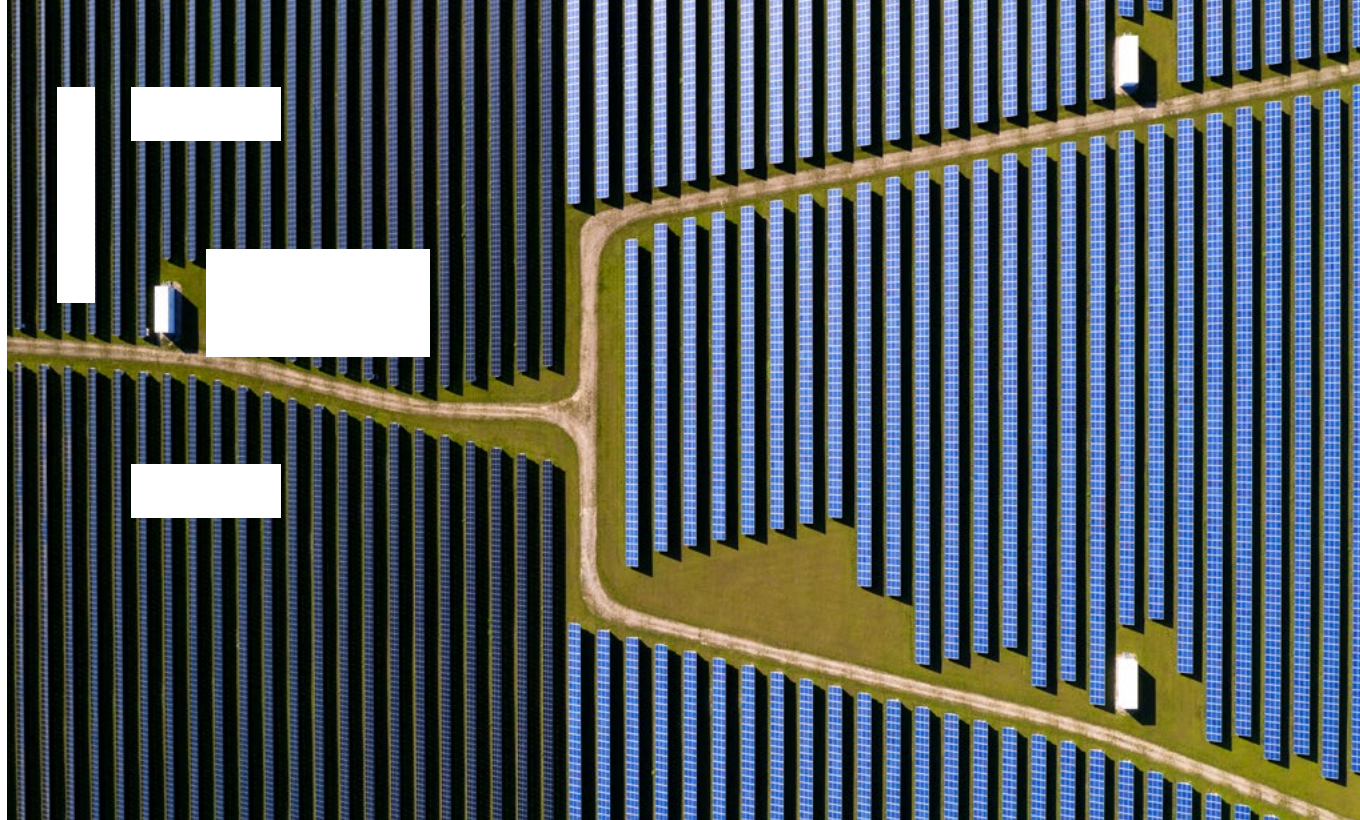
- Renewable energy companies need to consider their material impact on the planet and society - today and for the future.
- Renewable energy risk managers and business leaders will need to adapt to continuing developments in sustainability. Sustainability and climate-related investment, data and reporting is on the rise, and managing this requires a whole of company approach. At the same time, supply chain management will also become an even bigger risk for this industry.
- Renewable energy companies should look to build and maintain a good ESG rating for their stakeholders and investors, as well as to attract talent and retain customers. A good ESG rating can also help attract a lower cost of capital. However, ESG ratings, scores, disclosures and standards also add additional layers of complexity for renewable energy companies to tackle.
- Risk managers need to be prepared for new regulatory changes and how to manage them as they face an increasing transition exposure due to these new requirements.

So do be prepared – develop a transition risk management strategy that shares information and works with other relevant stakeholders, such as lenders, insurers, governments and civil society to find solutions and opportunities. Prudent risk management is critical to this process - and action is now required.



Margaret-Ann Splawn is a climate policy finance and investment consultant. She is the Executive Director of the Climate Markets & Investment Association, an Active Private Sector Observer for developed nations at the UN Green Climate Fund, and a Fellow of the Royal Geographical Society.
margaret.splawn@cmia.net





A look at the energy transition in Colombia: a new operational and regulatory framework

Introduction: exponential renewable energy growth in Colombia

In 2021, Colombia has experienced a notable growth in the participation of non-conventional renewable energies within the composition of the energy matrix. This collective effort, led by the Government, headed by the Ministry of Mines and Energy (MME), allows Colombia to be one of the leading countries in Latin America that have shown great progress in terms of the energy transition. This is reflected in the auction that closed in October 2021, where 11 generation projects were awarded through 9 companies that acquired obligations close to 800MW which expect to start generating in early 2023¹; to this is added the 1,298MW that had already been awarded in the 2019 auction².

According to MME, thanks to the Power Auctions, Colombia will increase its installed capacity in 2023 by a factor of 100 times compared to 2018.

The vision of the government, reflected in the National Energy Plan presented by the Mining and Energy Planning unit (UPME), is that by 2050 the demand for electricity, driven mainly by the growth in non-conventional renewable energies and natural gas, would exceed that of liquid fuels, mainly in the transportation sector³.

New operational and regulatory framework

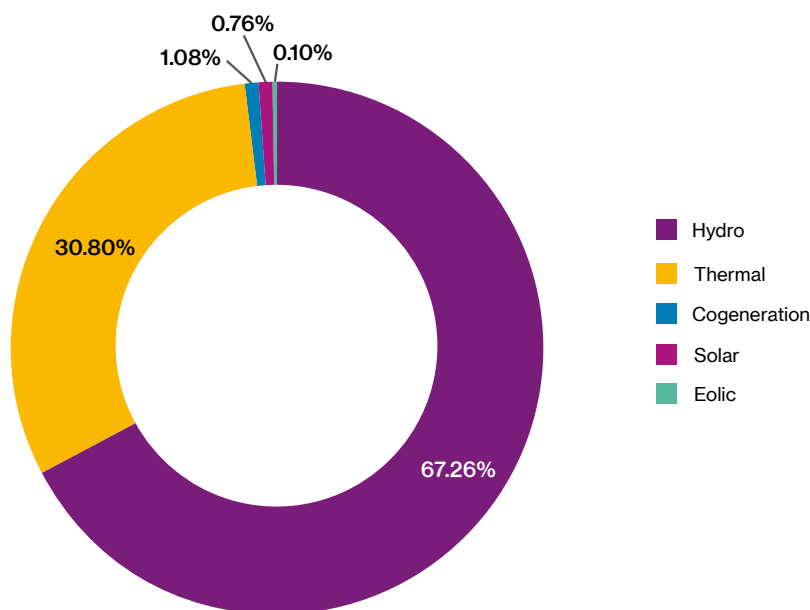
In order for these important steps to be taken firmly, the country has been working within the operational and regulatory framework to adequately articulate the different sources of generation, in order to achieve adequate complementarity. It is worth highlighting that water remains the dominant resource in Colombia within the energy composition (see Figure 1 on the next page), followed by the support offered by thermal power plants, which are increasingly based on state-of-the-art technologies. These aim to reduce the level of CO₂ emissions, such as the so-called "Super Critical", which offers reductions in CO₂ emissions which are lower than those for a natural gas plant.

¹ MINENERGIA (2021, october). Nuevo hito en la Transición Energética: Colombia multiplicará por más de 100 veces su capacidad en energías renovables. <https://www.minenergia.gov.co/en/web/10180/historico-de-noticias?idNoticia=24314285>

² MINENERGIA (2019, october). Día histórico para las energías renovables en Colombia: por primera vez, la energía del sol y del viento llegará, a precios más bajos, a los hogares colombianos. <https://www.minenergia.gov.co/en/historico-de-noticias?idNoticia=24146550>

³ Unidad de Planeación Minero Energética – UPME (2020, february). PLAN ENERGÉTICO NACIONAL – PEN. https://www1.upme.gov.co/DemandaEnergetica/UPME_Presentacion_PEN_V48.pdf

Fig 1: Effective capacity by type of generation



Source: PARATEC XM. <http://paratec.xm.com.co/paratec/SitePages/generacion.aspx?q=capacidad>

The example of Ecopetrol

Just like the changing profile of thermal power plants, it is important to highlight the efforts being made by large companies in the petrochemical sector to be part of the energy transition initiative. Perhaps the best example is Ecopetrol, who made the decision to reduce CO₂ emissions by 25% by 2030, contributing to Colombia's goal to reduce greenhouse gas emissions by 51% by 2030 and be a carbon neutral country by 2050⁴. Ecopetrol are deploying significant efforts to incorporate renewable energy, hydrogen and carbon capture, storage use in the energy mix.

Energy storage and the role of hydrogen

Two components in the energy transition framework that Colombia has been actively working on are energy storage and the leading role of hydrogen:

- Last year, the government promoted an energy storage auction; Canadian Solar was awarded the contract for a battery system project with a capacity of 50MW
- Regarding hydrogen, a roadmap⁵ has been established, which determines it as a key component in achieving Colombia's carbon neutrality targets. The roadmap analyzes hydrogen production capacity, its expected demand, the associated reduction of emissions and the country's export potential, amongst others.

Conclusion: diversity without compromising key objectives

Finally, it is important to note that in Colombia steps are being taken to profoundly change generation profiles, introducing elements such as digitization, decentralization and democratization, with aim that the end user has a leading role and can become an actor in the generation system.

At the end of the day, the objective for Colombia is to diversify the energy model, but without compromising sustainability, reliability and competitiveness.



Oscar Torres is Power Leader, Willis Towers Watson Colombia.
oscar.torresh@willistowerswatson.com

⁴ ECOPELROL (2021, march). Grupo Ecopetrol anuncia compromiso y plan para lograr cero emisiones netas de carbono en 2050. https://www.ecopetrol.com.co/wps/portal/Home/es/?1dmy&page=detalleNoticias&urile=wcm:path:ecopetrol_wcm_library/as_es/noticias/noticias%2B2021/reduccion-emisiones

⁵ MINENERGIA (2021, september). Hoja de Ruta del Hidrogeno en Colombia. https://www.minenergia.gov.co/documents/10192/24309272/Hoja+Ruta+Hidrogeno+Colombia_2810.pdf#:~:text=La%20Hoja%20de%20Ruta%20del,Acuerdo%20de%20Par%C3%ADs%20del%202015.





Part Two -
renewable energy
industry developments



Green hydrogen: the fuel of the future

Introduction: a zero-emission energy source?

There is much talk about hydrogen, and particularly green hydrogen, as a sustainable energy source of the future - a future that will help some of the largest CO₂-emitting industries to decarbonise. Hydrogen has for some time been viewed as a potential energy source capable of supplying large scale applications such as domestic heating, industrial processing, transportation and clean electricity generation.

However, there's a problem; hydrogen today is produced using fossil fuels in a process that creates vast amounts of carbon dioxide and greenhouse gases. The challenges inherent in making hydrogen production cleaner, cheaper and at scale has long been an obstacle to realising the hydrogen energy transition and meeting the climate change target of Net Zero by 2050.

Fortunately, hydrogen production processes are set for change, helped by both a renewable power sector enjoying rapid expansion and technological advances that offer economies of scale that weren't thought of ten years ago. As reported by the World Economic Forum (WEF, 2021) the cost of renewable technologies like wind and solar is falling significantly¹, making renewables in most parts of the world cheaper than fossil fuel power generation. Indeed, since 2010 the cost of Solar PV electricity has fallen 85% and onshore and offshore wind have dropped by around 50%².

Cleaner and cheaper renewable power is enabling today's green hydrogen energy transition - a transition that has renewable power and water electrolysis at its heart. Green hydrogen is crucial and will play a pivotal role helping the world transition from the existing fossil fuel economy to the hydrogen economy of the future - a future that is almost with us today.

Why is the hydrogen economy only possible now?

As a highly reactive element, there are practically no free H₂ molecules on earth that can be simply and cheaply collected. Instead, pure H₂ must be liberated from molecules such as water or methane through thermo-chemical or electro-chemical processes. In 2021 fossil fuels remained the principal source of industrial hydrogen production, with steam reforming using natural gas continuing to be the cheapest industrial process available.

It is a classic energy currency conundrum. The conversion of one form of energy to another is costly - both financially and environmentally - and is best avoided where there is no tangible benefit. Consequently, hydrogen today is only produced in relatively small volumes, supplying those industries where pure hydrogen is essential to their processes and where no other viable alternatives exist, such as the refining industry.

¹ <https://www.weforum.org/agenda/2021/07/renewables-cheapest-energy-source/>

² https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/Jun/IRENA_Power_Generation_Costs_2020.pdf

Other sectors, such as domestic heating, industrial processing, transportation and clean electricity generation can make use of hydrogen but have continued to rely on the direct burning of fossil fuels, entrenched in a business model that was established in the early 1800s. But these sectors are entrenched only because the available technology and the associated energy currency dictates that converting fossil fuels to hydrogen involves a huge energy conversion cost, creates as much harmful greenhouses gasses and only shifts rather than eradicates fossil fuel and greenhouse gas emissions from the global economy.

Even with the environmental alarm bells ringing and strong public and government motivation, it has not been enough for the traditional sectors to embark on an energy transition journey. As always, what is needed is the right technology, the right economics and a little government incentive to enable change. The environmental message is very much out there; the global economy must change, wean itself from carbon intensive fuels and seek cleaner, greener alternatives. The motivation has been there for decades, but the technology has been wanting - until now.

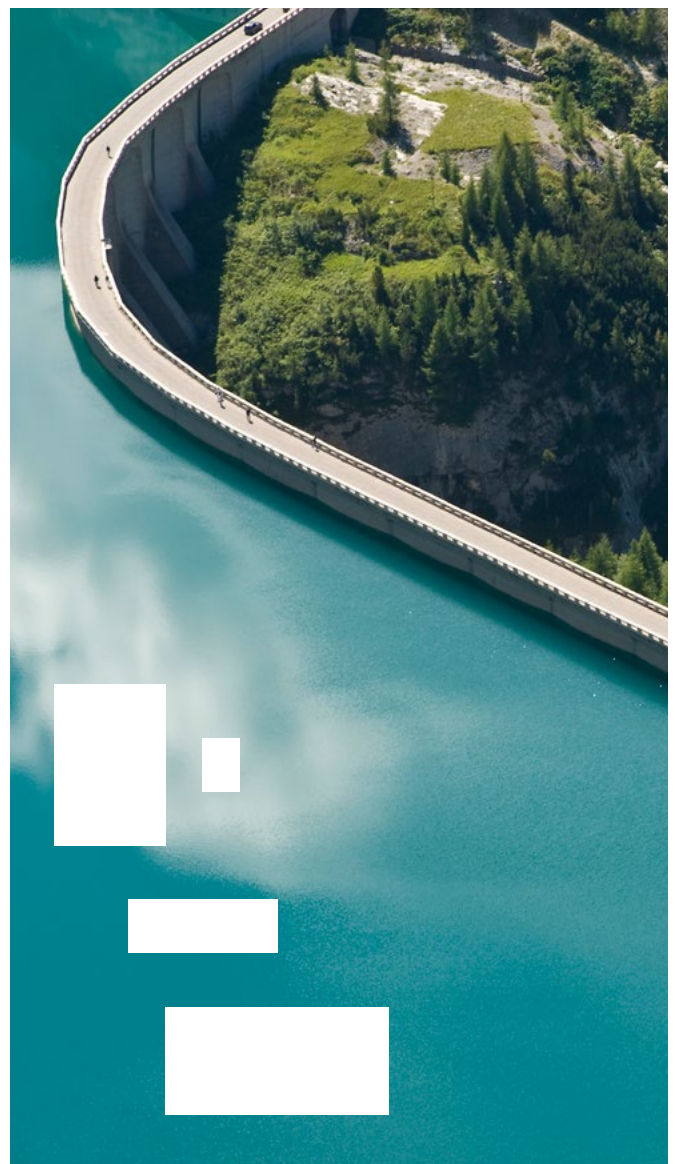
The hydrogen energy transition

The dependence on fossil fuels to produce hydrogen is set to change, with countries around the world investing in green hydrogen projects to help decarbonise and drive their Net Zero economies. The World Energy Organisation recently commented that although the world's largest electrolyser currently in operation is only 10 MW (megawatt), new green hydrogen projects, totalling 50 GW (gigawatt) were announced in 2020 alone, many of which are GW scale projects³.

Fundamental to the develop of large-scale green hydrogen projects is the continuing development of large solar PV farms/battery complexes and record-breaking onshore/offshore wind farms. Without these, green hydrogen would not be possible on an economically viable scale to meet global demand. Large renewable power projects, coupled with equally large water electrolysis plants, represent the symbiotic technology relationship that is helping nudge the global economy towards a hydrogen energy transition.

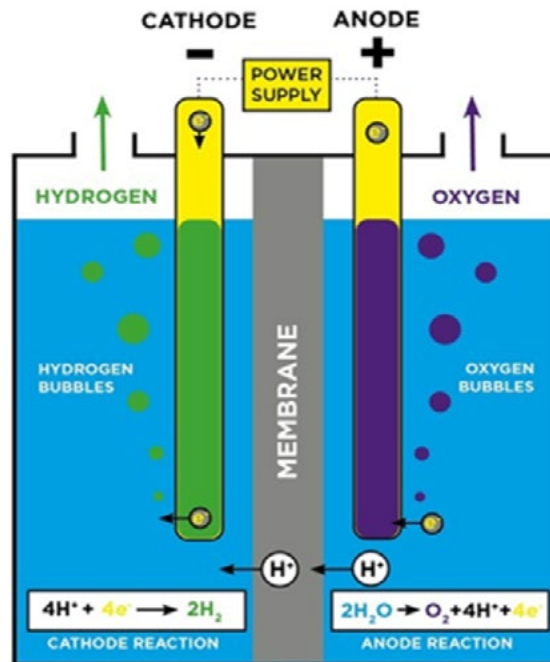
Green hydrogen & water electrolysis

Green hydrogen is produced by water electrolysis, using surplus or new captive electrical power generated from renewable sources such as solar PV or wind turbines. Water contains both hydrogen and oxygen molecules that are strongly bonded; electrolysis is used to liberate hydrogen from the oxygen by passing an electrical current through the water. Electrolysers are made up of an anode, a cathode and a polymer membrane. An electrical circuit is made, creating an electro-chemical reaction that gives off hydrogen and oxygen in a process that is between 60% and 80% efficient. When hydrogen is produced in this way, the process is CO₂ free and in today's climate framework is considered 'green' hydrogen.



³ <https://www.world-energy.org/article/14732.html>

Fig 1: Green hydrogen & water electrolysis



Source: Willis Towers Watson

Green hydrogen & renewable power

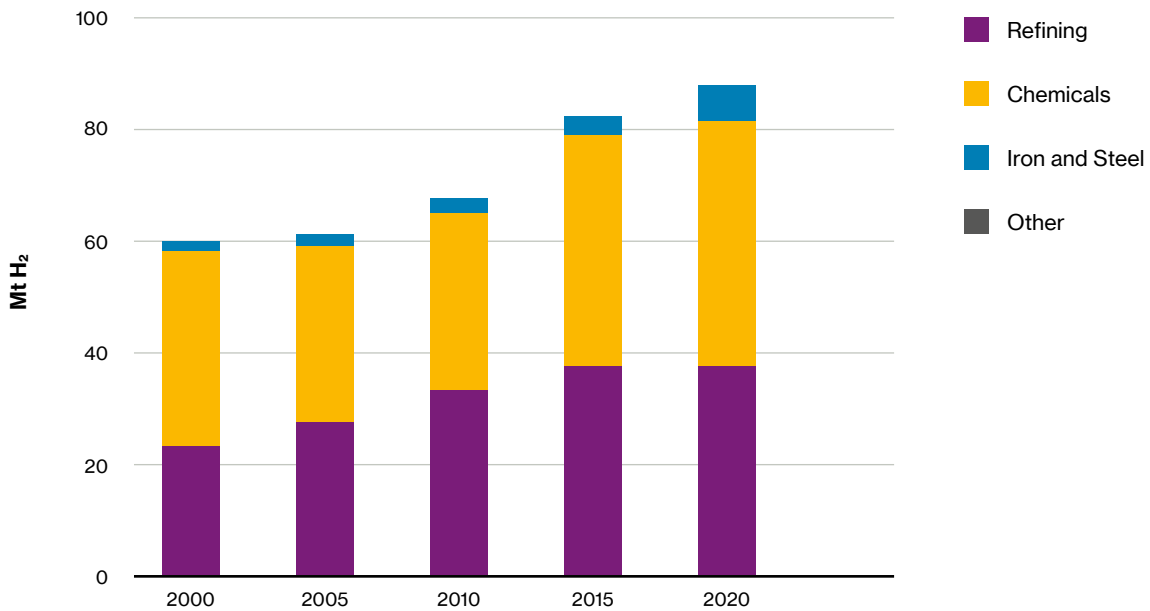
For a long time, renewable power has suffered a storage problem: it has been unable to match the power-generating potential of the weather with end-user demand. One of the great synergies of producing green hydrogen from renewable power sources is that it provides a means of converting and storing excess electrical power - in the form of hydrogen - when supply is greater than demand. Rather than storing excess electricity in power grid scale batteries, green hydrogen production provides an energy conversion, storage and transportation solution (electricity > hydrogen) that can economically support the growing global hydrogen demand and remove fossil fuels from the hydrogen production process.

Global hydrogen supply & demand

Global hydrogen demand has continued to grow since 2000 and was around 90 Mt (million tons) H₂ in 2020, with most demand coming from carbon-intensive industrial processes such as refining, fertiliser manufacturing and chemicals⁴.

⁴ <https://www.iea.org/reports/global-hydrogen-review-2021>

Fig 2: Hydrogen demand by sector

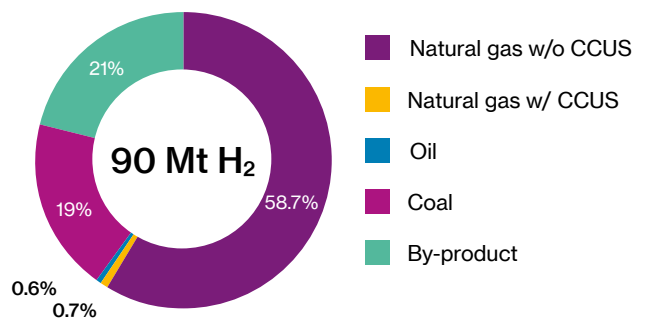


Note: "Others" refers to small volumes of demand in industrial applications, transport, grid injection and electricity generation.

Source: IEA Global Hydrogen Review 2021. (<https://iea.blob.core.windows.net/assets/285801dc-9414-4894-b6c8-656465c78666/GlobalHydrogenReview2021.pdf>)

Almost all the 90 Mt of global hydrogen produced was met by fossil fuel hydrogen production and was responsible for almost 900 Mt of direct CO₂ emissions, equivalent to the CO₂ emissions of Indonesia and the United Kingdom combined. Approximately 79% of hydrogen production was from dedicated hydrogen production plants and 21% as a by-product of other carbon intensive refining processes.

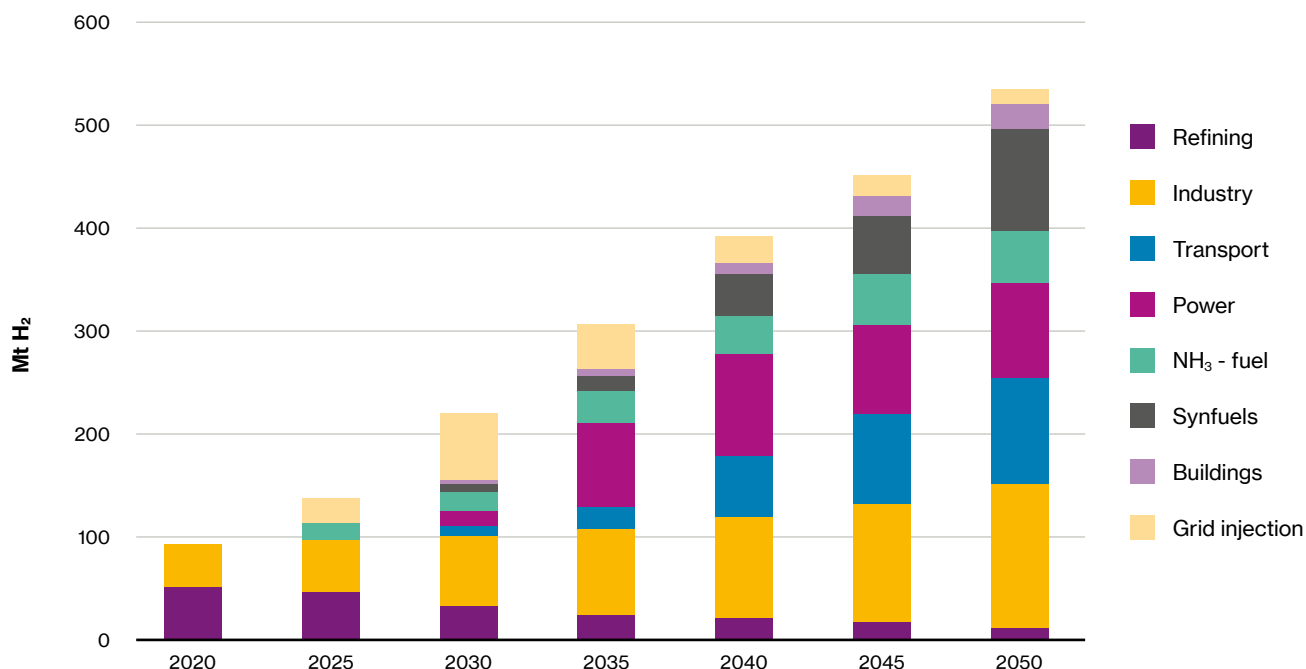
Fig3: Sources of hydrogen production, 2020



Note: CCUS = carbon capture, utilisation and storage.

Source: IEA Global Hydrogen Review. (<https://iea.blob.core.windows.net/assets/285801dc-9414-4894-b6c8-656465c78666/GlobalHydrogenReview2021.pdf>)

Fig 4: Net Zero emissions by 2050



Source: IEA Global Hydrogen Review 2021 - All rights reserved. (<https://iea.blob.core.windows.net/assets/285801dc-9414-4894-b6c8-656465c78666/GlobalHydrogenReview2021.pdf>)

Note: NH₃ - fuel is produced in a process that combines hydrogen and nitrogen to create liquid fuels.

Steam reforming of natural gas and gasification of hard (black) or lignite (brown) coal dominated, whilst green hydrogen accounted for a mere 0.1% of global production in 2020⁵. Steam reforming using natural gas continues to be the cheapest industrial process available⁶ and renewable energy is only just beginning to challenge this dominance. The dominance of fossil fuels, as often the case, correlates directly with their abundance, ease, cost, and process efficiency.

The global demand for hydrogen is set to increase as the largest CO₂ (carbon dioxide) emitting industries turn to hydrogen to achieve their Net Zero initiatives in response to the climate change target of Net Zero by 2050. Current projections set out by the International Energy Agency in their 2021 Global Hydrogen Review publication suggest that global demand will reach more than 500 Mt per annum by 2050⁷.

This increase is driven by traditional industries which traditionally have been based on fossil fuels developing new technology to make use of green hydrogen:

- **Aviation** – aircraft manufacturers are exploring hybrid configurations using modified gas turbines using liquid hydrogen and oxygen and hydrogen fuel cells to power the avionics. The target for the first zero emission aircraft by 2035⁸.
- **Road transport** - Vehicle manufacturers are showcasing hydrogen fuel cell powered vehicles, with some models expected in 2022.
- **Rail transport** – Train manufacturers are developing and testing hydrogen fuel cell trains, the first series of hydrogen trains will begin service in Germany in 2022⁹.

⁵ <https://iea.blob.core.windows.net/assets/285801dc-9414-4894-b6c8-656465c78666/GlobalHydrogenReview2021.pdf>

⁶ https://onlinelibrary.wiley.com/doi/full/10.1002/14356007.a13_297.pub3

⁷ <https://iea.blob.core.windows.net/assets/285801dc-9414-4894-b6c8-656465c78666/GlobalHydrogenReview2021.pdf>

⁸ <https://www.airbus.com/en/innovation/zero-emission/hydrogen/zeroe>

⁹ <https://www.alstom.com/press-releases-news>

Table 1: Green Hydrogen Projects^{10 11}

Project	Completion	Location	Power Source	Electrolysers	H2 Output
Asian Renewable Energy Hub	2027-28	Western Australia	16GW Onshore, 10GW Solar PV	14 GW	1.75 Mt/year
NorthH2	2027 - 2040	Netherlands	Offshore	10 GW	1.0 Mt/year
AquaVentus	2025 - 2035	Germany	Offshore	10 GW	1.0 Mt/year
Murchison	2028	Western Australia	Onshore, Solar PV	5 GW	tbc Mt/year
Beijing Jingneng	2021	Inner Mongolia	Onshore, Solar PV	5 GW	0.5 Mt/year
Helios Green Fuels	2025	Saudi Arabia	Onshore, Solar PV	4 GW	0.24 Mt/year
Pacific Solar Hydrogen	tbc	Australia	Solar PV	3.6 GW	0.20 Mt/year
H2-Hub Gladstone	2025	Australia	tbc	3 GW	tbc Mt/year
HyEx	2024	Chile	Solar PV	1.6 GW	0.124 Mt/year
Geraldton	tbc	Western Australia	Onshore, Solar PV	1.5 GW	tbc Mt/year
Greater Copenhagen	2023 - 2030	Denmark	Offshore	1.3 GW	0.25 Mt/year
H2 Sines	2030	Portugal	Onshore, Solar PV	1.0 GW	tbc Mt/year
Rostock	tbc	Germany	Germany	1.0 GW	tbc Mt/year

- **Marine transportation** – Shipbuilders are developing ocean-going freight and passenger vessels, using ammonia liquid fuel derived from hydrogen and nitrogen.
- **Domestic/commercial heating** – natural gas transmission and distribution companies have ongoing plans to hydrogen proof their existing networks to allow a higher hydrogen to natural gas blend to be delivered to end-users.
- **Power industry** – major gas turbine equipment manufacturers have for the last decade been researching hydrogen as a fuel in gas turbines and are successfully increasing the percentage of hydrogen in the fuel mix¹². Not only does hydrogen provide cleaner burning fuels - it also acts as a renewable energy store. Converting hydrogen back to electricity effectively delivers constant power during renewable shortfalls which provides grid resilience.
- **Steel industry** – steel makers are experimenting with small scale green steel projects that include blast furnace conversions and ore extraction techniques.
- **Cement industry** – demonstration plants using hydrogen to heat rotary cement and lime kilns are now in operation.

Perils, hazards & insurance

The burgeoning green hydrogen industry is in its infancy and will likely face construction, technological and operational issues along the way. This is to be expected of any hazardous industry, particularly where new large-scale and evolving technology is being deployed. To prevent industry loss events along the way, this new industry will no doubt have to learn new practices, as well as continually developing and modifying its technology.

Given the scale of the hydrogen energy transition, insurers and brokers are likely to see an increasing demand to cover green hydrogen projects, both in their construction and operational phases. This boom brings a new era of innovation and technology progression, which will carry new risks associated with the construction, production, storage and handling requirements of each project. These projects will include:

- ever larger wind turbine arrays, using record breaking wind turbines
- water electrolysers, of increasing MW size and H2 output
- H₂ storage and handling solutions, that encompass new and existing pipeline infrastructure, marine vessels, and docks

¹⁰ <https://www.world-energy.org/article/14732.html>

¹¹ <https://www.nicnewmanoxford.com/green-hydrogen-projects/#:~:text=The%2012%20Largest%20gigawatt%20plus%20green%20hydrogen%20projects...%205%20South%20American%20Green%20Hydrogen%20Projects.%20>

¹² <https://www.siemens-energy.com/global/en/news/magazine/2019/hydrogen-capable-gas-turbine.html>



The cost of insurance will evolve over the next few years and will in part be determined not only by industry experts designing out the risks but also by risk and insurance professionals taking the time to understand the technology and the associated risks. Whilst insurers will undoubtedly be able to make use of historical loss data in some areas of these new projects, there are likely to be new risks that we simply do not have knowledge of yet.

It is clear that a high degree of engineering expertise and insurance know-how will be required to understand the risks, and in doing so risk intermediaries can help support rather than hinder the growth of this emerging industry. The production process will undoubtedly involve the concentration of hazardous and reactive chemicals, large electrical installations, rotating equipment and production/storage of flammable gasses. The corresponding loss drivers are likely to be fire, explosion, large electrical equipment faults arising from transformers and AC/DC convertors, power interruptions and rotating equipment failures from turbines, compressors and pumps.

Fast developing technology risk

The lines between existing proven technology, the evolution of existing technology and new “first of kind” technology is often blurred when manufacturers introduce new technology, scale up existing technology and introduce new materials, geometries and manufacturing techniques to reach higher outputs and efficiencies.

Renewable technology is already in the middle of a rapid development path, particularly for onshore and offshore wind turbines, solar PV (photovoltaic) panels and battery storage. However, green hydrogen is rather more at the beginning of such a path, with the size of water electrolyzers predicted to increase rapidly.

Projects using fast-developing technology require a thorough understanding, using up-to-date equipment manufacturer information to accurately assess the risk. This information can be difficult to obtain yet understanding what is proven and what is unproven is essential. Furthermore, determining when a technology is considered proven requires an agreed operational performance metric to gauge and indicate when proven status has been reached. This metric is yet to be agreed in the renewables sector - something that applies equally to hydrogen water electrolysis equipment.

Construction

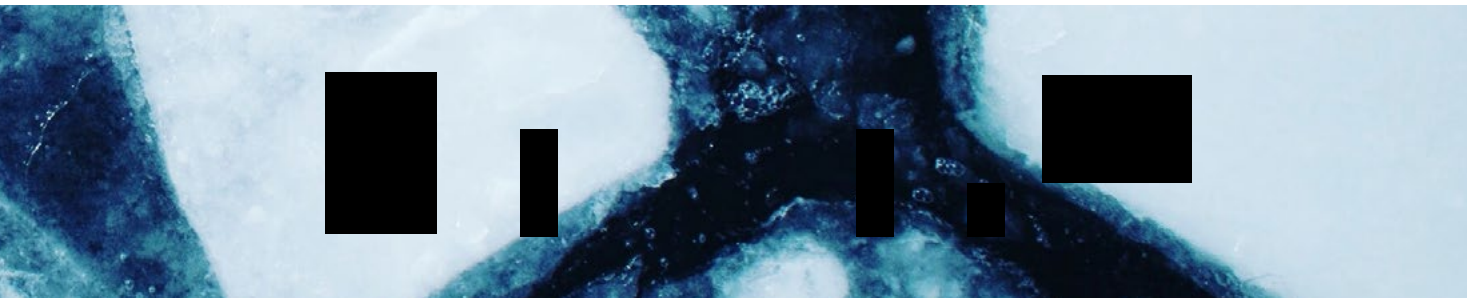
Construction risks are well understood but difficult to predict, particularly when dealing with new technology. Projects face a wide variety of risks and loss drivers that can lead to Property Damage, Delay in Start-up, Advance Loss of Profits and Liability claims:

- Design omissions
- Use of prototypes or fast developed technology
- Project management issues (risk assessment, risk registers, critical path, and progress data)
- Quality control (poor workmanship, skill, human error)
- Natural catastrophe losses (earthquake, windstorm, subsidence, landslide, flood, inundation)
- Damage due to third party activity
- Fire and explosion
- Heavy or abnormal lift risks
- Collapse and damage to temporary works
- Materials and workmanship errors
- Testing and commissioning risks

Asset concentration & plant layout

Plant design and layout are a fundamental part of the design process, with inherent or residual risks baked in at the design stage and carried through the life of the project. Although existing plant design codes will probably support green hydrogen project designs, there are likely to be some unique risks and circumstances that will need to be considered, outlined below:

- **Construction, location & layout:**
 - Geographical limitations of the site
 - Relationship with new or existing support facilities (power, roads, marine transit)
 - Location of hazardous processes and bulk storage facilities from sensitive, exposed equipment and plant boundaries
 - Prevention of confined spaces where explosive mixes could develop
 - Prevent domino effect of adjacent events



▪ **Equipment & processes:**

- Safety relief devices
- Piping and fittings
- Ventilation (natural and mechanical)

▪ **Operation & Maintenance**

- Optimal distancing for operation and maintenance throughout the life of the plant
- Inspection and maintenance practices

▪ **Human element:**

- Training of employees and contractors
- Supervision of employees and contractors

▪ **Protection:**

- Control of ignition sources
- Passive fire protection features
- Automatic sprinkler protection

Fire & Explosion

Fire and explosions are a key peril and a common occurrence in any high hazard industrial process leading to significant insurance claims. Hydrogen has several fundamental properties that requires rigorous control to avoid explosions.

- Hydrogen is highly flammable when allowed to mix with air and has a lower flammability limit of 4% (volumetric ratio of hydrogen to air).
- Hydrogen has small molecules that can easily leak in the most air-tight of systems.
- Hydrogen leaks are hard to identify without dedicated detectors since hydrogen is colourless and odourless.
- Hydrogen flames are almost invisible in daylight.

“No matter how well understood hydrogen interaction is in theory, there is no substitute for real world experience. Furthermore, lessons learnt and standards adopted may vary from country to country.”

Existing infrastructure

Transporting hydrogen via pipeline from large scale production facilities to domestic or industrial end-users will require existing transmission networks to be repurposed. New national networks are unlikely to be built; rather, existing networks will be adapted and repurposed to carry higher and higher hydrogen and natural gas mixes. National transmission networks use carbon steel pipes to transport natural gas, so the interaction between steel and natural gas is well understood. It is also known that hydrogen at elevated pressures and above certain concentrations (usually greater than 20%) can interact with carbon steel and lead to hydrogen embrittlement and cracking. Although this phenomenon is understood, there is limited real world experience of hydrogen in large transmission networks or in new dedicated end-user hydrogen handling systems and equipment.

The ageing infrastructure (e.g. pipes, valves, compressors) could be highly susceptible to hydrogen embrittlement and cracking, leading to potentially harmful and explosive gas mixtures. An extensive amount of research, testing and development is underway in some countries but, no matter how well understood hydrogen interaction is in theory, there is no substitute for real world experience. Furthermore, lessons learnt and standards adopted may vary from country to country, leading to varied network reliability and safety concerns.

Greenhouse gasses

Whilst creating, converting and burning green hydrogen has little environmental impact in terms of greenhouse gas emissions and climate change, it is known that hydrogen is a secondary or indirect greenhouse gas when released into the atmosphere. Hydrogen reacts in the atmosphere and disrupts the distribution of methane and ozone which can drive global warming. It is estimated that a 10% leakage rate of the projected global hydrogen economy would generate a climate impact of 6% of that of the fossil fuel system it replaces¹³. This may give rise to new regulations that sets the annual emission rate limit for hydrogen for a given piece of equipment, avoiding the worst effects of hydrogen release to the atmosphere. Evidently, strict operation and maintenance practices will be required as well as leak detection to control the amount of hydrogen leakage into the atmosphere.

¹³ https://ec.europa.eu/environment/integration/research/newsalert/pdf/39na1_en.pdf

Conclusion: our best chance to decarbonise

The hydrogen energy transition is our best chance since the introduction of fossil fuels to decarbonise our most “hard to decarbonise” industry sectors. It is the synergies between renewable power and green hydrogen production that have created the potential to instigate the rapid rise of global green hydrogen projects.

Yet it is not a cure-all technology solution - there are project risks inherent in hydrogen production as outlined earlier, and new demands will be put on the existing infrastructure. Moreover, if green hydrogen projects are to develop as projected, the demand for purified water by 2040 will be around 620 million cubic metres¹⁴. This water will have to be sourced from the ocean, creating an expansion of the water desalination industry - an industry that is itself power intense and one that will need to be supplied from ever larger renewable projects.

Evidentially, future green hydrogen, renewable power, and water desalination projects are becoming increasingly important and on the verge of more rapid growth. Insurers will therefore see an increasing demand to cover the construction and operation of integrated green hydrogen projects, projects that span all industry sectors and disciplines. A major transformation of the global energy system is in its infancy; it will undoubtedly present new risks, but will be one that the insurance industry must support with all the skills and experience to provide the best solutions to help the transformation of the global energy system.



Paul Watson is a Power Risk Engineer, Natural Resources, Willis Towers Watson London.

paul.d.watson@willistowerswatson.com



¹⁴ <https://www.euronews.com/green/2021/11/04/is-green-hydrogen-less-sustainable-than-dirtier-blue-hydrogen>



Solar: how technology is reducing the risk

Note: this article is by Will Hitchcock of Above Surveying and does not necessarily represent the views of Willis Towers Watson

Introduction: growth brings its own challenges

The utility-scale solar industry is going through a period of profound change. Solar power is growing at a fantastic rate – in fact, 70% of installed Solar is less than five years old¹ – the technology is rapidly changing and it's moving from a fringe energy generation source to a core part of the global energy mix. And while solar was once supported by subsidies, it is now readily deployed subsidy-free as an alternative to gas, coal and nuclear.

However, this seismic change in the industry is not without its challenges, which, if not addressed, pose a significant risk to the credible and sustainable growth of the industry.

Challenge one – skills shortage

Firstly, rapid industry growth results in a skills shortage. Solar companies are growing as quickly as possible to meet world demand, with European solar PV jobs potentially tripling by 2030². Drastic growth, coupled with skills shortages, is impacting this next phase of industry expansion. Drastic growth, coupled with skills shortages, is impacting this next phase of industry expansion - along with the fact that solar companies are growing as quickly as possible to meet the demand that the industry is offering them.

Many of these organisations are growing so fast that governance and control across a growing number of geographically dispersed teams are often yet to be established. Inevitably this leads to fragmented entities in each location with a dilution of skills and best practices.

Fig 1: Using the EyeSight Mobile App



Photo courtesy Above Surveying (reproduced with permission)

¹ <https://irena.org/solar>

² <https://futureenergyweb.es/en/eu-solar-jobs-potential-to-triple-to-1-1-million-in-2030/>

Fig 2: Construction monitoring

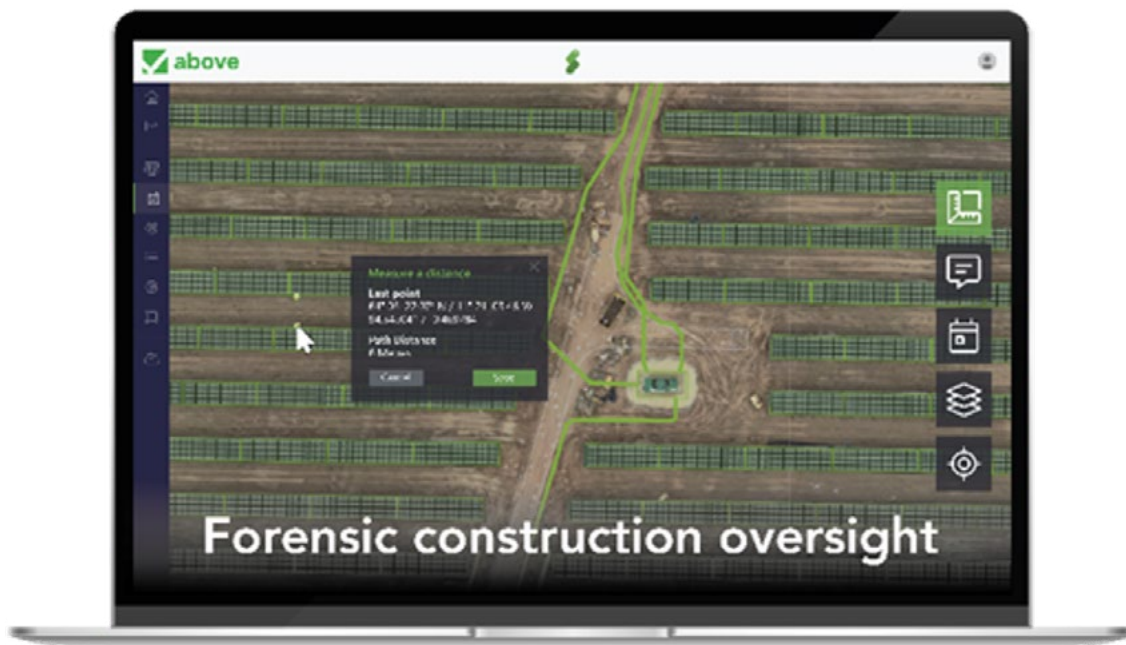


Photo courtesy Above Surveying (reproduced with permission)

Challenge two - increasing asset sizes

Secondly, assets are getting much bigger. The market is moving from assets of a few hectares with a few thousand modules to assets covering hundreds of hectares with hundreds of thousands of modules. This growth means that current techniques for asset monitoring, testing and ground maintenance are no longer viable. Labour resources make up around 80% of solar plant management and maintenance costs - the highest in any energy industry.

Challenge three - longevity expectations

Thirdly, assets are being expected to last longer. Asset owners expect solar assets to produce energy for decades to come - at a time when many key components' long-term life is coming under question. Component technology is evolving fast, with little time for extensive field testing before it is rolled out on a vast scale, making it challenging to understand long-term reliability.

The industry response

In the face of these challenges, the industry needs to respond quickly to reduce both the immediate and long-term impact that they will bring. Increasing the levels of standardisation, quality assurance and condition monitoring throughout the asset lifecycle will be a vital response to these challenges.

Embracing new technology

Huge gains can be made by the industry embracing new technology and exploiting the rapidly developing potential of robotics, artificial intelligence and machine learning. Over the last few years, drones have become an industry standard for inspecting solar PV plants. Thermographic and visual spectrum drone inspections are replacing manual module inspections, improving accuracy, efficiency and speed. This new technology, which has enabled the credible condition monitoring of 100% of the modules, has provided a step-change in component level monitoring and puts poor quality modules under the spotlight, demonstrating the impact they have on ageing assets.

Fig 3: Solar plant inspection

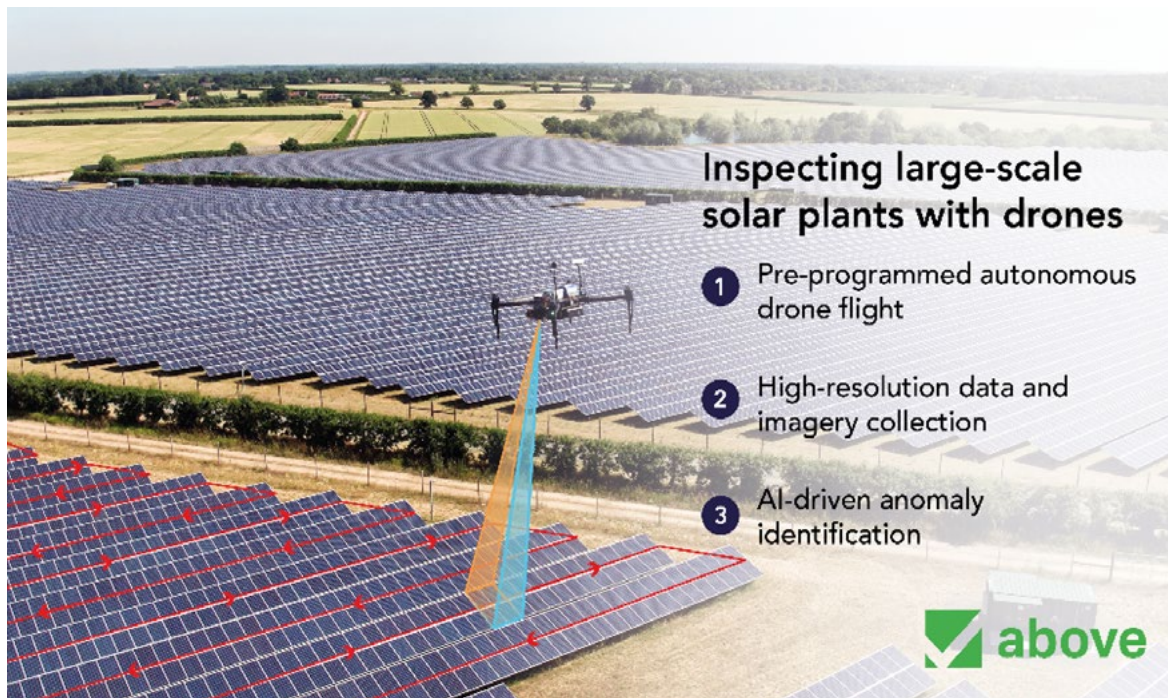


Photo courtesy Above Surveying (reproduced with permission)

The power of “Digital Twins”

Innovators in the industry, such as Above Surveying (who offer a range of aerial inspection and data services to the solar industry) are now able to geospatially and electrically model assets down to the smallest of components. The resulting ‘Digital Twins’ are powerful platforms for the aggregation and correlation of all forms of testing and inspection data. The aggregation with the factory test data, which is often underutilised by the industry, provides a robust baseline to work from, where the origin of defects such as microcracks is often a cause for dispute. The integration of the digital twin with SCADA data will enable the industry to progress towards the goal of predictive maintenance; a significant reduction in plant maintenance costs will result, together with increased plant performance.

Drone monitoring of solar plant construction

More recently, drone technology is being used to monitor solar plant construction. Above Surveying has developed a method using photogrammetry to forensically monitor the construction of large-scale solar projects. The service provides a detailed view on construction versus design and project progress reporting, leading to reduced construction and quality risk.

The solution also enables users to generate as-built documentation during construction, creating a permanent digital record for the future. This digital record provides oversight to inform future major remedial works, technical due diligence, and asset transfer.

The heat is on as the solar industry matures into a major player within the global energy mix. Adopting such advanced digital technologies will help it do this, both robustly and sustainably.



Will Hitchcock is Founder and CEO, Above Surveying Ltd.
will@abovesurveying.com



BESS: an increasingly attractive proposition

Introduction

As governments and companies seek to make informed investments in clean energy innovation for the future, Battery Energy Storage System (BESS) developments are becoming an increasingly attractive proposition to balance the grid and optimise energisation. In this article, we will outline the industry growth, along with key considerations and impacts that real world BESS deployment has on the insurance industry.

Growth

Growth in battery energy storage systems has accelerated substantially in recent years, with Bloomberg recently quoting that global energy storage installations are estimated to reach a cumulative 358GW by the end of 2030, representing an exponential growth of 20 times the current position¹. Driven by competition, rapidly declining costs have given developers an exciting avenue of growth in the renewable sector, along with an opportunity to further maximise energy efficiency. With increased competitiveness also comes innovation, with different industry participants continuously striving to initiate new expansion plans to boost their product acceptability. However, as with any developing technology, this also presents challenges to overcome when insuring these risks.

Regulation standards

In recent years, a growing number of installation codes and standards have been updated to reflect new industry developments, research and testing. Standards have also evolved to meet the safety needs of industry and the regulatory community in a more effective way, including energy storage system size and separation requirements². However, a key concern is whether these standards can keep pace with technological developments, given the industry's rapid growth. With companies consistently looking to make innovative advances, current industry codes are at risk of hampering development and productivity if they cannot frequently modernize standards.

Losses

As is the case with any evolving risk, patterns - and inevitably losses - begin to emerge. A key area of concern following a number of large-scale losses is thermal runaway, leading to fire and propagation. A lithium-ion battery that is malfunctioning, or has been damaged in some way, will likely experience an internal temperature increase, either gradually or quickly. This can result in a thermal runaway of heat within the cell - so great that it overwhelms the cell and it breaks down³. As a result, there is increased emphasis in the insurance market surrounding design, specifically relating to fire mitigation measures and protection systems.

¹ <https://ieefa.org/bnef-global-energy-storage-capacity-to-hit-358gw-by-2030/>

² <https://www.ul.com/news/ul-9540-energy-storage-system-ess-requirements-evolving-meet-industry-and-regulatory-needs>

² <https://www.powermag.com/protecting-battery-energy-storage-systems-from-fire-and-explosion-hazards/>

Mitigation measures

As loss patterns begin to materialise, so too does insurer focus on developers incorporating mitigation measures into their designs. Now is therefore a crucial time for developers to test standards, including focussing on key issues such as the spacing of battery units and blast walls to minimise any potential propagation.

Fire detection systems, such thermal cable detection and infrared thermal cameras, will also be key to providing comfort to insurers, as well as engagement with the fire service and consideration of hydrant proximity.

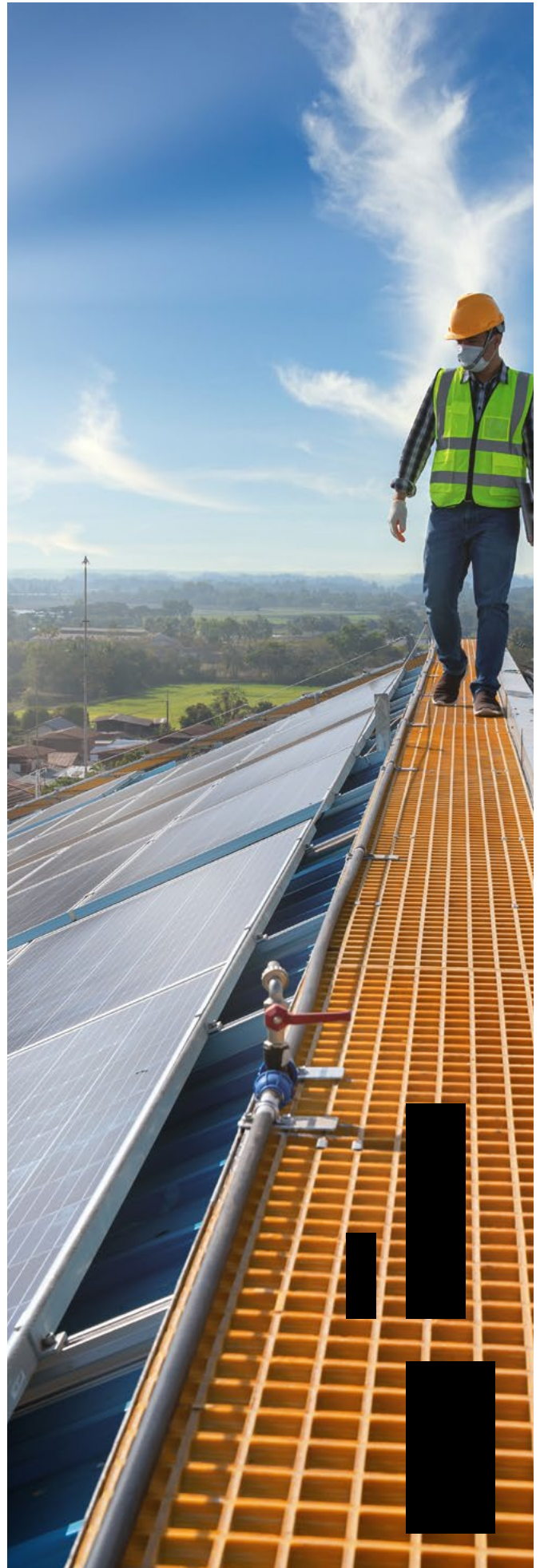
Conclusion: market challenges

Having mentioned rapid growth, regulatory standards, losses and mitigation measures, how do these issues transpire into practical matters for insurers covering energy storage systems? When it comes to underwriting these risks, a key challenge arising from the industry's growth is that the insurance market is still in a period of education, given that advances in technology and equipment, along with standards, are constantly developing.

These factors prompt both brokers and buyers to work more closely on the design details and ensure that we are capturing key information to provide additional comfort and knowledge to insurers. A final consideration is that, unlike Solar, Wind or other power generation sites, there are a number of unknowns in regard to longer term trends, together with the impact that future innovations will have on performance and risk robustness.



Jordan Horne is an Account Executive in the Renewables team, Willis Towers Watson London.
jordan.horne@willistowerswatson.com





Hybrid: the way forward, or a short-term fix?

Introduction: what is a hybrid power plant?

Hybrid plants are a combination of a renewable energy source (such as solar or wind) with a secondary energy source; this can be either another type of renewable energy or an alternative generation asset such as a diesel gensets to produce power¹. In more sophisticated hybrid plants, there is also an element of battery energy storage systems to help optimise the plant's output to ensure the plant is able to provide a continuous power supply - as well as create a more efficient system and provide a greater balance in the energy supply.

Advantages and disadvantages





The major advantage of hybrid renewable energy is that developers can mitigate the variability of the of solar and wind, given the falling costs and increased penetration of the renewable energy technologies², combined with the ever growing roll out of battery energy storage systems. This can be done with the help of the batteries to create a smoother dispatchable power plant to meet the demands of the grid they operate in - more along the lines of a conventional power plant, which would be preferred by grid operators and purchasers³. This also means a more stable

¹ WindEurope. (2019, July). Renewable Hybrid Power Plants - Exploring the Benefits and Market Opportunities. Retrieved from Wind Europe: <https://windeurope.org/wp-content/uploads/files/policy/position-papers/WindEurope-renewable-hybrid-power-plants-benefits-and-market-opportunities.pdf>

² IRENA. (2021, June 22). Majority of New Renewables Undercut Cheapest Fossil Fuel on Cost Tweet. Retrieved from International Renewable Energy Agency (IRENA): <https://www.irena.org/newsroom/pressreleases/2021/Jun/Majority-of-New-Renewables-Undercut-Cheapest-Fossil-Fuel-on-Cost>

³ Colthorpe, A. (2021, February 18). Why 2020 was the UK's 'Year of Battery Storage'. Retrieved from Energy Storage: <https://www.energy-storage.news/why-2020-was-the-uks-year-of-battery-storage/>

Fig 2: Advantages and disadvantages of hybrid technology

	<p>Cost Synergies</p> <p>+</p> <ul style="list-style-type: none"> ▪ Current qualify for more financial incentives. ▪ Shared permitting, siting, equipment, interconnection, transmission and transaction costs.
	<p>Market Value Synergies</p> <p>+</p> <ul style="list-style-type: none"> ▪ Policy driven market design rules may value hybrids more than standalone batteries. ▪ Batteries can capture otherwise "clipped" energy. ▪ Batteries can reduce wear and tear from thermal generator cycling.
	<p>Operational and Siting Constraints</p> <p>—</p> <ul style="list-style-type: none"> ▪ Reduced operational flexibility. ▪ Potentially sub-optimal siting away from congested areas.
	<p>Regulatory Uncertainty</p> <p>+/-</p> <ul style="list-style-type: none"> ▪ Market rules for standalone and hybrid batteries continue to evolve. ▪ Uncertainty related to the future availability of financial incentives (e.g., federal ITC).

Source: Gorman, W. (2020, April 03). Hybrid Power Plants Are Growing Rapidly, But Are They a Good Idea? (<https://www.greentechmedia.com/articles/read/hybrid-power-plants-are-growing-rapidly-but-are-they-a-good-idea>)

revenue source from subsidies, as well as spot markets that developers can take advantage of.

Another benefit of hybrid plants is that, by putting together renewable energy sources with batteries in the same space, this also saves on additional costs such as permitting, shared equipment, interconnection agreements and transmission costs⁴, apart from any technical and economic savings.

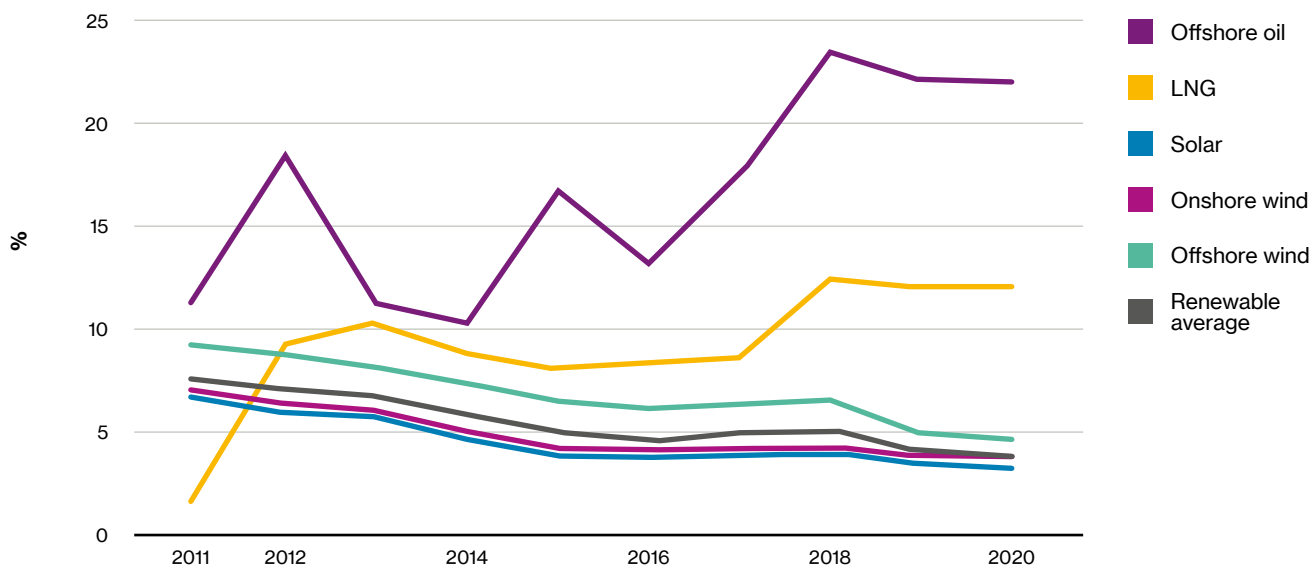
There are some disadvantages as well of the hybrid structure, partly to do with regulations and partly to do with location. In respect of regulation, the way the tariffs and credits are currently structured, the battery forms part of

the generation asset to get the benefit of these incentives. As such, they are only store energy from that source rather than being able to store it from the grid and then redeploying that later, as and when required. This does make the use of the battery in these projects sub-optimal from a grid stabilization perspective. So, while it might be great for the developer or owner, it isn't being used in the best way possible to reduce grid volatility and fluctuations⁵.

The other disadvantage is that these hybrid projects can only be deployed where there are good wind or solar resources to ensure the plant output is optimised. While this not unusual, it means that they can't be deployed in more remote locations where there is poor infrastructure but where there is a real need for power, especially in some larger countries which would also help reduce the pressure on governments and the grid requirement⁶.

⁴ SolarTechnologies. (2018, April 28). Advantages and Disadvantages of Hybrid Solar Energy Systems. Retrieved from Solar Technologies: <https://solartechnologies.com/advantages-disadvantages-hybrid-solar-energy-systems/>
⁵ Lund, M. (2020, jUNE 26). Hybrid Power Plants Are an Inefficient Usage of Battery Technology. Retrieved from Power Magazine: <https://www.powermag.com/blog/hybrid-power-plants-are-an-inefficient-usage-of-battery-technology/>
⁶ Sengupta, S. (2019, September 10). Renewable hybrid energy systems as a game changer in India. Retrieved from McKinsey Sustainability: <https://www.mckinsey.com/business-functions/sustainability/our-insights/sustainability-blog/renewable-hybrid-energy-systems-as-a-game-changer-in-india>

Fig 3: Cost of capital: fossil fuels versus renewable energy



Source: Quinson, T. (2021, November 09). Cost of Capital Spikes for Fossil-Fuel Producers. Retrieved from Bloomberg: <https://www.bloombergquint.com/business/cost-of-capital-widens-for-fossil-fuel-producers-green-insight>

What’s next for hybrid - the way forward, or a short-term fix?

Does the hybrid model work as it stands? Simplistically yes it does, because even an imperfect hybrid model is better than the alternative options, especially in the light of the falling cost of capital to develop renewable energy projects. Can it be improved upon? Definitely - however, there are quite a few changes from various sides to make this a more viable and smoother transition.

Firstly, although we already expect costs of lithium-ion batteries to drop over the coming years, there needs to be constant investment in all forms for storage technology to ensure fewer technical issues, along with increased longevity of the tech⁷. Secondly, changes in regulation and tariffs as to how incentives apply to hybrid projects need to change so that better optimisation of the storage solutions are not necessarily limited to generation from connected sources. Additionally, some of the administrative burdens and costs need to be reduced, such as re-applying for permits and licenses to install storage systems onto existing renewable energy assets - subject to the project not exceeding the agreed contracted capacity.

So, one of the key takeaways is that energy storage systems are going to play a key role in helping countries and governments along the energy transition path if they are to realistically achieve the Net Zero levels that they have committed to at COP26. This means that to replace older conventional carbon heavy power stations with more reliable, cheaper and most importantly stable power from renewable energy sources, hybrid is going to play a major part in the energy transition going forward.



John Abraham is Senior Associate and Deputy Team Leader, Renewable Energy division, Willis Towers Watson London.
John.Abraham@WillisTowersWatson.com

⁷ McCamey, D. (2021, June 17). Are Hybrid Systems Truly the Future of the Grid? Retrieved from NREL: <https://www.nrel.gov/news/features/2021/are-hybrid-systems-truly-the-future-of-the-grid.html>







Part Three -
insurance and risk management
issues



Renewable energy and parametric insurance: solving the volatility issue

Introduction

All over the world, the number of renewable energy projects has been increasing at an unprecedented rate in recent years. However, renewable energy output remains highly volatile and vulnerable to weather variability: wind speed for wind energy, rainfall for hydroelectric and irradiation for solar energy. For example, the wind power market in the US recorded a plummet of 82% in energy production in February 2008 resulting from a lack of wind¹; similarly, Scottish Power, an energy supplier in Europe, witnessed its profits tumble by around £40 million over six months due to less wind than had been anticipated during the first half of 2016².

Shifting our vision to the other side of the globe, a severe drought in India lasted from 2013 to 2016, resulting in a sustained drop of hydropower generation, materially hampering the Indian economy. According to the Central Electric Authority, due to this precipitation shortage total hydropower generation during the 2015-2016 period was 6% below the previous year, even as the operating hydropower capacity in 2015-2016 was 1,151 megawatts higher³.

The limits of traditional insurance

Traditional insurance does not provide adequate cover to protect renewable energy businesses against such weather risks, primarily due to the need for proof of physical loss or damage as a pre-condition to an indemnity payment. Parametric insurance fills this gap by providing coverage for the financial loss of renewable energy arising from a lack of weather resource - without the occurrence of physical loss.

Parametric insurance – advantages and challenges

Advantages

- **Supporting the protection gap:** parametric insurance covers the non-damage business interruption which conventional insurance does not. It covers the financial losses when the energy output is lower than expected; such losses are not necessarily associated with any physical damage to the renewable energy asset itself.
- **Transparency and speedy payment:** payments are triggered by the value of an index such as the modelled renewable energy output. The value is based on data provided by an independent third-party source, while the pay-out amount is calculated according to a pre-agreed threshold. Coverage options are straightforward and objective, which allow the claim to be settled immediately when the contract is triggered.
- **Volatility reduction:** parametric insurance effectively safeguards a minimum amount of revenue for the renewable energy investment regardless of climate variability, so lenders can assume a more confident estimate of their expected revenues; this in turn means that lenders can offer more favorable debt service coverage ratios. Parametric insurance strengthens the project's tolerance against weather variability, securing and stabilizing the project's cash flow and revenue stream.

¹ <https://www.reuters.com/article/us-utilities-ercot-wind-idUSN2749522920080228>

² <https://www.windpowerengineering.com/hedging-low-wind-5-things-know-weather-risk-transfer-structures/>

³ <https://www.circleofblue.org/2016/world/indias-severe-drought-causing-havoc/>

Challenges

- **Regulatory approval:** in many countries, regulatory approval is required before a parametric insurance policy can be properly issued. In some cases, depending on a country's regulatory and legal framework, parametric solutions are issued as a derivative rather than an insurance contract. The reason is that parametric solutions tend to include so-called basis risk, in which there is uncertainty on whether the pay-out will match the actual losses. This contradicts the fundamental indemnity basis of insurance as a contract that pays out according to incurred losses from an insured event. A further regulatory concern can be whether the insured has a legitimate insurable interest.

However, when it comes to parametric insurance products for the renewable energy industry, legitimate insurable interests can be developed from third parties. For example, local governments may wish to purchase a parametric insurance product to support their state-subsidized projects for climate risk mitigation. Because of the increasing drive towards ESG objectives and government support for climate change mitigation, it is anticipated that restrictions in parametric renewable energy insurance will be further reviewed to unleash the wide-ranging potential of this form of risk transfer. Regulators' support will continue to be crucial to speed up the adoption of parametric insurance products, which in turn will help to close the protection gap.

- **Data availability:** sometimes it may be a challenge to obtain reliable and consistent data, considering the low density and unsatisfactory quality of weather recording instrumentation in some countries. Satellite-derived and computer-simulated weather measurements have been increasingly accepted and used to complement (or even replace) weather station data in parametric insurance program structuring and implementation.

Weather solutions for renewable energy businesses

Major risk intermediaries have now developed a range of proprietary weather risk analysis tools and parametric insurance solutions for renewable energy businesses reliant on wind energy, hydroelectric and solar energy.

These tools and solutions are based on weather data from reliable providers that are accepted across the insurance market. For wind, hydroelectric and solar energy, modelled energy output is generated by inputting appropriate weather data into a model of energy generation accounting for specifications of each project. This modelled energy output is further calibrated, using locally measured data,

actual historical output values or expected output values from a professional renewable energy assessment report, to reflect the performance of the insured project.

The volatility of the past 41 years' modelled output is then studied and incorporated by the risk intermediary's pricing model to calculate financial consequences under various different risk scenarios. The tool shows a premium range based on requested insurance structure (typically trigger point, pay-out formula and contract limit). It also provides simulation results of distribution of financial loss of the insured project. Risk intermediaries are also now working closely with the world's leading parametric (re)insurers in extending protection to the renewable energy carbon trading inventory.



Parametric insurance solutions and renewable energy Certified Emissions Reductions (CER) trading inventory

It costs industry to release CO₂ into the atmosphere, and the price of CO₂ release is subject to fluctuations in the carbon trading market. In the EU, the carbon price has experienced a massive jump from EUR 30 per ton at the start of the year 2021 to EUR 60 per ton by August⁴. Around the world the trading price is lower, but still substantial, at US\$28.26 per ton in California, US⁵ and CNY49 per ton in Shanghai, China⁶. For each MWh generated from coal, 0.85 tons of CO₂ is produced, whilst it is 0.59 tons for oil and 0.19 tons for gas-fired power plants. Using coal, oil or gas in lieu of renewable energy when there is low wind, low solar irradiation or low rainfall comes at some cost.

Under the Emissions Trading Scheme (ETS), there is a cost for each MWh of electricity generation from carbon-emitting energy profiles. In a portfolio that can produce renewable energy alongside traditional energy sources, each MWh of electricity generated from renewable energy can save up to 0.85 tons of CO₂⁷. As such, a “saved” quota of CO₂ can be traded in the market as carbon credits.

So, with the launch of ETS, two types of financial losses may be incurred, should renewable energy output be lower than expected:

- First, the direct loss, based on per-unit price of one MWh of electricity and reduction of output
- Second, the consequent loss of value of carbon credits as an intangible asset

As ever, associated with lower energy output there are also income losses and possible penalty fees for not meeting total energy requirements.

Conclusion: parametric solutions to play increasingly important role

We cannot control the weather, but we can control how we handle the ways it affects the renewable energy market. Parametric insurance protects renewable energy investment returns against weather risks and will play an increasingly important role with renewable energy development all over the world.



Richard Zhang is Managing Director - Alternative Risk Transfer (Asia), Willis Towers Watson; this article is written on behalf of the global WTW ART team.

richard.zhang@willistowerswatson.com



⁴ <https://www.ft.com/content/c1a78427-f3d5-4b4f-9878-c3e1dffe2ba>

⁵ <http://ww2.arb.ca.gov/sites/default/files/cap-and-trade/carbonallowanceprices.pdf> (price as of December 21 2021)

⁶ <https://www.csis.org/analysis/chinas-new-national-carbon-trading-market-between-promise-and-pessimism>

⁷ <https://www.eeagrants.gov.pt/media/2776/conversion-guidelines.pdf>



Political risks in the renewable energy sector: an emerging market perspective

Introduction

The transition from carbon-heavy energy to renewable energy is clearly here to stay and will continue to gather momentum, including within emerging markets. There are many reasons for this shift towards renewable energy, not least of which is the simple fact that the global environment needs it. However, despite the global enthusiasm for green projects, the sector will not be sheltered from the usual political risks associated with foreign investments. In fact, the risks may even be exacerbated, given sensitivities around the right to power, the importance of power to fuel economies and growth, the cost of power and the continually widening gap between the haves and the have nots.

Renewable energy investors and the associated lenders need to be pragmatic about the political risks involved in their projects and be cautious of being swept away by the euphoria that tends to be linked to renewable energy. Fortunately many of these risks can be managed, including being protected through well-structured political risk insurance policies.

Social concerns could lead to political violence

Energy is considered a key catalyst to economic growth, so when new power projects commence, a wave of optimism moves through the communities close to the project. This optimism varies, from the hope of employment to the impact that reliable electricity can have on the daily lives of communities. However, renewable energy projects generally only contribute to limited employment and much of what is available is on a short-term basis. The establishment of local supply chains remain rare, with most technologies being imported, further limiting the indirect job opportunities.

The onset of available electricity requires payment, something not always familiar to or affordable for poor communities, highlighting the reality that there is a cost for energy. The initial optimism can therefore quickly move towards frustration, social unrest and even political violence, aimed not only at the government but also at the projects themselves. These tensions can often escalate, through rumours of how foreign investors and international suppliers are benefiting from lucrative government contracts while the local community sees very little direct benefit.

Financial constraints can influence government intervention

Across the globe, governments are investing heavily in renewable energy. Many renewable projects involve an Independent Power Producer (IPP), often linked to international investors, and a Power Purchase Agreement (PPA) with the state power utility. Most of these projects require international funding, which is generally structured in hard currencies such as the US dollar or the Euro. Even though the PPA may be linked to a fixed amount in terms of the currency of the funding, this does not remove the financial pressures that an emerging market may have to settle international debt in hard currency, especially when one considers that the majority of the utilities revenues are generated in the local currency. Most utilities raise revenues by charging their citizens for the use of power; however, these revenues are in local currency. In the event of the currency depreciating, the effective international cost of debt increases, with the utility having a limited ability to simultaneously raise the local tariff charged to the general population.

Furthermore, governments are often required to invest in supporting the infrastructure required to maximise the value of the power plant, for example expanding transmission lines to ensure that the power reaches the required destinations. It is not uncommon for delays to occur in the development of this additional infrastructure, either because of inefficiencies or financial constraints. This can add further pressure on utilities, who may have to start paying for power that is not fully utilised, the combined effects of which are additional financial strains and a frustrated local population.

As economic pressures and social tensions increase, so will the risks of government intervention, through attempts to adjust license agreements, amend PPAs or revise feed-in-tariffs. In extreme cases, such government intervention could even take the form of IPP nationalisation.

Long-term nature of projects heightens uncertainty

Most renewable energy investments are long term in nature, in the form of long term PPAs and long-term financing, both of which increase any uncertainty. Political risks in the short to medium term are difficult enough to predict, let alone in the long-term, which is a near impossible exercise. Governments and leaders will change during the duration of most projects; given the lack of democracy in some cases, or the immaturity of democracies in many others, how emerging market governments will respond to foreign investors is often untested. The initial hype as to why the project was originally embarked on is long forgotten, especially if there are now financial and social challenges or if the original government that awarded the contract has a reputation for corruption.

Rapidly changing technology adds to uncertainty

Another unclear concern relates to advances in technology and their associated costs. In many rapidly changing environments, costs are generally written off over a relatively short period, acknowledging that new technology will shortly replace the current technology. In the renewable energy sector technology is continually being developed, the cost of which continues to decline. However, PPAs and funding are often locked into 15 to 20-year structures. Well before the expiry of these arrangements, new projects will cost significantly less, while far lower feed-in-tariffs will be negotiated. How relatively expensive and dated green plants will be viewed by governments and the populations will also add to the political risk uncertainty.

Managing risks

Renewable energy is the future and should be welcomed by all; however, projects will not be without risks and certainly not without political risks. These risks need to be appropriately managed by investors and lenders, while PPAs need to be well structured. In weaker countries with weak utilities, some government backstop behind the PPA should be considered. A country's legal and judicial structures are important considerations for investors, while arbitration arrangements should be located in independent jurisdictions. Investors need to be sensitive towards the communities where the projects are located and should actively work on establishing good relations as well as having various social upliftment programmes in place, maximising community involvement.

The procurement of political risk insurance by both investors and lenders also needs to be seriously considered. The private political risk insurance market is actively looking to participate in the green revolution in several ways; for example, by developing green specific products, increasing the duration of their support and upscaling their project finance expertise.

Conclusion: well-structured insurance policies can mitigate most risks

Most of the risks highlighted in this article can be managed through well-structured insurance policies. Political Violence and perils covered under the banner of Confiscation, Expropriation, Nationalisation and Deprivation are standard covers under a political risk policy. While currency depreciation is not covered, Currency Inconvertibility/Exchange Transfer is covered. Protection against governments trying to change the agreed terms of an IPP or PPA can be covered by the inclusion of Breach of Contract and Arbitration Award Default. Risk intermediaries are able to advise clients on the appropriateness of insurance policies in place in a project or to assist clients purchasing the appropriate political risk insurance.



Michael Creighton is Executive Director, Credit & Political Risks, Willis Towers Watson London.

michael.creighton@willistowerswatson.com



The Jones Act and the US offshore wind industry: what it is and what risks it might present

Introduction

As the United States begins an ambitious goal to develop some 25GW of offshore wind generating capacity by 2030¹, there are many headwinds to face – pun intended! While the current global supply chain issues are expected to be resolved soon, efforts are underway here to address the need for:

- skilled workers
- an infrastructure for the development of this resource:
 - manufacturing facilities to support survey, fabrication and construction activities - and eventually to support wind farm operations and maintenance
 - offshore wind turbine (OSWT) and substation construction and servicing
- suitable wind turbine installation vessels (WTIV)
- support vessels to move equipment and shuttle workers

In particular, constraints on the availability of suitable vessels is certainly a risk to the 2030 goal, and what may prove to be the limiting factor is just how fast that 25GW goal can be met – after all, not just any ship will do.

What is a suitable vessel?

So, what is a suitable vessel? In the United States, the Jones Act (a law enacted in 1920) requires that goods shipped between US ports must be transported on ships that are built in the US, the majority owned by US entities

and operated by a majority of US citizens (or permanent residents). The Act's purpose was more than just a protectionist policy for the marine industry; it was to ensure that the US maintained a capable shipbuilding industry, with qualified operators to serve the country's needs during a war or national emergency.

Effect on transport options

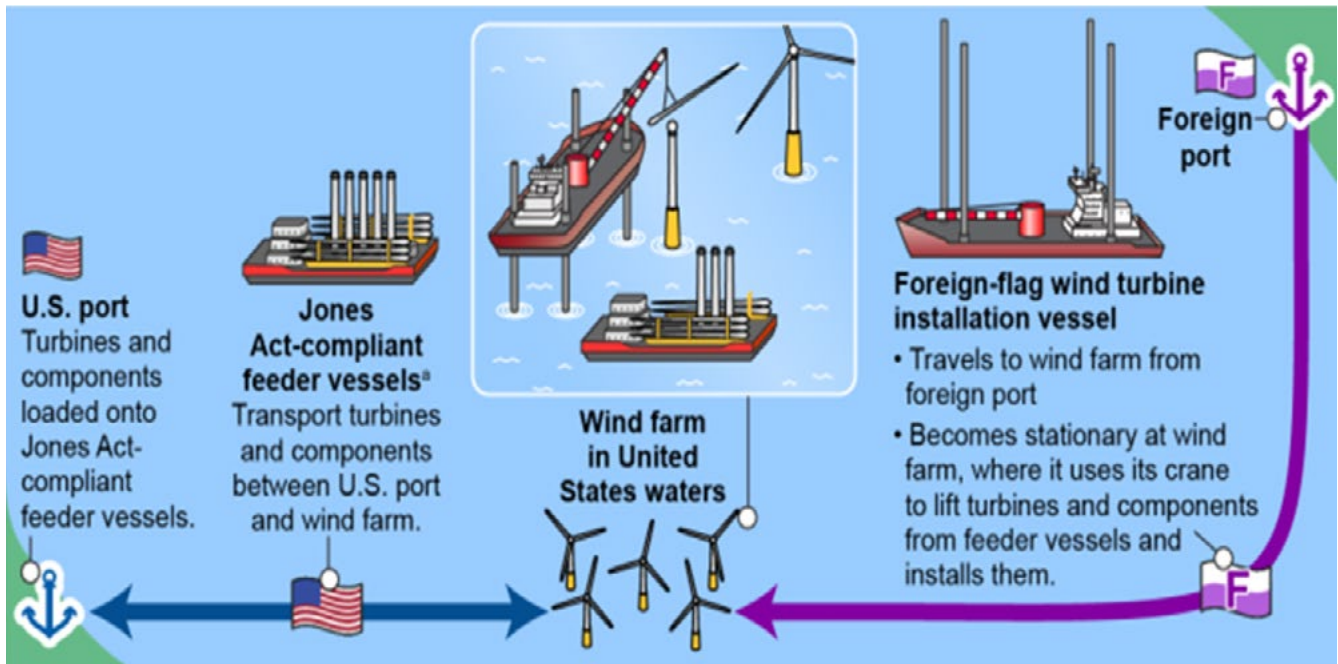
This Act now applies to offshore wind turbine construction and directly affects the transport options available to build and service OSWTs. While a workaround solution was implemented for the only two US offshore wind farms (OSWF) now operating - the five turbine Block Island OSWF (which went commercial in 2016) and the Virginia Coastal OSWF (which went commercial in 2020) - there are currently no Jones Act-compliant purpose-built WTIVs.

For the two OSWFs mentioned above, the temporary solution utilized a European WTIV, each of which was kept offshore to avoid the “transit between US points” requirement of the Jones Act. They relied on smaller compliant feeder vessels to shuttle equipment and personnel between onshore points and the wind farm, on multiple trips. One study has shown this process has resulted in shorter construction times, but with the added cost of the feeder vessels². While this worked for these two early projects, such an arrangement for installing large numbers of turbines would benefit from the efficiencies of an assembly-line like construction process that a compliant and available WTIV provides.

¹ <https://www.windpowermonthly.com/article/1697902/us-bill-targets-25gw-offshore-wind-2030>

² U.S. Jones Act Compliant Offshore Wind Turbine Installation Vessel Study, by GustoMSC at <https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/Master-Plan/US-Jones-Act-Compliant-Offshore-Wind-Study.pdf>

Fig 1: Example of an offshore wind installation in US waters, using a foreign-flag installation vessel and Jones Act-compliant feeder vessels



Source: GAO-21-153 (<https://www.gao.gov/products/gao-21-153>)

Keeping WTIV's Jones Act-compliant

WTIVs are often referred to as specialized jack-up vessels, such as those used for offshore oil and gas projects. A WTIV is a self-propelled ship, with berthing and dining space for the ship's crew and construction workers. The vessel will have long columns that extend to the ocean floor, elevating the vessel and its working platform at each turbine site. For installation work in water depths of 180 feet (55 meters), column lengths of about 295 feet (90) meters would be expected. The WTIV also includes a large capacity crane and deck space for the wind turbine components (see Figure 1 above).

Keeping a foreign WTIV moored offshore (if one could be charted) would likely result in higher costs due to global demand, while its limited availability would increase the risk of failure to meet project schedules and budgets. Furthermore, the inability of a non-compliant vessel to dock in port for unplanned maintenance or emergencies would present an additional schedule risk. Today's large OSWTs can have blades over 328 feet (100 meters) long, and the generating machinery in the turbine nacelle can weigh approximately 700 tons. With global demand for OSWFs increasing, Jones Act-compliant WTIVs will help ensure the most efficient construction process possible for meeting the overall 2030 goal.

Addressing the need

The first US firm to address this need is a Virginia-based utility; Dominion Energy has commissioned the first built for purpose, Jones Act-compliant WTIV, along with several partners. In addition to its two turbine Coastal Virginia OSWF, Dominion is also preparing for the full build out of that OSWF, with a planned generating capacity of 2.6 GW from about 176 turbines³ - hence the need for such a vessel. The construction of the ship, with a reported cost of approximately US\$500 million, has begun at a Texas shipyard. Its reported dimensions are 472 feet long (144 meters), with a 184-foot beam (width) (56 meters). Delivery is expected in 2023, and is to be named Charybdis, after a sea monster in Greek mythology⁴.

To meet the 2030 offshore wind generation goal, it is estimated that four to six WTIVs - ranging in cost from US\$250-500 million each - will be needed. As the cost of these WTIVs is substantial, the vessels will likely be utilized by multiple OSWF entities to optimize the benefit of such a capital investment. In fact, on June 1, 2021 Dominion Energy announced an agreement with OSW developers Orsted and Eversource, that the developers would charter Dominion Energy's Charybdis for the construction of two OSWFs in the Northeast US, to serve Rhode Island, Connecticut and New York⁵, in addition to supporting Dominion's Coastal Virginia project.

³ <https://coastalvawind.com/>

⁴ <https://www.merriam-webster.com/dictionary/Charybdis#:~:text=Definition%20of%20Charybdis,a%20female%20monster%20%E2%80%94%20compare%20Scylla> The Strait of Messina is the narrow passage between the island of Sicily and the "toe" of Italy's "boot". In Greek mythology, two monsters hovered on either side of the strait. Scylla, a female monster with six snake-like heads, each with pointed teeth, barked like a dog from the rocks on the Italian side. Charybdis, on the Sicilian side, caused a whirlpool by swallowing the waters of the sea three times a day. When Odysseus attempted to sail between them, he encountered disaster on both sides. Being caught between Scylla and Charybdis is a lot like being between a rock and a hard place.

⁵ <https://news.dominionenergy.com/2021-06-01-Dominion-Energy,-rsted-and-Eversource-Reach-Deal-on-Contract-to-Charter-Offshore-Wind-Turbine-Installation-Vessel>

Cables: re-spooling and underwater repairs

Secondary to natural catastrophe considerations, the greatest perceived risk to many offshore wind insurers for the new industry in North America has been the risk of internationally sourced cables from Europe and Asia needing to be re-spooled - from factory-loaded vessels to local Jones Act-compliant installation and cable laying vessels. Experience in the North Sea has shown that, despite the best intentions, sub-sea cables are sensitive in nature and require careful attention when being loaded onto and off the spooling equipment contained within the specialist vessels. The concept of internationally sourced cables may need additional spool handling, with the potential for errors to occur and minimum bend radius specifications to be exceeded outside the normal vessel to laying operation; this has the potential to substantially increase the risk to the operation. The fact that this

re-spooling operation will no longer be required is a source of great comfort to insurers and provides access to more readily available capacity to support these projects.

Regarding the repair of underwater marine cables, as long as the repair ship takes any failed or used cable with them and does not unload that failed cable at a US port, they too can be non-Jones Act compliant vessels. They could also load new cable in the US, but they must also take that cable away with them to a foreign port. For the near term, given the magnitude of the planned investment for offshore wind projects, the legal rulings on the cable repair issue will result in additional requests for clarification; expect some go to litigation. The parties involved determine how an outcome affects them; with a learning curve to contend with for this nascent industry, it is also best to seek legal advice on this issue.

Cable laying ships

One major question, regarding whether cable laying ships had to be Jones Act-compliant, seems to have finally been resolved by US Customs and Border Protection (CBP), which is tasked with ruling on which activities must comply with the Act while the US Coast Guard determines which vessels meet US-built requirements. Similar to onshore wind farms but underwater, groups of offshore wind turbines are connected via buried electrical cables; these cables from groups of turbines, which will then typically be connected to an offshore substation. This substation in turn then connects to a land-based substation (via another buried electric cable) to supply the electric grid.

Until recently, there was some uncertainty around whether a marine cable laying ship working on OSWFs had to be Jones Act-compliant. In addition, since burying the cable is integral to the installation (for its protection from impact and the elements), how the cable was buried has generated the question of whether that process was the same as a dredging operation - US law requires dredging to be conducted by a US-flagged vessel. Requiring Jones Act-compliant vessels could have presented another project risk, as global demand for cable laying ships is currently high due to the growth of the global offshore wind sector. This could negatively impact costs and construction schedules, much like relying on non-compliant, foreign WTIVs.

A cable laying ship is not really transporting goods or people; if it was, it would require a compliant vessel, which was the argument being made by the project sponsors. On November 9, 2021, it was reported that the CBP had announced a public ruling, dated November 2, which essentially permits the use of a foreign vessel to lay cable in US waters, including burying the cable in support of OSWFs as well as the transport of technicians from shore for the cable laying operation⁶.

Recent CBP findings have helped provide clarity on the questions of when Jones Act-compliant vessels must be used or what alternatives are acceptable. These most recent rulings have been applied to both offshore coastal (near-shore) as well as outer continental shelf sites.

Conclusion: move quickly!

It is expected that legal questions and challenges will be part of the evolving and growing offshore wind industry. Stakeholders should continue to monitor the legal landscape, as it will remain fluid in the new OSW space. In the meantime, it is advisable to move quickly, given the two years or so needed to build a new WTIV, along with expected demand for compliant vessels. Those stakeholders planning to build offshore wind farms need to consider the how they will plan for and procure all the marine vessel resources necessary to meet their project schedules, as well as consulting with legal counsel to ensure their decisions and investments are following the latest Jones Act rulings.



Jamie Markos is US Renewable Energy Practice Leader at Willis Towers Watson.

James.Markos@WillisTowersWatson.com

“Recent CBP findings have helped provide clarity on the questions of when Jones Act-compliant vessels must be used or what alternatives are acceptable.”

⁶ <https://www.winston.com/en/maritime-fedwatch/us-customs-issues-cable-operation-ruling-helpful-to-offshore-wind.html>



Aftermarket/aged site improvements: preventative maintenance and blade enhancements

Introduction: the pressure to reduce costs

While the energy transition's trajectory is unwavering, there remains a high level of pressure resulting from sector competition and the desire to continuously drive down the levelized cost of energy. This is particularly intense in the onshore wind space, where profit margins for these assets, generating increasingly competitive power, remain one of the few variables under developers' and project owners' direct control. As every line item is scrutinised, asset managers are under significant strain to optimise costs wherever possible - however insignificant these savings may appear - in the hope that, when aggregated, they will deliver a marginal cost advantage or enhancement to the project's financial operating model.

While it's sometimes possible to create efficiencies in the project's financial operating expenditure, it is equally important, where possible, to maximise any incremental increases in the variable power output. While wind turbines are designed to take advantage of the best available wind resource, in the same way as children might fly different types and designs of kites in the same wind environment, each project wants to have the "best kite in the park".

The rise of the after-market service sector

With all these economic pressures, there is an increasingly visible new sector within the industry offering after-market service. These providers have clearly identified the challenging market and resource pressures which the generators are under; as a result, they are now frequently making bold promises on reduced downtime, enhanced yields and loss prevention. We are seeing that these range from innovative aerodynamic solutions to conventional and convenient monitoring systems. Some of these service providers advocate using technology which is already incorporated into the latest wind turbine platforms;

the ability to apply these proven approaches to older turbines by retrofitting can be highly appealing. Others are using cutting edge technologies, often adopted from the aerospace or Formula 1 industries that are still in their infancy.

A new preventative maintenance system

One such offering is the implementation of a third-party, AI-driven preventative maintenance system. Through the process of machine learning, it is increasingly possible to forecast future mechanical loss and or breakdown events. This level of predictive modelling aims to ensure that the adequate servicing or component replacement work is undertaken at a time of the owner or maintenance providers convenience - preferably on a low wind day so that overall turbine availability (and of course revenue) can be maximised.

The predictive and preventative modelling approach is relatively easy to understand. Software continuously monitors sensors within the wind turbine, tracking a myriad of factors, including power output, temperatures and vibrations. The data gathered is then used to build predictive models for loss events; as the body of data grows, the model can plan maintenance in an intelligent manner which maximises the turbine uptime and minimises unnecessary downtime through planned outages used to perform routine maintenance operations. Patterns which lead to losses can be identified early and the necessary work undertaken well in advance of an issue arising.

Machine learning advantages

This process of machine learning can offer several advantages over traditional preventative maintenance which, while often effective in preventing unexpected component failures, can result in more frequent

downtime (both planned and unplanned) and at times the unnecessary replacement of perfectly functional components. Applying such an approach to key items such as gearboxes not only promises to reduce maintenance and repair costs, but also has the potential to substantially enhance a generating asset's profitability.

More innovation needed as insurers warm to developments

It's easy to see how this approach is appealing to insurers, who often pick up the bill when expensive components suffer unexpected failures resulting in physical loss or damage to the components, including any downstream consequential damage and the associated loss of revenue arising from the downtime. We expect to continue to see innovation in this area in the coming years; for early adopters, it is important that these systems are highlighted to their insurance brokers, who continue to negotiate in hard market conditions.

Installation of blade 'furniture'

Another approach in optimising assets is the installation of blade 'furniture' at older sites. Driven by advances in the aerospace and motorsport industries (among others) blades are now considerably more advanced and effective than they were a decade ago. It is therefore unsurprising that applying modern blade elements to aged assets has the potential to offer meaningful yield enhancements.

These 'retro-fit' installations can include examples such as winglets at the tips of the blades, serrations in the blades, vortex generators and even improvements to the blades surface such as the application of wax agents. These offer a plethora of benefits such as stall prevention, increased torque and even a reduction in sound emissions, which in some sites can allow for a further up-rating of the turbine.

Calculation of fatigue loads

However, with increased power output comes an increased load on the turbine itself. Insurers are keen to understand how carefully extreme and fatigue loads have been calculated with reference to the specific turbine models. They ideally look for a meaningful amount of trouble-free operating hours to have been completed with the specific pairing of selected blade improvements and the turbine model in question; third party certification is ideal.

Interaction with onboard computer systems

There are also questions raised around the interaction between these blade enhancements and the onboard computer systems of the turbine, which react to measured wind conditions. Such systems may need to be tuned to understand that the turbine is now more powerful, so that the turbine can continue to be managed correctly.

While it is not unreasonable to expect these retrofitted components to come with their own performance warranties, these need to be read carefully to understand how different potential loss events would play out. There remains a reluctance in the renewable energy insurance market to provide coverage for consequential physical loss resulting either from the failure of the enhancement or any consequential financial loss resulting from a loss event to the enhancement or its surrounding property. This frequently means that independent pioneers of such technology enhancements are left with a challenging environment to find asset owners on whose equipment they can test their enhancements, with most of the physical and/or financial losses resulting from the additional strain put on the turbine remaining the responsibility of the host asset owners. It is therefore important to thoroughly understand the contractual allocation of risk in the web of relationships between the supplier, the installing party, the operations & maintenance partner, the host turbines and the owners (and frequently their financing parties).

Conclusion: early engagement with your broker essential!

Coming full circle, when considering enhancements to an existing fleet - be it focused on preventing issues, increasing power output or some other package - we recommend an early engagement of your insurance broker in the negotiation process to understand the potential implications it could have on any coverage.

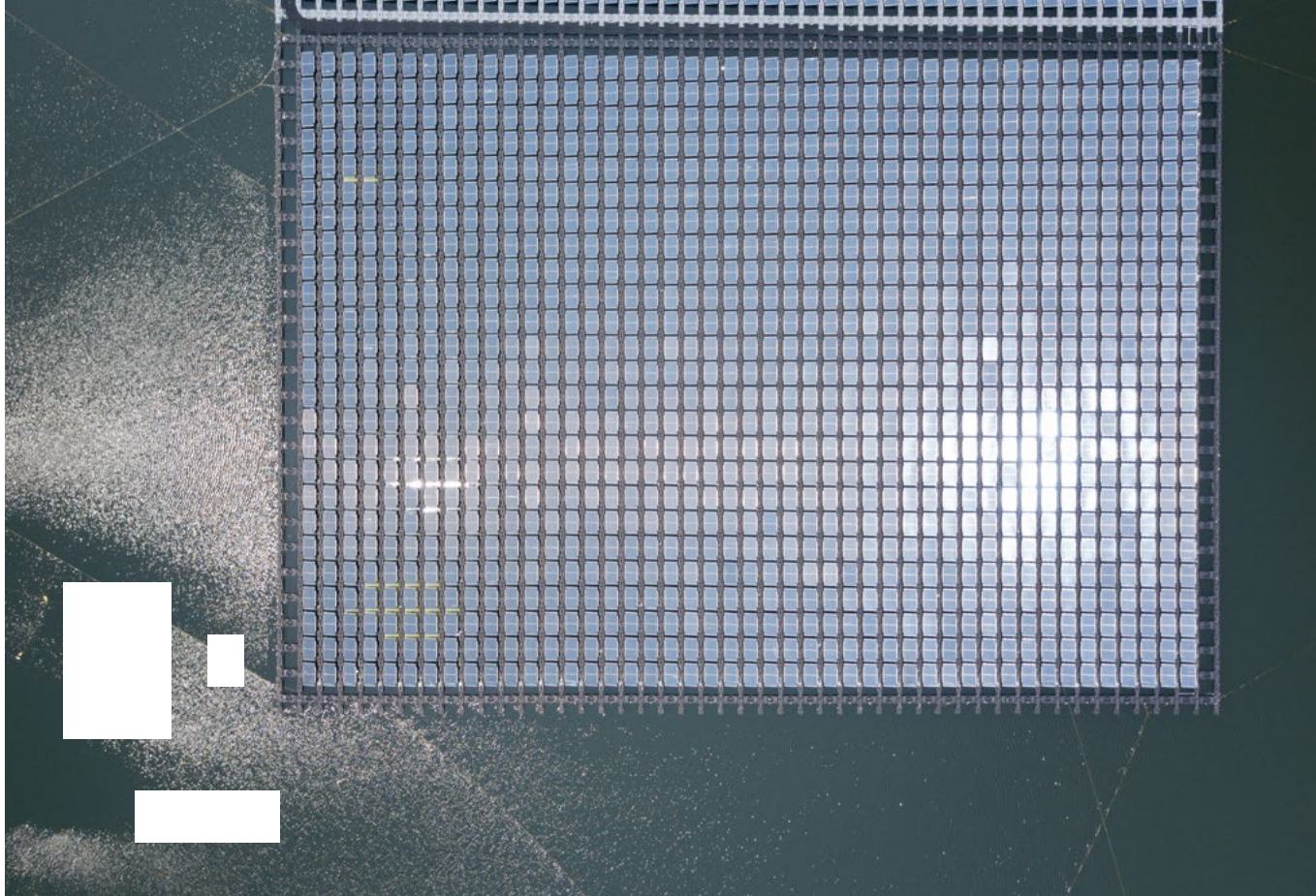
Improved condition monitoring and preventative maintenance can be appealing to insurers, as they demonstrate a proactive approach to risk management and the minimisation of losses. Armed with detail of the implemented solution, your broker will be best positioned to secure improved terms of coverage.

In the same way, to effectively manage insurer concerns arising from output enhancements it is important that insurers are approached early in the process to understand the wider implications that such enhancements may have on the level of coverage available.



Oliver Warren is a Renewable Energy Account Executive & Broker at Willis Towers Watson London.

oliver.warren@willistowerswatson.com



The rise of waiver requests: the impact of the hard insurance market

Introduction: the rise in non-compliance with historically agreed finance obligations

Many renewable energy projects around the world are financed on a limited or non-recourse basis, with the risks to which the projects are exposed falling largely on the lenders rather than on sponsor balance sheets. As lenders will have little leverage (other than over the assets of the project and the revenues it generates), insurance forms a critical component of the financing requirements to ensure that the lenders' interests are protected. It is normal practice, when this finance structure is used for insurance requirements, for it to be heavily negotiated; the insurances agreed will be an affirmative covenant within the loan agreement which the project owner, as borrower, will be required to meet. If the insurance requirements cannot be met, the borrower may be in breach of their loan covenant unless an agreement can be reached with lenders to waive the specific requirements that cannot be met on a temporary or permanent basis.

The hard insurance market, together with the impact of the COVID-19 pandemic, has resulted in a significant increase in loan waiver requests. We have highlighted below some specific issues that lenders and borrowers should watch, together with points that should be considered when waivers are sought.

Specific coverage issues

- **Capacity restraints** (sometimes resulting from claims experience on specific projects or types of project) are resulting in reductions in the Sums Insured available for specific insured perils or for certain types of projects. In some cases, we have seen pressure to include sub-limits for policy extensions within the Sum Insured as opposed to the previous "normal" approach in the "soft" market of including these in addition to the Sums Insured.
- In general insurers are looking to **reduce sub limits and breadth of cover**. In particular, Denial of Access and Notifiable Disease extensions are proving difficult to obtain at the limits required in loan agreements.
- In some territories **Strikes, Riots and Civil Commotion cover (SRCC) is being excluded** from the standard Property Damage "All Risk" operative clause cover. This results in the potential need for separate Political Violence insurance rather than the more limited Sabotage & Terrorism policy forms.
- **Coverage for defective design, materials and workmanship during the construction phase has become much more restricted**. There is now limited availability at a cost that fits with project financial models for the LEG3/06 Defects Liability "Exclusion" Clause and in some instances the clause is not available. The more restrictive LEG 2/96 Clause is still pretty much obtainable.

- **Policy deductibles are being increased** across the board. This is particularly impacting coverage for Natural Catastrophe perils and defective design.
- Significant insurance premium rises are leading borrowers **to seek to insure on an agreed value basis** (rather than for total replacement sums insured) and to **buy first loss limits** for specific elements of coverage such as Nat Cat and Terrorism.
- **Market exclusion clauses are being applied**, excluding coverage for Communicable Diseases and Cyber Risks.

Waiver request points

Provided potential non-compliances with the insurance covenant requirements are raised with lenders in good time, waivers will tend to be agreed by lenders; however, they will need full details of the reasons for the non-compliance and will seek to limit any waivers to the minimum level possible. Lender credit committees are unlikely to agree waivers for significant non-compliances merely on the basis of statements that these are the result of general insurance market conditions.

In order to manage the process, the following points should be considered:

- Many loan agreements will include “market availability” or “market capacity” clauses that will allow borrowers to agree with lenders that the insurance covenants will not be met due to changes in the insurance market environment throughout the term of the loan. These clauses will specify the conditions for any agreement and will specify the information that will need to be provided. These clauses may require that the availability of cover within the insurance market is comprehensively canvassed and tested regularly on an ongoing basis.

- Where sums insured or policy limits are being reduced, lenders will want to know whether the reductions will inhibit the projects’ ability to reinstate any loss or damage and maintain their debt service obligations following insured loss or damage. This may mean that the borrower will need to consider arranging PML/EML reviews to provide lenders with an assessment of the worst-case loss scenarios and levels of losses.
- Where deductibles are being increased, lenders will need to check that the project’s financial model will have sufficient reserves or cash flow to meet any increased deductible levels should a loss or damage event occur. This may result in borrowers facing requests to increase debt service reserve levels or contingency account levels.
- Where policy coverages are withdrawn or excluded, lenders may ask for full details of the insurers that have been approached and the responses received. Lenders will also want to understand the new risk profile of the project due to the reduction of cover offered which may necessitate discussions with the borrowers’ engineering team as well as lenders’ technical advisors.
- In the case of the now standard market exclusions for Communicable Diseases which have been implemented after the COVID-19 outbreak, lenders will accept that this exclusion cannot be currently removed, however, waivers are still only being agreed on a temporary basis as the market position may change as the market softens.

“Lender credit committees are unlikely to agree waivers for significant non-compliances merely on the basis of statements that these are the result of general insurance market conditions.”



Conclusion: communication is vital in a hard insurance market

Lenders and borrowers have a mutual interest in ensuring that projects are appropriately protected against relevant risk exposures. Mitigation through risk transfer to the insurance market is one of the most cost effective, tried and tested ways of obtaining such protection for insurable risks. A comprehensive insurance package forms part of a lenders risk and credit assessment of projects and helps to make a project bankable. In a “hard” insurance market, where such protection may only be available with less favourable terms and conditions or at much higher premium costs, this risk assessment may change. It is therefore important that there is good communication between the loan agreement parties in order to resolve any non-compliances to reach a reasonable and satisfactory outcome.

The use of experienced insurance brokers in dealing with loan financed projects and a lenders insurance adviser providing services throughout the term of the loan are key to explaining the changes in the market and in managing the process between borrowers and lenders from an insurance perspective.



Gavin Newton is an Executive Director in Willis Limited’s Lenders’ Insurance Advisory Practice.
gavin.newton@willistowerswatson.com



Leonardo Chaves is Global Head of the Lenders’ Insurance Advisory Practice at Willis Towers Watson.
leonardo.chaves@willistowerswatson.com





Renewable energy innovation: who takes the risk?

Introduction: should insurers underwrite innovation?

Renewable energy technology is advancing, creating new and unknown risks and losses, which are being dealt with in both Construction and Operational Phase contracting. But are the contracting ramifications of both the Construction phase and the long-term O&M phase understood from an insurance perspective?

With the global push towards greener and renewable energy sources, the quest for bigger, more efficient and economically viable technology has led to an acceleration in innovative solutions. Here we come to the divide: insurers are wary of anything which they consider prototypical, but manufacturers tend to see these technologies as a natural progression or a mere evolution.

New technology still needs to be proven to ensure reliability, and that's why insurers see it as prototypical. So should the development risks associated with these improvements be underwritten by insurers? Given that innovation does not equate to a risk-free operating environment, who should take the risk?

More grey areas

Complicating the matter from an insurance perspective is that the manufacturers of these technologies also increasingly provide the Engineering Procuring and Construction (EPC), Supply and Install (S&I) and Operations and Management (O&M) services for projects where they are being used. This creates a grey area - where do the obligations lie between the related parties? Will this create blurred lines of responsibility between manufacturing and construction?

Insurers treat manufacturers and contractors very differently when it comes to coverage and there is a considerable amount of finger pointing as to who assumes the risk of defects. We are seeing instances of project owners accepting the benefits of prototypical technology but find themselves in no man's land where insurers and manufacturers are not willing to take any associated risk. Increasingly, insurers and manufacturers are requiring project owners to maintain insurance covering the defects risks above any "pure warranties" limited to the defect itself and not any "downstream" or subsequent physical damage risks. This is at odds with what coverage insurers are willing to provide on this more prototypical technology.

Early adopters versus underwriters

Large numbers of projects in the renewables space are now utilising a whole-of-life approach with an EPC wrap. This is essentially a “wrap-around guarantee” where an entity guarantees the obligations of contractors and subcontractors, in particular the Balance of Plant (BOP) and S&I activities, during construction and then the subsequent O&M. It is effectively a single point of responsibility for the project company and their lenders for the life of the project.

In other cases, it may not be an EPC wrap, but a separate S&I and BOP contract. Here, the S&I contractor may also be O&M contractor. Many of the issues we discuss here apply to these scenarios also.

Let’s look at the EPC situation first; to mitigate its exposures, the EPC contractor requires cover for its related manufacturing entities or activities during the construction and operations phase of the project. We are now seeing a very clear shift in the insurance market underwriting guidelines, due to the ambiguity of obligations as noted above, such that insurers are less willing to provide full coverage for related manufacturing entities; although this may have been acceptable in the past, the same is not necessarily true moving forward. This impasse has a broader impact affecting other industries, but the renewable energy industry - and in particular the wind segment - seem to be leading the way. There is a voracious appetite to bring on larger, more efficient technology as a way of underpinning the economic viability of new projects.

However, numerous insurers have been severely burnt with claims arising from defects, particularly wind turbine blades, pins or gearboxes, which would be traditionally be warranty or product liability claims against the manufacturer of those items. Some insurers have told us they’re experiencing loss ratios of 300-400% on their wind renewables portfolio.

Ultimately, technology needs to be tried by someone – without this, there would be no progress – but the tension between early adopters and the insurability of projects is potentially exacerbated where lenders and financiers review projects and require a level of certainty over their investment; lack of insurance would clearly be a stumbling block.

A revised approach

In the past, insurers offered full defects coverage with a waiver of subrogation in favour of manufacturers and/or suppliers, to the extent they were an Insured under the policy. However, we are now seeing restricted defects coverage and insurers wanting to maintain their rights of subrogation against manufacturers for product warranties.

Insurers are now limiting the extent to which manufacturers and or suppliers are covered under the policy for their manual onsite activities only; the reasoning is simply that insurers do not wish to provide what is effectively quasi-Product Liability or Warranty cover. Similarly, consultants are being treated in the same manner, as insurers do not wish to provide what would amount to Professional Indemnity cover.



Insurers are stipulating within policies that manufacturers are to maintain their warranty provisions, and any claims for defects must be addressed to the manufacturer under those warranties in the first instance, prior to the insurers accepting a claim.

Depending on the language used in the insurance policy, what also must be considered separately are the implications for the coverage levels for project Insureds under the contract. This includes the failure of the principal to procure insurance for manufacturers/suppliers for their “offsite” (manufacturing) activities to fulfil this requirement, and whether this may be considered a breach of the EPC or S&I contract and have significant ramifications for the project, if not previously considered and drafted accordingly.

Currently, the global market is only providing LEG1/96 Defects cover (outright exclusion for design/workmanship issues including resultant damage) for prototypical wind turbine technology (including towers and foundations) until type certification has been achieved. This leaves the early adopters with a lack of coverage for their project.

We have seen broad language encompassing all aspects of the project (even parts of the project where the technology is tried and tested), which arguably goes further than what would be anticipated by the restricted defects coverage. We must ask some key questions, such as:

- How far does this go?
- Should the BOP contractor be penalised for unproven technological parts of the project, or are they truly symbiotic?

The inclusion of LEG1/96 Defects Exclusion becomes an issue where there is an expectation by all parties that there should be at least LEG2/06 coverage available for the non-prototypical sections of the project, and this is written into the contract.

Similar issues arise during the O&M phase – particularly where the EPC/S&I contractor is also the O&M contractor and they require coverage for “downstream physical damage” under the Industrial Special Risk policy to be written into the O&M contract. This contemplates anticipating what the market will currently provide and hoping that the cover will remain achievable during the life of the O&M contract, often lasting 15 to 30 years. We have seen the market deteriorate; covers which were readily available have evaporated or now come at an extreme cost, with consequent implications for the economic viability of the project.

Conclusion: where to from here?

All parties to renewable energy projects must be absolutely sure that they are aware of the state of the market and have the foresight to “futureproof” their O&M contract. Attention to detail is key to ensure that the contractual requirements are strictly achievable and met. This is crucial where both EPC and S&I contracts are negotiated at the same time as the O&M contracts.

The details matter – EPC, S&I and O&M contractors are seeking contractual certainty on which to price their exposures and are very explicit in their demands. Project principals and developers clearly need to seek the same, in a changing insurance market. Are the implications fully understood? Can they withstand this potential volatility? It is critical that the options and risks are clearly outlined so informed decisions may be made.



John Rae is Australasian Renewable Energy Leader, Willis Towers Watson.

john.rae@willistowerswatson.com





Renewable energy insurance placements: buffeted by insurers' growing Nat Cat fears

Introduction: growing Nat Cat losses

COP26 has conditioned us all to believe that Natural Catastrophe (Nat Cat) events - driven by climate change - are now at a critical point, having dramatically increased over the last few years. Ranked by insured losses, the top five costliest natural catastrophes in 2020 were events that occurred in the United States, according to Munich Re NatCatService.

Date	Country/Region	Event	Fatalities	Overall losses US\$ m	Insured losses US\$ m
21.5-30.7.	China	Flood	158	17,000	350
16.5-20.5.	Thailand, Bangladesh, India, Sri Lanka	Cyclone Amphan	135	14,000	minor
26.8-28.8.	United States	Hurricane Laura	33	13,000	10,000
Aug - Nov	United States	Wildfires California	32	11,000	7,500
8.8-12.8.	United States	Convective storm	4	6,800	5,000

Source: <https://www.iii.org/fact-statistic/facts-statistics-global-catastrophes>

Fig 1: Munich Re NATHAN Single Risk Assessment Report

Hazard Score Rating

Hazard zoning values for significant natural hazards

	low	high	hazard rating
Earthquake			Zone 0
Volcanoes			No hazard
Tsunami			No hazard
Tropical cyclone			Zone 3
Extratropical storm			Zone 1
Hail			Zone 3
Tornado			Zone 4
Lightning			Zone 4
Wildfire			Zone 1
River flood extent (JBA)			Zone 0
Flash flood			Zone 4
Storm surge			No hazard

Source: Munich Re (with kind permission)

The 2020 US wildfire season as illustrated in the table above was highly active. Severe thunderstorms in the month of August ignited wildfires across California, Oregon and Washington.

Texas in particular has also been attracting insurers attention, due to storms that produce hail over portions of the state where golf ball (and larger) sized hail fell in some areas. Noticeable losses were incurred in May 2019 when a hailstorm damaged 400,000 panels of a Texas solar farm and resulted in \$70 million to \$80 million in losses according to GCube's 2021 report, Hail or High Water.¹

Impact on renewable energy projects

More frequent and severe weather losses, especially hail, has led to both a constriction in capacity and consequent rate rises in the Renewables insurance market for the last two years. Terms and conditions are also coming under scrutiny, especially “micro-crackage” for solar panels from hail, as well as contractor’s risk, construction, machinery and warranty for solar and wind risks. Deductibles are also being extended, especially with hail limits for solar. A number of insurers no longer want to underwrite solar projects in Texas, while underwriting criteria is now ever more demanding in respect of location and technology.

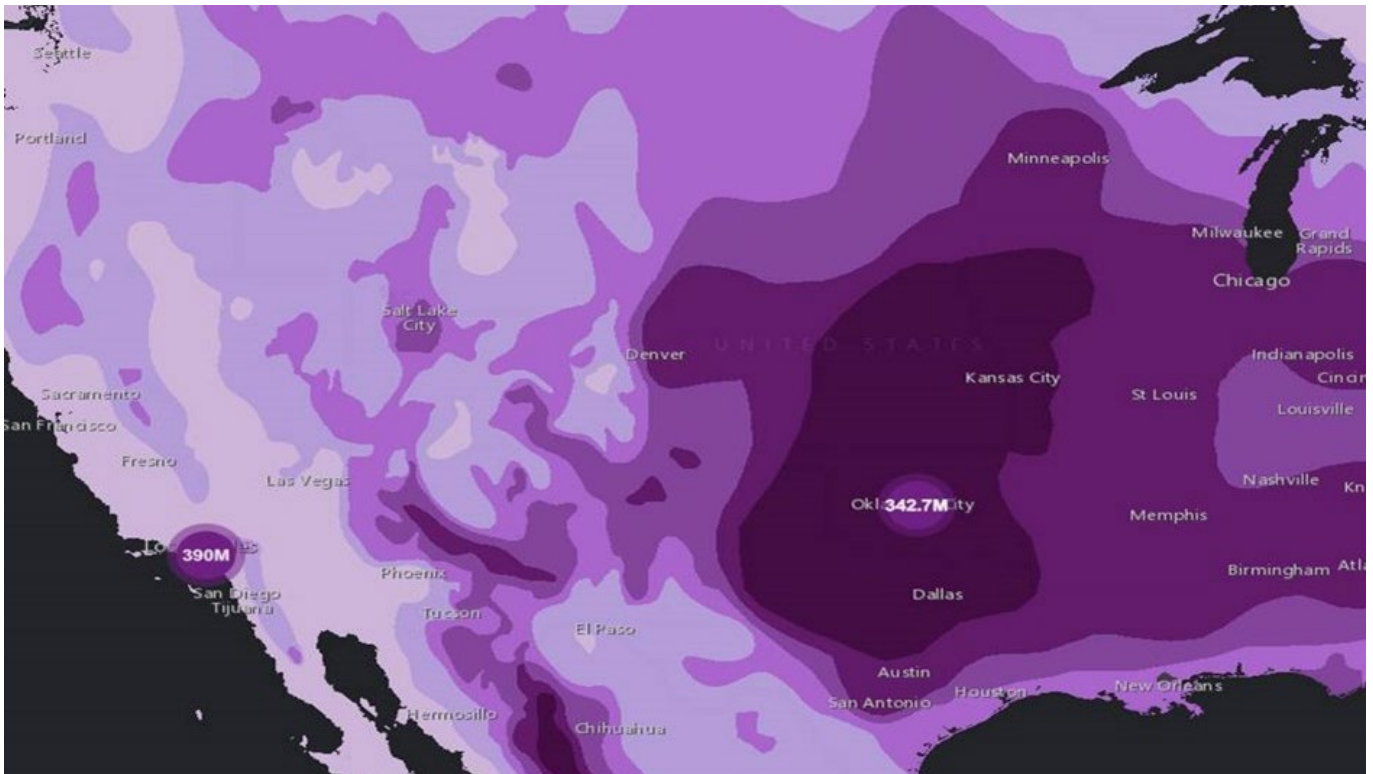
Storm and hail in Texas - how bad has it been?

A recent 400MW+ Construction solar project in Texas, completed during 2020/21, demonstrated the detail required around the location, Nat Cat exposures and whether the equipment could withstand the potential weather systems that the project could be exposed to.

A Texas Nat Cat image from Munich Re Nathan model; was produced, based on the Longitude and Latitude of the site. An illustration is show in Figure 1 above.

¹ <https://www.linkedin.com/pulse/hail-wind-fire-extreme-weather-drives-up-rates-energy-michael/>

Fig 2: FM Global Hail Zone Map



Source: FM Global Zone Map (<https://www.fmglobal.com/research-and-resources/nathaz-toolkit/flood-map>)

In this example, with the site less than 30 miles from the sea, Underwriters were particularly concerned about windstorm and hail. In addition to the Munich Re Nathan report, Insurers would consider maps such as Hail Zone below (courtesy of FM Global).

In fact, earlier hailstorms had not been in this part of the state so in this example we were able to assuage insurers' concerns. However, they requested to know the specification of the trackers on which the PV modules are mounted to determine what wind speeds they could withstand. As per the Munich Re model outlined in Figure 3 on the previous page, the tropical cyclone exposure is Zone 3 which equates to 213-251km/h (132 – 155 mph).

Manufacturers typically offer different strength trackers which are able to withstand varying windspeeds and in this case two models on offer could withstand either 129mph or 139mph. There is an additional cost for the higher wind speed version and clients need to understand the cost benefit analysis of the chosen model. In 2017 Hurricane Harvey made landfall in Texas with sustained winds of up to 130mph and severe rainfall; in this example the client decided to go with the 129mph version. Module manufacturers were challenged on the ability to withstand hail; in this instance, they were able to confirm that they had been hail-tested as part of the certification process. Being trackers with full tilt also helped persuade insurers that, despite the potential weather conditions, the client had considered the mitigation measures. There is a fine line between spending more on the equipment to be able to withstand strong weather conditions and undermining the overall profitability of the project.



Which is the most appropriate loss model?

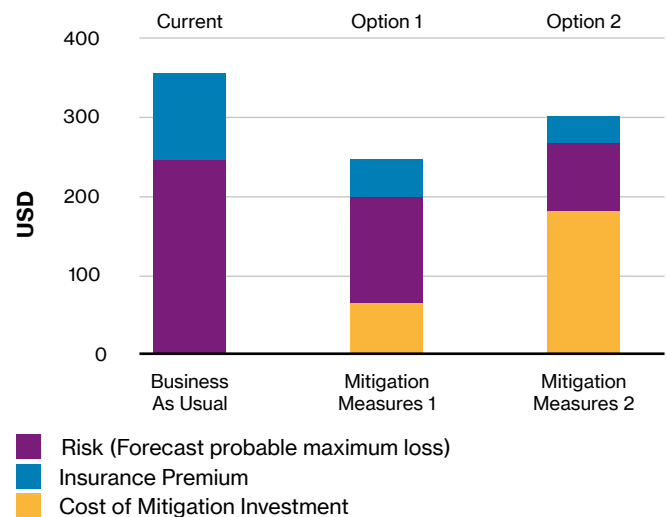
This is a choice to be made between using an Estimated Maximum Loss (EML) or Probability of Event Occurring model (PEO). Should the worst occur, insurers, clients and lenders need to understand the maximum loss that could occur at the site, including a major windstorm or hailstorm. Our engineers consider the location and the natural hazards and, in this case, provided estimates for lightning, storm, flooding and hail.

There are alternative studies that can be undertaken to assess the risk, including the best estimate of losses in excess of the given dollar amount for the corresponding probability of non-exceedance, also referred to as the return period. The RMS EML model is based on the average over the course of a 10,000-year simulation, using the median (50th percentile). It's critical that insurers, clients and lenders are aligned in terms of what the most likely event could be and the maximum liability or damage that could be incurred. We have seen types of report variances from EML studies that consider a US\$250m worst case compared with a hail event study and a US\$10m probabilistic assessment; typically this will be due to the single location whereas solar parks are typically spread over thousands of acres. The model chosen may therefore have a dramatic impact on the premiums expected by the insurers.

Risk intermediary natural catastrophe and climate risk consultants can help in assessing a detailed Probable Maximum Loss, taking into account a detailed hazard review as well as site specific vulnerabilities in terms of both property damage and business interruptions.

To gain a thorough understanding of the hazard, risk intermediary engineers undertake a detailed review and modelling of the hazard for a range of return periods. This is through the use of meteorological data and probabilistic severe event simulations from catastrophe models as

Fig 3: Engineering based CCOR assessment

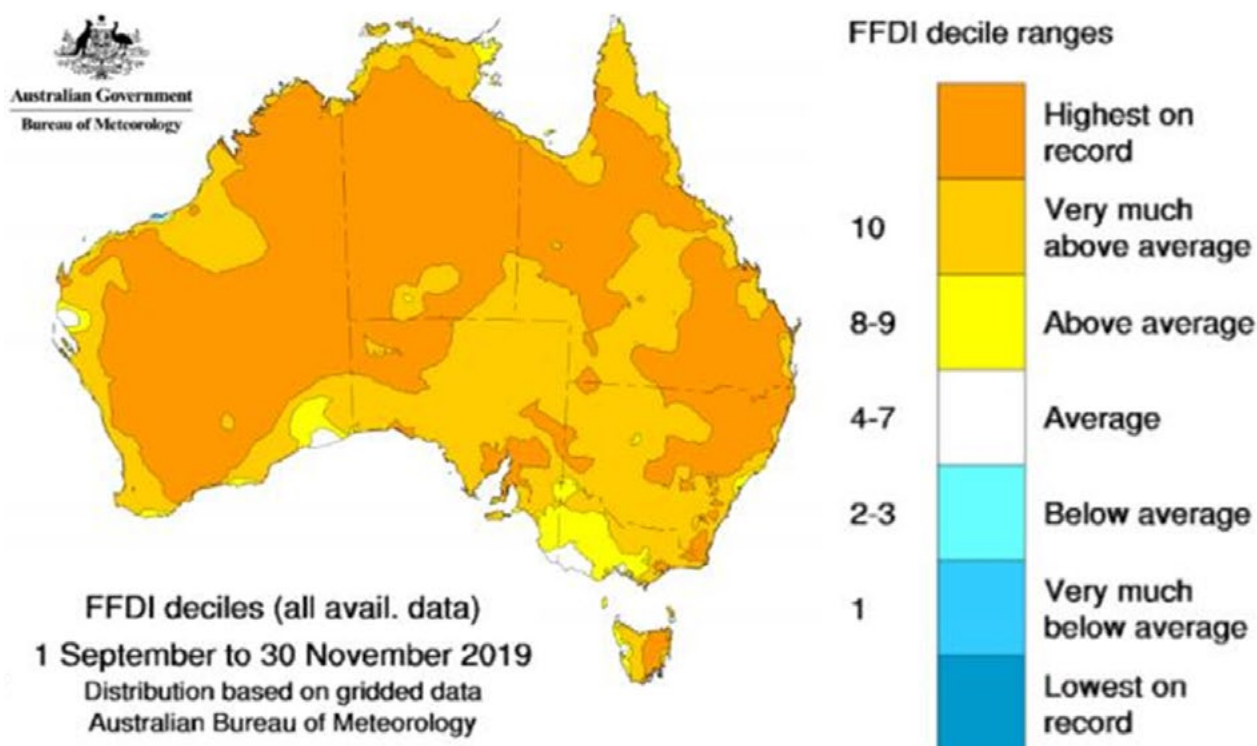


Source: Willis Towers Watson

well as insurance market recognise databases such as those operated by Munich Re Nathan and Swiss Re. A review of the design specifications for the site and the corresponding building design code is also considered. Insight into how the hazard is likely to change in the future can also be provided by our engineers.

Clients typically seek the Probable Maximum loss for a site due to say a hail storm, and then want to stress test whether the current risk transfer arrangements are good value for money. They also often want to explore and quantify the impact of good practice risk mitigation options to forecasted PML. A good approach is to analyse the current transactional structure and the likely impact of the risk mitigation investment costs on the Total Cost of Risk. The sample chart below demonstrates how savings can be achieved by taking smart risk mitigation such options with measured risk mitigation investment costs into consideration.

Fig 4: Accumulated-FFDI deciles for spring 2019 (based on all years since 1950)



Source: Special Climate Statement 72-dangerous bushfire weather in spring 2019 (Australian Bureau of Meteorology)²

Bushfires in Australia - are they getting worse?

Bushfire concerns have also been of significant anxiety for insurers in not only California but Australia. Millions of hectares have been destroyed, including 8 million hectares during the 2019 bushfire season. Insurers are therefore naturally concerned as to the likelihood of bushfires occurring in proximity to renewable energy projects. A recent example of this was an Australian placement of a sizable windfarm where the project's longitude and latitude red flagged bushfire as a likely occurrence on the Nathan Report, albeit a Zone 2.

Record low rainfall and warmer than average temperatures in 2019 resulted in the highest ever fire weather risk across Australia, as measured by the Forest Fire Danger Index (FFDI), with record high values observed in areas across all states and territories (see Figure 4 above).

Climate processes

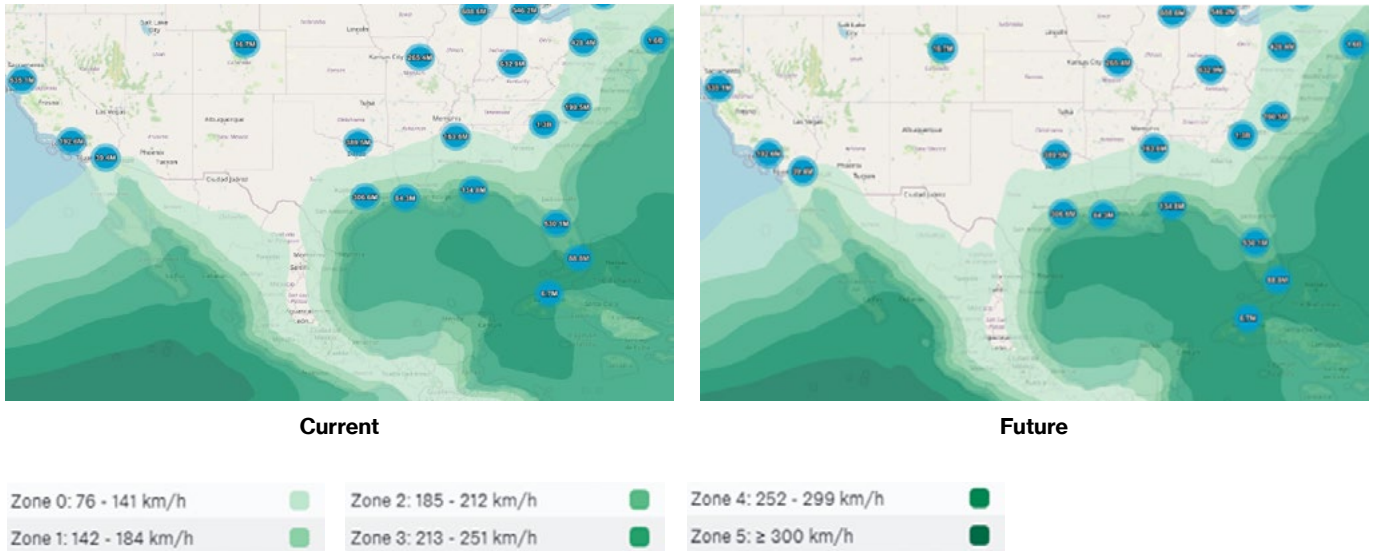
Australia's climate was impacted by a positive Indian Ocean Dipole in 2019, exerting a drying influence over many parts of the country. A prolonged negative phase of the Southern Annular Mode enhanced the warm and dry conditions in areas of eastern Australia, and a sudden stratospheric warming in September shifted the westerly winds further north over New South Wales and Queensland during October and November. The combination of dry, hot and windy conditions provides the perfect environment for bushfires to ignite and spread rapidly.

Being fully aware of the catastrophic bushfires in Australia in 2019 and 2020, during which there were over A\$1.9Bn of losses³, insurers have taken a cautious approach and expect to see bushfire mitigation plans and vegetation management. Indeed, without detailed specification on who will be responsible for prevention and or mitigation should fires start, insurers are now beginning to refuse to cover the risk.

² <http://www.bom.gov.au/climate/current/statements/scs72.pdf>

³ <https://www.insurancejournal.com/news/international/2020/07/07/574617.htm>

Fig 5: WTW Climate Diagnostic Tropical cyclone hazard layer under current climate and under future climate conditions (2050 and RCP 8.5)



Source: Willis Towers Watson

EMEA Nat Cat Losses

The main driver of Europe, Middle East and Africa (EMEA) Nat Cat losses in 2020 was extratropical cyclone activity (ETC), notably storms Ciara and Dennis. However, the year was also characterized by exceptional subtropical storms, particularly Alpha and Ianos, affecting Portugal and Greece during the summer season. There are undoubtedly territories that one would least expect a Nat Cat event and yet with the evolving climate we have seen rare events occur such as in Spain.

How to future proof your choice of location

Risk intermediaries now provide climate diagnostic and predictive modelling for projects which are looking into the future on how a certain territory could succumb to more Nat Cat events. Given projects can be in situ for 20–25 years, investors will be keen to know if their investments will not be blown or burned away in 10 years' time because the climate has changed and the equipment and mitigations are not good enough to withstand a major Nat Cat event.

Our own Climate Diagnostic tool uses industry recognized standards and the latest scientific projections to assess climate change and the impact upon our client's assets worldwide. The tool considers both acute (tropical cyclones/ hurricanes, extreme flooding and wildfire) and chronic hazards (sea level rise, precipitation and drought stress) multiple climate scenarios and multiple time horizons (current / 2050 / 2100). Figure 5 above shows the tropical cyclone exposure under current and future climate conditions for sample portfolio in the USA. As it can be observed some locations might experience an increase in hazard intensity by 2050 and under specific global warming scenarios.

Assessing both current and future climate exposure will help renewable energy companies with:

- Strategic planning insight: the tool outputs provide valuable insight towards companies' longer-term strategic planning.
- Building portfolio and asset level resilience: the tool identifies which assets/properties have the highest physical risk, allowing targeted mitigation to reduce risk exposure.
- Ensuring regulatory alignment: this approach responds to recommendations provided by the TCFD, allowing companies to comply.

Conclusion

Natural catastrophe losses and climate changes are having a dramatic impact on renewable energy developers. There are three key questions that both developers and investors need to consider:

- 1. Where is it safe to invest, avoiding Nat cat perils?** Can I get full cover against the main Nat Cat perils or will I be sub-limited to a percentage of the actual full value of the project?
- 2. What is the best technology to withstand Nat Cat events such as hail and windstorm?** Have we conducted a full cost benefit analysis of choosing a less expensive option, against the risk of it not being able to withstand higher wind speeds?

3. How is the climate likely to change in the designated location for the construction of the renewable energy project in question?

Critically, it is important to engage early with insurers on the project, location and technology to be used.



Adam Piper is Global Account Director, Renewable Energy, Willis Towers Watson Natural Resources, London.
adam.piper@willistowerswatson.com





Environmental, Social and Governance (ESG) Clauses: time for the insurance market to act!

Introduction: a case of market inertia?

The UK was proud to host the recent UN Climate Change Conference (COP26) in Glasgow in 2021 which continues to elevate the profile of the climate crisis to highest level, making it the greatest and most critical item today on the global agenda. There is strong optimism that governments around the world are finally taking actions that are commensurate to the climate change threat, with a strongly felt acceptance that we have a limited and time-bound opportunity to make amends before it is too late.

As we observe the strong ethical positions taken by Lloyd's of London and other global insurers over the last few years regarding mitigating the climate threat, it's clear that the cultural change in the insurance markets has already begun. No longer can insurers ignore the increasing pressure from brokers and clients to reposition historical and traditional policy wordings to respond to the current drive for sustainability and to be more 'environmentally friendly'. Across the market, brokers and clients strongly feel that the insurance community is no longer exempt from this process and needs to be prepared to take a stand to contribute to climate enhancement.

So there is now a strong demand from clients that the industry must do more to help facilitate the transition to a lower-carbon world. And yet sadly, ESG clauses are still not commonly found in traditional Property & Casualty insurance policies - even though they have been in

existence for over a decade. Although such clauses have been available for many years, it's disappointing that they have been considered as an extra or a 'nice to have'; or even something for insurers to start considering for the future to make businesses appear more ethical - in other words, 'greenwashing'.

But now insurers have a golden opportunity to further their ESG credentials and support their clients. With trillions of dollars of assets within their portfolios, they can help contribute to a greener, cleaner environment through the common adoption of ESG clauses.

The problem with strict indemnity

The traditional concept of indemnity creates a fundamental obstacle to the insurance industry's efforts to support climate action; with indemnity, the familiar concept is to place the Insured in the same financial position they occupied prior to a loss after it has occurred, without betterment. This effectively means that reinstatement following a loss must be equal to and no better than the value of the original insured property that has been lost or damaged. Simply put, insurers are contractually and financially obligated to seek to replace on a like for like basis, without consideration of the developments in technology and the concept of future resilience. Building better for the future is "betterment", and that financial burden is solely the responsibility of the asset owner, not the insurer.

Pre-agreed percentage increase

The current ESG clauses being considered in the market show that insurers are prepared, as part of the loss settlement, to include a level of betterment to perhaps 10% of the originally claimed amount, subject to being within the original sum insured when the insured property is damaged; this increase would then form an intrinsic part of any claims settlement process. Both brokers and clients strongly feel that, in addition to insurers' publicly stated corporate stance on ESG, the strong adoption of such clauses will provide a clear differentiation in insurance suppliers, which will be a major factor in buyer insurer selection by buyers going forward.

Developing market insurer positions

- On the one hand, we are aware of some Casualty market exclusion clauses being considered, which state that the insurer is not liable to make any payment or pay any claims that directly or indirectly result from greenhouse gas and/or climate change. "Greenhouse gases" are defined as carbon dioxide, methane, nitrous oxide, fluorinated gases, ozone and water vapour.
- But on the other, one clause which one major carrier has put forward in its process to 'upgrade to green' is very forward-thinking, as it includes cover in respect of recycling. This clause provides that "The company will pay the Insured's expenses to clean-up, sort, segregate and transport debris from the Insured's damaged property to recycling facilities".

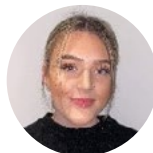
Furthermore, in respect of replacing equipment, this carrier appears to be willing to pay more money to replace with greener equipment. Two examples are shown below:

'The Company will also pay to repair or replace damaged light bulbs with light bulbs which have low mercury content.'

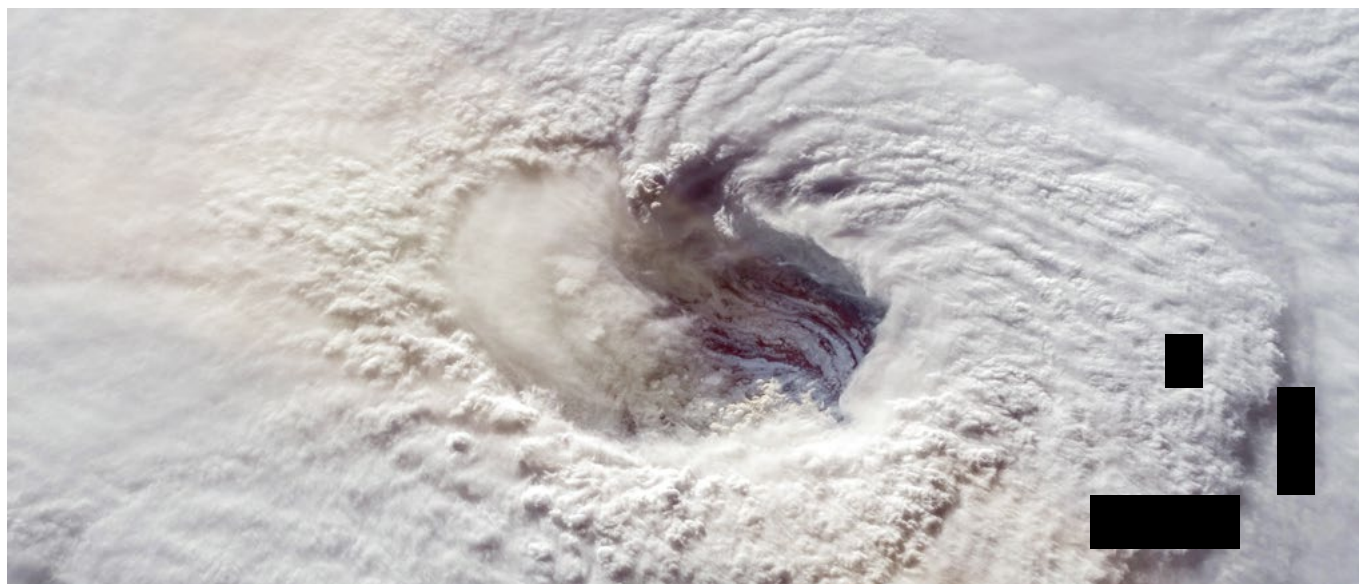
'An additional 25% of the applicable limit of liability for the building and/or business personal property shown in the Statement of Values or similar schedule to upgrade to green.'

Conclusion: insurers need to support a more sustainable market

The insurance market frequently talks about innovation. While the major carrier's new clauses are a positive start, we feel this is an area which could be further adopted and developed in response to the climate change threat and insurance buyer demands. This is a real opportunity for insurers to support a practical solution to help contribute to a cleaner and more sustainable energy market; we believe that 2022 should herald a much wider inclusion of such clauses in many Renewable Energy (and general Property & Casualty) wordings if the insurance market is to promote a cleaner and greener future.



**Brooke Beales is an Account Executive,
Willis Towers Watson GB Renewable Energy.**
brooke.beales@willistowerswatson.com





Japanese offshore wind projects: their unique risk profile

Introduction: rapid acceleration of Japanese offshore wind industry

The development of Japanese offshore wind projects has accelerated significantly since the enactment of the “Act on Promoting Utilization of Sea Areas for Renewable Energy Generation” which came into effect on April 1st 2019. As this publication goes to press, the results of the first round are scheduled to be announced; these results will be closely watched, with the further Round 2 tender results due to be released in this first quarter of 2022.

The Government of Japan (GOJ) has also stated that they will continue to designate 3-4 promotion zones across Japan which will generate approximately 1GW of wind power per year for 10 years. The capacity awards of 10 GW by 2030 and 30-45GW by 2040 are also structured to include the delivery of floating offshore wind schemes¹.

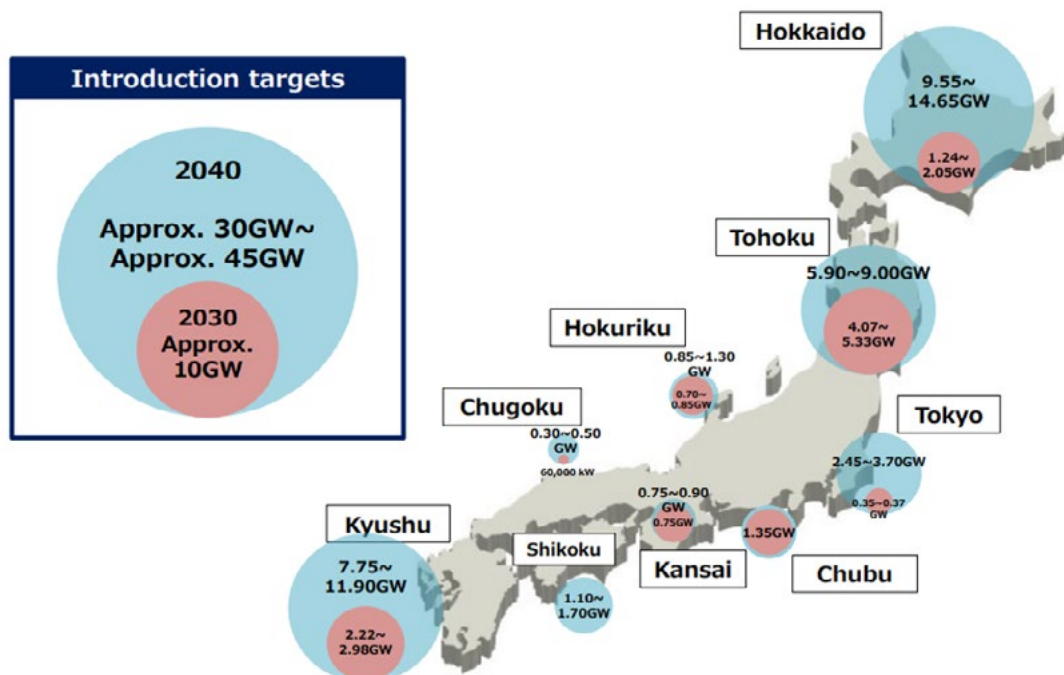
In order to drive this rapid development of wind energy capacity, the GOJ has committed to three important pillars of support for the renewable energy industry:

1. Attractive domestic market creation
2. Investment promotion and supply chain establishment
3. Next-generation technology development and cross-border collaboration with a view to expansion into Asia

However, this does bring to attention the unique risk landscape facing Japanese projects which needs to be considered.

¹ Public-Private Council on Enhancement of Industrial Competitiveness for Offshore Wind Power Generation, Overview of the Vision for Offshore Wind Power Industry (1st), Dec 2020 https://www.enecho.meti.go.jp/category/saving_and_new/saiene/yojo_furyoku/dl/vision/vision_first_overview_en.pdf

Fig 1: Overall vision for Japanese offshore wind industry to 2040



Source: Public-Private Council on Enhancement of Industrial Competitiveness for Offshore Wind Power Generation, Overview of the Vision for Offshore Wind Power Industry 1st Dec 2020 (https://www.enecho.meti.go.jp/category/saving_and_new/saiene/yojo_furyoku/dl/vision/vision_first_overview_en.pdf)

Natural catastrophes in Japan

A significant concern facing developers of projects in Japan is the exposure to natural catastrophe in the region; specifically, there is a heightened exposure to earthquake, tsunami, wind and lightning.

Earthquake/tsunami

The headquarters for Earthquake Research Promotion have released an updated prediction of Seismic activities on the coasts of Japan in 2020. As an example, the Akita Coast of Japan (where several promotion zones are located) has a 6-26% chance of earthquake activity, with a magnitude of 6+ on the Richter Scale anticipated within the next 30 years². This level of seismic activity intensity is within the remit of wind power infrastructure design specifications; however, the resistance of the deployed assets to stronger shocks is yet to be evaluated. It is also worth noting that, for EML/PML assessments of projects in this region, the main driver is the resultant tsunami/ high tide affecting onshore assets such as sub-stations, pre-assembly yards and storage facilities still under construction.

Wind

The wind conditions in Japan, together with the frequency of tropical cyclones/typhoons, have accelerated the requirement for developers to provide IEC Typhoon Class (T-Class)³ certified wind turbines to handle elevated extreme wind speed conditions. TÜV SÜD has developed a computer model to demonstrate suitability of assets for regions impacted by such extreme conditions, based on the IEC61400 standard⁴.

Lightning

The most frequent claims seen in the Japanese domestic Onshore Wind market are lightning-related incidents. Winter lightning events often exhibit extremely complicated charge structures, and these will be accounted for in developments of wind turbine deployment. An effective lightning prevention system is still an ongoing technology development, with patent applications⁵ being submitted by National Renewable Energy Laboratory (NREL) on Thermal Welding and other fields of traditional LPS being deployed for projects affected by Asian offshore conditions.

² <https://www.hp1039.jishin.go.jp/eqchreng/eqchrfrm.htm>

³ <https://www.renewable-technology.com/comment/wind-turbine-technology/>

⁴ <https://www.tuvsud.com/en-gb/press-and-media/2021/september/tuev-sued-provides-certification-of-wind-turbines-for-regions-impacted-by-tropical-storms>

⁵ <https://www.nrel.gov/news/program/2021/lightning-protection-wind-turbine-blades.html>

DSU/BI exposures in Japan

A significant factor to consider when evaluating the EML/PML quantum of projects in Japan is the extent to which they are driven by DSU/BI exposures. The high FIT (Feed in Tariff) guaranteed for 20 years for projects (approximately 4-5 times the average amounts for European projects) means that the expected financial models are significantly more attractive when compared to similar European projects. The P50 wind conditions typically encountered by Japanese projects are expected to drive revenues, so the resultant DSU/BI exposure is generally more significant than the Physical Damage exposure, driving the resultant Combined Single Loss beyond market expectations.

There is much stakeholder concern in Japan regarding the ability to transfer this increased loss of revenue to the insurance market. This is a vital factor in attracting debt financing to secure the bankability of these projects throughout their lifecycle.

Self-elevating platform availability/concerns for the supply chain

Due to the rapid deployment of large-scale projects across Japan and the potential overlap of project developments across promotion zones, a key risk factor is the availability of vessels, technical expertise and spare parts. One of the strategic pillars of the GOJ is to increase the availability of Japanese domestic supply for projects; however it is yet to be seen whether the suppliers have the capacity to fulfil demands imposed by multiple projects.

Extra due diligence is therefore required in reviewing the DSU/BI periods, which must take into account the unavailability of immediate remedies; the resultant delay may be enlarged by sea conditions, which can fluctuate significantly across Japan.

Insurance market appetite

The insurance market's capacity will also be considerably affected by the results from other Asian Offshore Windfarm projects during the next 2-3 years, before the Japanese market really takes off. The Nat Cat markets are already showing resistance by imposing capacity restrictions, and the availability of the market will therefore be tested once the projects are underway. Being able to secure the required risk transfer levels will be achieved by solid technical assessments, continuous dialogue with the market and an understanding of the full scope of international capacity provider requirements.

Conclusion: supported required from both domestic and international insurance markets

Much is still unforeseeable within this exciting market; this uncertainty will only be amplified by the results of other projects being developed in similar conditions. The Japanese domestic insurance market has shown a strong appetite to support developers, but the quantum of risk in the region will require the full support of the international markets as well. Appropriate strategies to access insurance markets, both domestically and internationally, will therefore be necessary to ensure the most efficient risk transfer is obtained from what is potentially going to be a very difficult marketplace.



**Katsu Hoshino is Account Director,
Japan Group at Willis Towers Watson London.**
katsuyoshi.hoshino@willistowerswatson.com





Getting the most out of the insurance market: managing the process

Introduction: the critical role of insurance purchase

A buyer's approach to the insurance purchasing process can make or break a budget, improve or deteriorate market relations or even lead to future challenges in the event of a claim. This article is to act as a guide to help insurance buyers navigate an evolving risk landscape in an effective way to get the most out of the Renewables insurance market. The three key areas of focus are:

- The route to market
- Sharing of risk information
- Managing the marketing process

Route to market

A buyer must strategically consider the optimum route to market to achieve their insurance objectives. This will involve not only the choice of insurers, but also the broker that supports and advises them through the process.

The confusion of a multiple-broker approach

Experience has shown that in some instances a programme may be taken to the market by multiple brokers to the same insurers. This can be intentional to drive competition, or it can be unintentional though the leakage of insurance terms out into the wider facultative markets; this effectively means that insurers are then looking to other insurers to lay off some of their risk. However, what this generally serves to do is only to create confusion for the market, as it is unclear who is acting as the primary

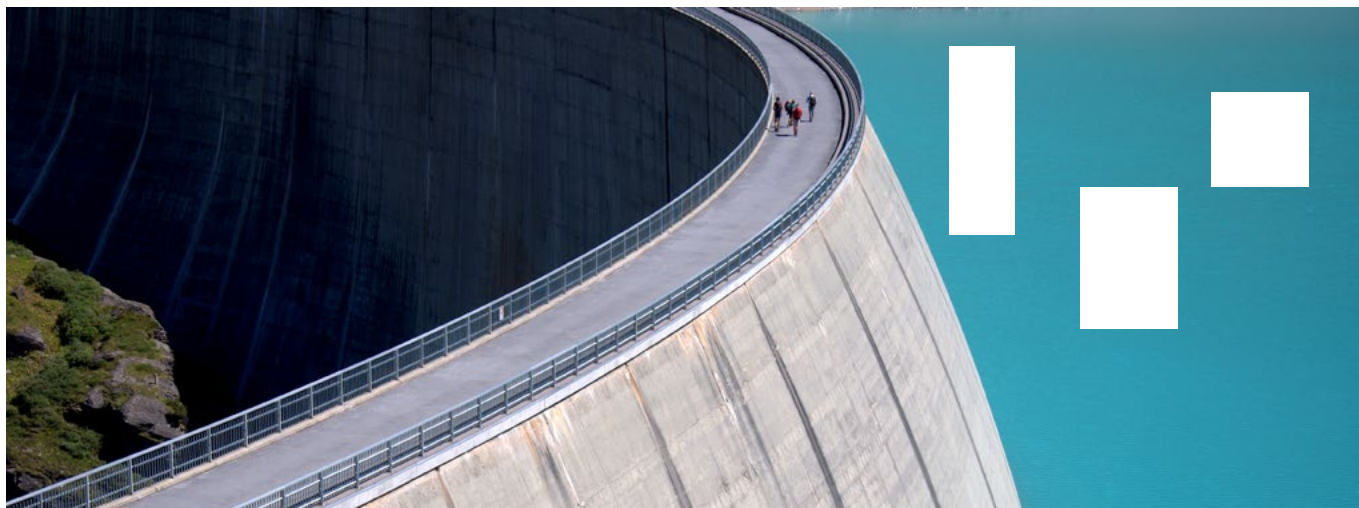
advocate of the insurance buyer. If a buyer does intend to use multiple brokers in a tender style process, then it should be made clear as to which insurers are allocated to whom and that any intentional breach of their clients' instructions will result in penalisation against the offending party.

What happens when the workload increases?

In addition, we frequently see the competitive landscape driving behaviours but, once the workload increases (as it often does in today's hard market environment, where more technical information and risk justification is required) interest is lost, and focus can shift to engaging with other new buyers.

Service should be linked to quality and continuity

The counteract to this is a process of competitively buying in new relationships; the complexity of the placement and value brought by insurance advisors and transactional brokers should be incentivised in the first place, delivering for the buyer in a fair and commensurate manner. However, the services of a broker should be linked to the quality and continuity of the service and the enhanced value which they bring to the transaction. The risk transfer business in the 21st century is a complex and regulated one, with substantial tangible value delivered to large and complex client risk advisory and claims settlement issues.



Utilise incumbent panel to drive marketing exercise

In terms of insurer selection strategy, a buyer should seek to utilise their incumbent panel of insurers, or those that they have a relationship with, before broadening the marketing exercise. Many insurers seek to take a long-term view on risk placement; that is, they will support the buyer when things go wrong with the idea of recovering their position throughout the tenure of the project or the relationship. This is the concept of mutual risk sharing which underpins the insurance market; after all, the insurers must seek profitability to stay available to buyers, who hope to benefit from the increased certainty gained from less volatile and more stable long-term partnerships.

If the buyer has a construction project moving into commercial operations, when possible we would strongly advise that they continue with the same panel of insurers. This supports the concept of a seamless transition of insurance cover from Construction to Operational insurers, an issue which was further explored in last year's Review ("Ensuring a smooth insurance handover: what risk managers need to know")¹.

Single point of contact

To examine a key part of the buyer's role in the placement process; it greatly helps the marketing progress to have one single controlling point of contact through which to manage flow of information and to communicate on placement progress. This appointed person should have strong project management skills, with the ability to make decisions when required - of course, we recognise that some decisions require a second sign off, as is also the case for the insurers and their tightening underwriting guidelines. Finally, if there are lenders or other key stakeholders involved, this person should be armed with the key information to keep these parties up to date with the renewal process and avoid any default of any insurance related covenants.

Sharing of information & risk engineering

All successful placements start with a clear and concise submission of risk information to the market. A core broker role is to assist the buyer with articulating this information to make a fair and material presentation of the risk, while always recognising that, for new project developments, not all is known at the beginning of the process. A regimented questions and answers (Q&A) process therefore has to be expected, which optimises the material understanding for both the buyer's and insurers' time.

Information exchange a two-way street

It should also be recognised that this information exchange process is a two-way street; insurers will wish to make the buyer aware of their concerns or risk developments that can be fed back into the project development. Globally, insurers hold a wealth of data and knowledge across their global portfolios and, if accessed correctly, can contribute to the success of the buyers' projects.

Beyond the flow of a well-structured information exchange between the parties, the engagement of a commercial and project team dealing directly with the insurers, in either a face to face or virtual setting, is also viewed positively by the market. It affords the opportunity to meet with key commercial and technical parties from a project and creates a much higher level of understanding, a closer rapport and an enhanced business relationship which the insurance market values highly – it's not just names but people. It's no coincidence that Lloyd's of London relationships, which started in the coffee shops around the square mile in London, are now represented by a global corporation.

"If the buyer has a construction project moving into commercial operations, when possible we would strongly advise that they continue with the same panel of insurers."

¹ <https://willistowerswatson.turtl.co/story/renewable-energy-market-review-2021-ungated/>

Timing critical in a hard market

However, it should be noted that, especially in times of hybrid working and virtual market roadshows, it is a challenge to ensure full insurer engagement for more than two hours. That's why the sharing of information in good time before such meetings allows the insurers to consider the risk and then form an initial view, frequently consulting their senior underwriters, in-house engineers and catastrophe modelling teams to profile risks which can then be more fully understood and built upon in the meeting and follow up Q&A process.

Importance of regular feedback

Furthermore, insurers value information sharing outside the policy period itself - certainly for the more complex risks - so regular feedback helps to support their underwriting process in the lead-up to the next renewal. A good example of this is a buyer who agreed to a sharing agreement with another project nearby, to have shared rights in respect of a redundant generator step up (GSU) transformer in the middle of a given policy period. So if either plant were to lose their transformer, they could utilise the other party's asset while a replacement was sourced. This particular sharing agreement was then communicated to the market and favourably viewed by insurers; a buyer with a large portfolio of risks may seek this type of risk mitigation across their projects, ensuring that the technical configuration of the GSU can be made across all their assets.

Involve insurers' risk engineers in surveying process

Risk engineering is another crucial activity to be completed following the placement of the insurance policy. Opening up the surveying process to the insurers' engineers and underwriters, as well as the broker's engineers, ensures a balanced perspective of the risk which can be used in future insurance placement activities. This engineering will be technical in nature; it will provide a survey report and identify risk improvements which work to the benefit of both buyers and insurers. These recommendations are then built into the plan for part of the plant management.

Independent valuation will validate revised values

Finally, if a project is operational and the buyer is seeking to re-assess the value in order to optimise insurance values (and therefore premiums), most insurers seek an independent valuation to be completed. It is often not enough for this to be completed internally; furthermore, it would have to be agreed with the various stakeholders (including lenders) in good time for any renewal of the policy in question.

Managing the marketing process

A clear timeline

A clear agreed placement timeline is crucial to ultimate success in the insurance market. This includes time for the buyer and their broker to:

- collect the risk information described in the previous section of this article
- engage with insurers in the market and allow them due time to review and opine on the submission
- receive quote terms
- build supporting capacity

This is even more important in today's market, where senior sign off may be required by underwriters, especially for the more complex risks.

Realistic and clear expectations

Throughout this process, all parties should have realistic and clear expectations of what is achievable given the prevailing hard market conditions. In some instances, such as the renewal process, this may involve adapting to changing insurer appetites for risk, adapting the policy structure and capacity, and then of course agreeing these changes with the project stakeholders to ensure their agreement to the coverage being put in place.



Securing underwriters' attention

Buyers should also recognise that underwriter attention is currently at a premium due to the growth in the renewables industry, and so this challenge must be managed effectively. Particularly for Renewables programmes where the Property cover requires more than four insurers (a syndicated risk placement), this is always going to be a challenge; a good example would be having to make last minute changes, unless necessary. Nothing can challenge the market more than last minute notifications of changes to a placement, be they on cover or even events of claims arriving at such unfortunate times. However, the market does of course recognise some situations where this is necessary, and this will be taken into due consideration.

Managing internal stakeholders

For insurance buyers, managing their own stakeholders is also crucial. The broker can help with the articulation of the placement process and the insurance product being purchased to enable sign-off by the buyer's senior management. To this end certain classes (such as Cyber) are volatile and can change on a weekly basis, which can challenge any placement process.

Conclusion: stack the deck in your favour!

All successful placements start with a plan, but a plan is only as good as how it is implemented. We suggest buyers work with their broker and insurers to deliver insurance objectives, be clear on requirements and work to deliver to that end. If buyers work the process well, the insurance market will respond positively, setting them up for long term success.



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

Myles.Milner@WillisTowersWatson.com







Part Four - The Renewables insurance markets in 2022



London & International markets: is Renewables the first sector to feel the turn of the tide?

Introduction: a complex market

The Renewable Energy insurance market (Renewables) continues to be a complex, fragmented, dynamic, evolving and global market, still accommodated within many different product lines. This continues to make it very opaque to analyse, albeit that it has recently been closely tracking the broader Property & Casualty (P&C) market, with rates moving upwards in a similar fashion.

For those outside looking in, Renewables seems to be just another Construction or Property market; however, for those directly involved, it's certainly complex. That's because it traverses the fortunes and prevailing appetites in a number of product lines:

- The more experienced Renewable Energy Speciality markets, for project lifecycle and portfolio risks
- The less experienced Power and broader Downstream markets, for operational and portfolio risks
- The Construction, Marine and Liability markets, for specific consideration to new build activity and who influence the Renewable Specialty markets, with a multi-disciplined approach to renewable energy clients
- The traditional Upstream markets, most recently for Offshore Wind and Hydrogen technologies, as these are now attracting strong attention from these underwriters who see synergies in environment and technologies and the attractiveness of prevailing market conditions

There are therefore many different unconnected market segments that are looking to develop their understanding and offer a renewed appetite for Renewables business. Historically, the view that an insurer could have different pools of talent and “buckets” of risk has been challenged; it appears that insurers are now more frequently favouring a dedicated and integrated operating model to manage their opportunities and risks, given the growth of the sector and broker/client demands. This allows them to address the complexity inherent in this portfolio, which is often best understood after their own entrance to the market.

The situation at the end of 2021

It's certainly been tough!

The market “adjustments” of the last few years have certainly raised the profile of the cost of risk and challenged the value of traditional risk transfer of the insurance markets to the insurance buying community. This issue consistently remains high on corporate boards' agendas and continues to be a frustration for lender parties and other stakeholders. This is especially the case where buyer-mandated minimum levels of cover or maximum deductibles are still not always being delivered; indeed, it seems that reasonableness, commercial availability and insurability continue to collide head-on. We are in a period where traditional insurance strategies and modelling predictions are still being overhauled and recalculated, creating new opportunities for less conventional risk transfer structures in response to the pain which insurance buyers have had to endure over the past few review periods.

The last three years: a quick re-cap

In last year's Review we discussed the 'technical adjustment' which the market has insisted was required to return it to a sustainable level of profit. We reported that a few Renewables insurers had closed their speciality functions, while others had withdrawn from regional underwriting and brought capacity deployment back to London.

All insurers have been deploying hard market underwriting strategies and there has been a clear transition from a buyer's to a seller's market. The impact of the hard underwriting climate in 2019 - and even more acutely during 2020/21 - was still being highly influenced by how far buyers' insurance programmes were perceived to have moved along the spectrum to being considered correctly "adjusted" by insurers.

The sector was also being heavily influenced by performance as well as assessed or perceived Natural Catastrophe (Nat Cat) exposure, which in turn was affected by the type of Nat Cat season experienced by individual insurers. The market was still in turmoil, hesitantly trying to understand its own appetite through a forensic lens - reviewing its existing portfolio and deploying severe technical measures to achieve the desired correction.

Despite the global pandemic, the market continued to function well in its remote/hybrid model - even without the normal added value of strong face-to-face connections and relationships. Deals were regularly achieved - to the dismay of those buyers who had felt that such sharp and compressed changes were inequitable with their long-term contribution to insurers' premium income pools. As brokers, we had to consider the challenge of insurers shedding capacity and the impact of increased management pressure for portfolio and risk diversification. We also had to acknowledge the ripple effect of the London market's harsh rhetoric that "enough was enough" as it resonated through the global markets with a widespread impact. It was an empowering period for markets - but bleak for insurance buyers.



Market sentiment in late 2021: the beginnings of an ease...

At the time of drafting this article, we are pleased to report that, without being overly optimistic, the general sentiment in the market is that, when excluding Nat Cat rate and capacity considerations, it's reasonable for buyers to expect low-to-mid-single-digit rate increases for 2022.

There is now a clear sense that the head of steam which has driven the last three years of pricing accelerations is now starting to run out, given the good measure and progress made towards the substantial "technical correction" being painfully achieved in the London and global markets - indicating that the peak in rates might now be well within sight.

Will Downstream Renewables benefit from ESG demands?

Given the strong demand for insurers to demonstrate their ESG credentials, it's now widely felt that the Downstream Renewable Energy sector will attract greater interest from the market in future, especially bearing in mind the rapidly diminishing opportunity to capture the same levels of written premium enjoyed historically from carbon-based energy industries. For the right programmes, the promise of strong global deployment of green technologies, together with the desire to capture a larger market share of this booming green opportunity, could create a high level of competition in the market. This dynamic has the potential to accelerate the gradual slowing of rate increases in this sector of the Construction/Downstream markets - ahead of other P&C sectors - with rates potentially plateauing for attractive programmes during 2022.

As previously reported, there has never been a shortage of capacity in the Downstream Renewables market. The previous hardening of the global markets was driven by a need to return to sustainable and profitable levels, requiring a substantial technical adjustment. During this period, it was indeed the leading Renewables insurers who put their client reputations on the line and collectively sought to drive a better technical understanding of the risks in their portfolios. This has enabled them to become more educated, more selective and more technical in their assessment and acceptance of risk, while defining the appropriate technical rate.

"The impact of the hard underwriting climate" was still being highly influenced by how far buyers' insurance programmes were perceived to have moved along the spectrum to being considered correctly "adjusted" by insurers.

Equally, as we hope to approach some form of rating level peak, it will be the leading Renewables insurers who will need to decide, given the increased sector competition, how comfortable they are in their technical assessments of their portfolio, as well as which clients they wish to fight to retain and which they would be comfortable to lose to new market entrants.

It is clear that the market cycle has reached a point where new capacity has entered the fray, with a host of fresh insurers reported last year as well as at the beginning of 2022. All are actively seeking to deploy their underwriting and engineering capability to build new capacity and revenue streams to deliver on their new business plans. In contrast, existing capacity may continue to be constrained by the remedial effects of the last technical corrections to their current portfolios.

There have been positive signs of a return to more healthy profits for many insurers writing Renewables. This was only to be expected, given the substantive underwriting “knifework” to policy terms and conditions and the recent rating increases of up to 40% in some areas of the portfolio.

If insurers have learned anything from the last three years, it is that not all clients are equal. As a result, we have seen a substantive and demanding drive from insurers to move much closer towards a higher level of technical understanding of their clients. They are now creating an opportunity to be more selective towards well-presented clients and risks, while at the same time remaining empowered to reject pressure from brokers and legacy relationships where they feel that the clients or risks are still not presenting themselves in a way from which they can take any comfort. In the last three years the role of the “client-focussed” broker has been amplified, together with the importance and value of risk and insurance managers tasked with differentiating their organisation’s risk in the marketplace.

Fortunately for risk managers and insurance buyers, the tools now available to help analyse and present the data to the market are improving all the time. The Renewables insurance market has certainly continued to grow in line with its clients and technologies; although not fully mature, it’s smart, technical and attracting the best talent available from all areas of the insurance sector.

Have insurers reached the peak?

Just like some mountaineers, there is a sense in the Renewables market that their oxygen is about to run out, preventing them from reaching their peak and thwarting them of their vision of a substantive market correction as

new market forces arrive to disrupt their best-laid plans. However, the “destination” of pricing adequacy is not an exact science and is best viewed with hindsight. While Nat Cat losses can be sufficient to break some insurer portfolios, others will still dodge the bullets and return healthy profits for 2021/2022; with minor adjustments to their original “journey”, they will perhaps still feel that they have indeed arrived.

In the market there is a broad optimism about the strides made to re-underwrite risks, with Lloyd’s CEO John Neal confidently proclaiming on October 21 2021 that the Corporation was on a course to report a Combined Ratio of 95% or below in 2021, despite the toll of claims from Hurricane Ida, Winter Storm Uri and Storm Bernd¹. This would mark the first time Lloyd’s has turned an overall underwriting profit since 2016, with heavy natural catastrophe claims and the coronavirus pandemic having driven syndicates to four years of underwriting losses between 2017 and 2020.

In the Renewable Energy sector, we sense that most insurers will still be very reluctant to soften or modify their hard-earned rating levels. However, the opportunity to fill portfolios, particularly for fresh capacity without legacy or for those insurers who have been sitting on the sidelines, will prove to be a substantial attraction during 2022. We have certainly learned from the last three years that the market incentivisation and focus has not been on growing portfolios through the generation of greater market share, in the hope of weathering both attrition and severity by size and scale. Instead, it has been a time of reflective remediation, returning existing programmes to sustainable levels of profitability with considered, selective and hopefully profitable growth.



Two schools of thought

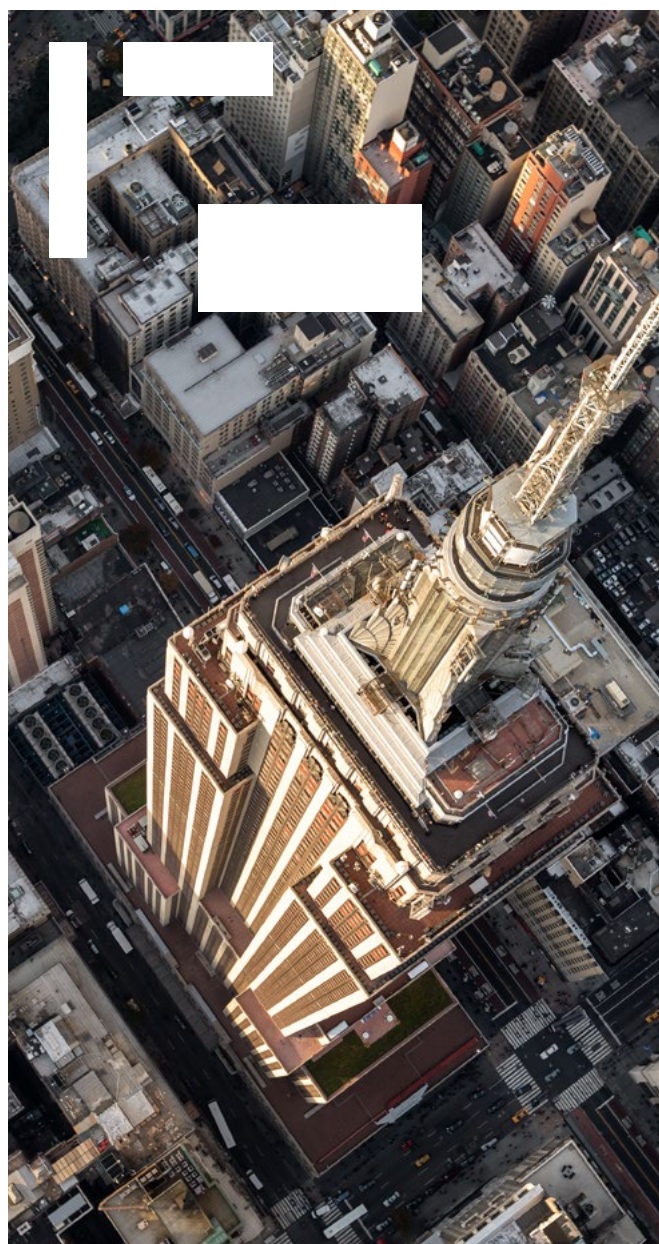
While insurers underwrite to avoid claims, there is an acknowledgement in the market that you can just be plain unlucky - despite the most forensic of underwriting approaches - and that all programmes will carry a level of attritional loss. It's the underwriter's ability to moderate the severity and frequency of claims peaks which will often make or break a portfolio, despite the best structured reinsurance protection. As such, for the Renewables market there are two schools of thought which need to be managed to ensure sustainable profitability at a time of continued levelling or downwards pressure on rates:

- **Firstly, the level of claims attrition**, together with the buyer's ability to address systemic loss level issues and to resolve claims quickly to ensure that the ever-rising claims costs and potential inflationary factors are managed. Across the globe, supply chain issues and labour shortages are driving up repair costs and expenses, which is becoming a real issue for all sectors.
- **Secondly, the ability to avoid the claims spikes** which provide most underwriters with the greatest concerns; these are categorised as the ones which create late night SMS messages to brokers and their claims teams. In previous editions we have discussed that, historically, the unsustainable rating conditions in the Renewables sector were often set at a level where risk perception did not meet the reality, particularly for assets exposed to Nat Cat risks. However, it is well understood that the industry continues to move forward with technological advancements, often at a pace where insurers are constantly having to reevaluate their understanding of risk based on limited and/or unproven operational history.

In our opinion, the frequency and severity of increasingly volatile global weather patterns continues to present the largest single exposure to an "event" to all but the most benign locations. The level of perceived Nat Cat exposure of a project, the agreed Estimated Maximum Loss, the accepted level of self-insured retention and the available capacity are likely to continue to be the greatest influencing factors in achieving some form of rate levelling in 2022 onwards. For Renewables projects there is a concern that they are frequently deployed in North America, Asia and emerging territories with high Nat Cat exposures. Additionally, the last five years have shown that the design and build costs of enhanced Nat Cat resilience are only incurred if the location has been historically exposed. So should history be the right measure for the future?

The outcome of the reinsurance treaties for 1st January and attitudes to Nat Cat will therefore certainly be highly influential in shaping the rating landscape for 2022. For some buyers with assets in high-risk locations, the reality is that this could counteract the competitive downward market pressure for attractive risks this year.

Swiss Re has estimated that industry insured losses from Winter Storm Uri will reach \$15bn¹, while Storm Bernd will cost \$12bn². Industry loss estimates for Hurricane Ida vary, with Swiss Re pegging its estimate at \$28bn-\$30bn³, and RMS US\$25-35bn⁴.



¹ <https://www.insurancejournal.com/news/international/2021/08/13/626900.htm>

² <https://www.insidepandc.com/article/2959qu90fqf239nfzoum8/swiss-re-expects-750mn-impact-from-ida>

³ <https://www.commercialriskonline.com/hurricane-ida-to-cost-swiss-re-750m/>

⁴ <https://www.artemis.bm/news/rms-says-hurricane-ida-loss-25bn-to-35bn-on-gulf-region-impacts/>

2022 - a year for new business targets?

We understand that most specialist renewable energy insurers, MGAs, traditional composite insurers, and Lloyd's of London syndicates all have new business targets for this sector which are likely to herald a different market dynamic in 2022 and beyond. This pursuit of a greater market share of quality risks does suggest a renewed confidence in overall rate adequacies and returns on capital. With the predicted levelling rather than rapid softening of the market, we remain hopeful that underwriters have re-learned their trade of assessing and differentiating risks and avoiding excessive and unpredictable rating swings. It is often the unpredictable nature of the market reaction, as much as any rate change, which buyers find generally to be untenable.

While many Renewables insurers now have a much better idea of the type of risks that they want to see in their portfolios, it is likely they will need to be prepared to adjust their own vision of their individual rating "peaks" to retain their best risks. Equally, they are much clearer on which technologies and territories are no longer within their appetite; these will quickly receive a lower level of interest or be rejected completely. Unfortunately, the market is becoming polarised in its view on what is, or what is not, attractive.

Unattractive programmes

What we can say is that the following are likely to be received unfavourably, or at least hesitantly:

- Owners who have demonstrated limited engagement with insurers over the last three years
- Assets that have consistently performed badly, with limited benefit from physical improvement or remediation in policy terms and conditions
- Projects where there is highly perceived Nat Cat exposure
- Projects featuring inexperienced contractor parties
- Assets that can only demonstrate limited trouble-free technology performance

This high level of risk selection does create an interesting phenomenon, whereby many risks will be too new and unproven, or by contrast too old, being out of OEM (Original Equipment Manufacturer) warranty. Furthermore, Construction risks are inherently less attractive than Operational ones, although Operational risks exposed to Nat Cat remain challenging. It is within this assessment that a sweet spot may emerge, where potentially we see competitive market forces starting to force a level of rating reduction.

"Flight to quality" - the only continuity in an evolving market

We reported in last year's Review that there was a fundamental shift in the market which we believed was here to stay – the "flight to quality". We fully believe that insurers have learned much during the last three difficult years; moving into 2022 and beyond, we remain certain that the degree of underwriting submission data which is now required by insurers to complete their review, assessment and acceptance of a programme will unfortunately continue to be an administrative burden on risk managers. The level of focus and professionalism in this sector has increased substantially, together with the size of the market opportunity and the associated technological, occurrence and aggregation risks. The challenge for insurers now is to achieve a satisfactory levelling of the sector position while maintaining a sustainable level of profitability. Insurers are in this for the long haul and will be positioning themselves for a longer-term "flight to quality" to sustain a satisfactory underwriting performance through increased diligence and assessment.

Two divergent streams emerge

In last year's Review we predicted that those buyers who have solid long-term partnerships, together with well performing programmes that offer a good degree of insurer transparency, would experience less of a chill wind during 2021 than those whose strategy remains to visit the market at every opportunity to buy capacity, thereby keeping their market relationships transient. And we have been proved right.

The market does not do an about turn each year; it is a massive global market, and to find out where we are in the market cycle, we must take a point on a given timeline – say January 1 2022 - whose future trajectory is only just becoming visible. The question of what constituents an attractive client to insurers will absolutely continue into 2022; buyers who meet these criteria are likely to see a glimmer of hope through a much earlier window of opportunity. With the right strategies in place, they are likely to be able to take much earlier advantage of the positive signs which are appearing in the market to others in the sector. The way in which buyers embrace this opportunity is likely to create two divergent streams, with those able to access the "accelerated" path reaping the desired monetary and cover benefits far quicker than those who continue to refuse to fully engage with the market.

Not all technology risks are equal

It is also worth acknowledging that technology type and insurer experience continue to play an important factor in influencing appetite and price. The market is still spooked by its historical relationship with Anaerobic Digesters, Energy from Waste and some Biomass programmes. While Battery Energy Storage Systems are rapidly evolving, market appetite for such schemes remains mixed, together with any commitment to concentrated solar power, hydro construction and geothermal (particularly underground).

The market is still unsure how to address hybrid technologies; some pure-play Renewables markets, or composites with high ESG considerations, will struggle with integrating renewable and conventional carbon technologies.

In contrast, the market is becoming increasingly comfortable with the technological developments associated with the upscaling of wind technology and bifacial panels on solar systems. This is especially the case where manufacturing defects can still be transferred to OEM warranties, where deductible levels are sufficient and where the current more attractive premium rates continue to prevail.

Capacity adjustments 2021-22

In 2021, we did not see the same degree of capacity withdrawal that we experienced in prior years. With the advent of more attractive terms following the “technical adjustment”, the adjustment level is now being highly influenced by the perceived level of unknown risk or hazard associated with newer, less proven technologies; where that level of unknown risk is lower, there is now a substantially increased interest in the sector.

Many underwriters now feel that market dynamics are unlikely to be more attractive than at present; now is the perfect time, they feel, to enter the Renewables market and secure a share of quality clients and risks in this rapidly growing sector.

Market positioning is no longer centred around the “vanity” of sector control; instead, it is now more about opportunistically capturing commercially attractive terms following a solid technical understanding.

In summary, just as the conventional Energy market is in transition, the Renewables market still has many factors influencing its direction of travel. There are positive signs that the market is transitioning to be a more accommodating one for insurance buyers, with more than a hint of increased stability compared to the previous three years.

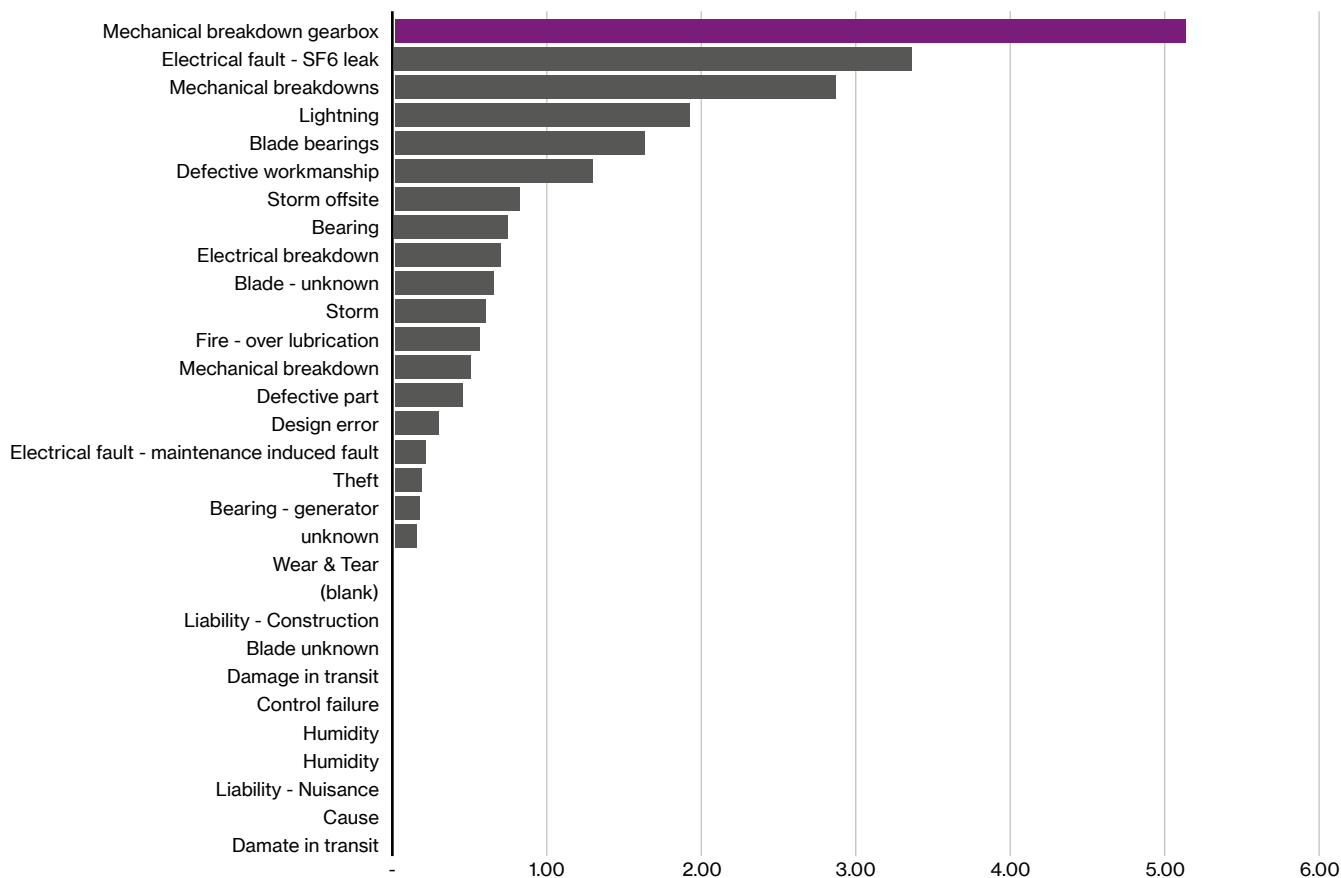
A better understanding of the buyer’s risk generates more capacity

There is a strong opportunity for brokers to work with risk & insurance managers to create a better understanding of their clients’ risk profiles, technologies and performance, which will better support more positive insurer reactions. Buyers who routinely purchase their insurance on a “disconnected capacity” basis are likely to see slower benefits from any positive adjustment of the market in their favour. The recent technical adjustment, stronger underwriting discipline and improved results make the Renewables sector more attractive to more capacity providers than at any time in its history; market forces of supply and demand will vie with insurers’ desires to reach their vision of completing or maintaining this technical adjustment. As with any movement in the market, it will be watched very carefully to see if further corrections are required; however, outside of Nat Cat appetite it is likely that any further corrective changes will manifest themselves in a more focused way to address specific areas of continued concern.

“Market positioning is no longer centred around the “vanity” of sector control; instead, it is now more about opportunistically capturing commercially attractive terms following a solid technical understanding.”



Fig 1: Onshore Wind Claims Summary 2021: by cause of loss



Source: RELA (Renewable Energy Loss Adjusters) - reproduced with kind permission

Onshore Wind - how much capacity is too much?

Over the last couple of years, we have seen some major changes and developments in the Onshore markets. We have seen strong new renewable energy focused capacity development from a number of different insurers in London writing global risks. They have entered this market without the challenges of an underrated and loss producing legacy portfolio; as anticipated, they have been able to capitalise on the upwards trend in rates, underwriting with strong growth and performance. We have seen strong performances from other experienced London-based global market leaders who, despite being the natural authors of corrective remedial measures, have continued to grow in competence and conviction of their understanding of key global risks. Collectively these insurers naturally also have the greatest opportunity to demonstrate profitable performance post-remediation.

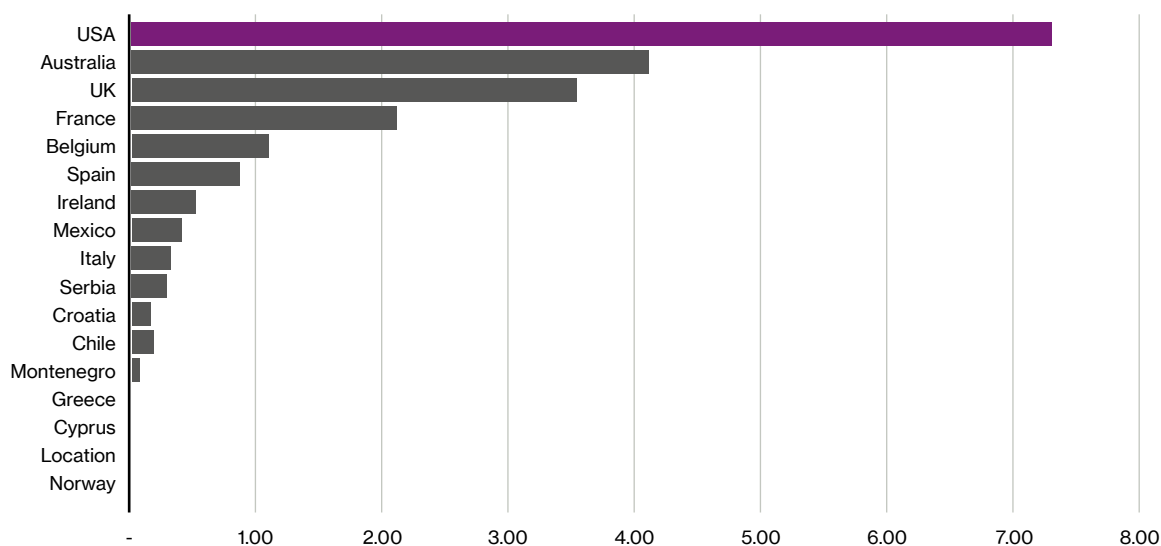
The more traditional Power markets have found substantially more opportunities falling within their appetite as they seek to transform their portfolios to capture future business. In this review period there has been exponential movement of renewable energy markets and

many who have lost key personnel to competitors building out their portfolios remain challenged by their legacy and available pool of talent to maintain their positions. As we move forward, we anticipate that several existing players, together with many others who have not already fully committed to the Renewables sector, will have business plans which include forward strategies to become more heavily involved.

It is therefore certain that the sector will present many new opportunities for the insurance market. However, while there is no shortage of following market capacity and insurers now regularly need to achieve minimum signed premiums, perhaps the question for 2022 is: will there be sufficient demand to satisfy the desired growth for all insurers who wish to participate in the sector?

The greatest challenge with the Renewables market remains the availability of reputable and established leaders - a challenge which needs to be addressed. To establish a position as a new market leader requires a strong and thoughtful commitment to invest in key underwriters, engineers and claims teams. Alternatively, if

Fig 2: Onshore Wind Claims Summary 2021: by country



Source: RELA (Renewable Energy Loss Adjusters) - reproduced with kind permission

an insurer already has the systems and structure in place to lead other product lines (such conventional Power or Property) and is seeing a reduction elsewhere in its portfolio, the transition to leading Renewables business could be more straightforward. It is therefore reasonable to expect that in 2022 we will see the breakthrough of a few more leading insurers who have the conviction and resources to deliver.

Offshore Wind - attracting capacity

As we move into 2022, the Offshore Wind and Sub-sea Cable market continues to experience perhaps the greatest changes that we have seen for a decade. The Offshore sector, despite advances in experience and proficiency, continues to present both high levels of risk and opportunity for reward. With the advent of many new project opportunities outside the North Sea, the promise of sustained sector growth in Asia, North America (and indeed globally) continues to attract much attention. Offshore Wind technology continues to rapidly evolve; frequently brokers and the market are approached to consider indicative terms to support business models for wind turbines which remain conceptual in their design - with production, prototype testing and commercial deployment forecasted some years into the future.

There continues to be concerns regarding risk aggregations - particularly in Asia, where deployed projects are exposed to significant typhoon risk. These concerns will continue in both Asia and North America, as both regions make strong progress to delivering on their offshore wind ambitions. Even when looking at the

North Sea, the level of deployment opportunity being considered with scaled fixed and/or floating technology will require serious consideration by the market and careful deployment of underwriting capacity.

As previously reported, acquiring capacity for many larger offshore wind projects is now a truly global exercise; this is particularly the case for those projects exposed to Nat Cat risks, which still command attractive premiums. Given the increased global climate volatility, it remains the case that any serious challenge to the manufacturers' package of preventative measures in respect of typhoon risk could result in an occurrence which threatens the overall attractiveness of Offshore Wind business on a global basis. It is commonplace to consider capacity on an agreed value basis, relative to the technically assessed EML; however, this is not an exact science. While contingency is often considered, we are seeing buyers across the globe needing to buy cover on an agreed value basis to increase capacity and reduce costs. However, this is a challenging process; buyers will calculate their own assessments of the EML, which are often different to insurers'; however, insurers will still apply their rate to the total value at risk. If they get this wrong, their risk is high; however, not as high as if the buyer was to reduce the level of cover and capacity with a view to reducing the ultimate premium paid.

Limited offshore leadership

There continues to remain a scarcity of leading capacity for offshore projects. As we move into 2022, we would predict that the sector will become increasingly supported

by the Upstream Oil and Gas market - as well as a well-known energy industry mutual - over the next five years, as traditional Upstream companies become involved in delivering projects within this sector and seek to rely on their usual insurance partners.

However, only insurers that have learned the lessons of the past, that have good memories and that can offer solid technical in-house support, with a wide appreciation of the risks involved, are likely to survive to reap the benefit of the longer-term opportunities offered by this sector. New nascent market capacity, attracted by the relatively high premium opportunities or under pressure to blindly follow existing clients into a new sector, should be very wary. The market is very sensitive - when rates are high, there is often a good reason for it. Global supporting markets will therefore be closely watching which leading insurers will be able to demonstrate the experience and self-belief to help the market navigate the terms and conditions which consider the industry's loss record, while at the same time striking the right commercial balance in responding to buyers' demands and needs.

Conclusion: how to be first in line for a positive adjustment

To conclude, there are six ways in which buyers can positively position their programme to take advantage of the recent positive movements in the market:

- 1. Make sure your risk transfer strategy is aligned at a corporate level.** The hard market has prompted a review of corporate risk buying strategies and there have been many new captive feasibility studies commissioned over the last three years. Do you have the ability and/or appetite to increase any self-insured risk? Do you commonly insure on a full value or agreed value basis? Can you ensure that you are comfortable with your technical engineering assessments, knowing that insurers prefer to partner with clients on a risk sharing basis?
- 2. Make sure your risk transfer strategy is based on a sound understanding of your risk.** While insurers are indeed insisting on forensic reviews of the material factors which influence the risks presented, some of

our clients have been pleasantly surprised; having undertaken a detailed review of their project or programme, that they have found that they are paying to transfer risk which is not in fact materially present. Consider what can be managed and/or retained - have you achieved the "efficient frontier" of risk transfer?

- 3. Ensure that your values are accurate,** up to date and accountable. Insurers are going to demand to know how they stack up and the basis on which they have been calculated. This is particularly important for the Renewable Energy industry, where average reinstatement prices have reduced. Have you engaged an independent professional valuation expert?
- 4. Accepting that there is still a flight to quality,** provide a high quality, comprehensive underwriting submission. This will be key to ensuring that the maximum potential capacity can be accessed and that the best possible results are achieved in an environment where risk selection is so prevalent.
- 5. Engage with your underwriters personally.** Even if this is just by video call in this hybrid working environment rather than face to face, it can make all the difference. Take the time to engage with them to explain your operations and answer any questions, and in so doing, create lasting partnerships and mutual understanding.
- 6. Timing is everything.** Work with your broker to ensure that you deliver your underwriting submission to the market at exactly the right time. Know in advance what the insurers will be looking for and so avoid any unwanted surprises.



Steven Munday is Global Head of Renewable Energy, Natural Resources, Willis Towers Watson.
Steven.munday@willistowerswatson.com







Global insurance markets round-up: taking London's lead?

Australia

Introduction - less differentiation in regional markets

The Australian Renewables sector in 2021 has remained buoyant, with no shortage of capital investment into renewables projects; this investment has been towards a mix of traditional solar and onshore wind projects, together with an increased interest in and exploration of Battery Storage (BESS), green hydrogen, pumped storage and hybrid projects.

Over the same period, the Renewables insurance market has continued to harden, with Australian insurers continuing to push rate increases, increase deductibles and maintain a focus on policy terms and conditions. This is a direct result of continued poor losses in this sector, with many insurers experiencing loss ratios well in excess of 100% on their Renewables portfolio. This has had the effect of reducing the gap between the Australian and UK/European markets and they have become more aligned. Global insurers have also taken a more centralised approach to underwriting projects, so there is little difference in underwriting approach between accessing those markets in Australia, the UK or Europe. This has enabled buyers to obtain the best deal and leverage their own relationships - no matter where those relationships are based. The result has had the effect of increasing available capacity, providing a greater choice of lead insurers and instigating the beginning of a stabilisation in rates

Project delays

The impact of COVID-19 continues to affect renewables projects, with many suffering delays due to impact of critical items being delayed, stemming from problems with the global supply chain and the impacts of COVID-safe on-site work restrictions. Projects are also experiencing delays due to connection and grid stability issues, with some experiencing delays of 12 months in connecting to the grid. Protracted project delays are not uncommon; insurers are now focussed on policy extension provisions, with many policy extensions attracting increased rating structures and tightening of policy terms and conditions. This is especially prevalent in circumstances where projects are effectively operational but are awaiting a final completion certificate from the EPC; particularly when the extension period will run through a further wet or bushfire season. In some instances, insurers have walked away from projects after their initial policy extension provisions have been exhausted, leaving the requirement to find alternative capacity for a partially completed project.



Technology

The technology used for a project is a focus for insurers, with the proliferation of prototypical and unproven technology now used for renewable energy projects. For the wind sector, the focus is on the turbine technology, including the turbine itself together with its associated blades, towers and foundations. If insurers deem this to be prototypical, they are applying Restricted Defects Provisions such as LEG1 until the turbine is type certified, as well as increased deductibles and less favourable Serial Loss provisions. In addition, lightning protection is also becoming a major source of concern for insurers following trends of losses occurring from lightning strikes during both the construction and operational phases of a project. We are now seeing deductibles for prototypical turbine technology and blades now reaching A\$1 million per occurrence. It is important for project owners and developers to engage with markets early and have a full understanding of the proposed technology that the EPC and manufacturer are proposing, as this can drastically impact the insurance costing for the project.

Technology concerns are not restricted to the wind sector; for the solar sector, there are increased concerns that the installed technology is not suitable for harsher Australian conditions. The Ingress Protection (IP) rating is a concern for insurers, with a view that technology that doesn't meet certain IP rating levels may not be suitable for the local conditions, particularly around water and dust ingress. This is driven by increasing levels of losses which could have been risk managed by ensuring the suitability of components. Insurers are starting to include specific conditions around the IP rating and in some cases will not provide cover for projects that they see do not have adequate inbuilt risk mitigation.

Other newer technologies such as large-scale Battery Storage and the relatively unproven green hydrogen facilities are also of concern to insurers. Overall, a thorough understanding of the technology used in a project is key to be able to achieve a viable insurance solution.

Natural Catastrophe

Natural Catastrophe and weather-related exposures remain a key consideration for insurers. Claims arising out of hail/convective storm, flooding and bushfire are all major factors driving insurer capacity, pricing, deductibles and in some cases these exposures are being sub-limited. Understanding these exposures to a project is key for owners to ensure that mitigation measures are incorporated in the construction phase and continue into the operational phase. Items such as location of critical infrastructure in relation to flood exposures, adequately protected components against hail, dust and water ingress

are specified, adequate lightning protection is included and vegetation management for bushfire are all understood and incorporated into a project. With a second year of La Nina conditions due for the Australian summer and wetter conditions expected, insurers are particularly focused on how these natural catastrophe exposures are being mitigated and managed.

Subrogation

Insurers are becoming more focussed on maintaining their full subrogation rights against manufacturers and suppliers for their manufacturing/supply activities and are starting to limit the extent that these parties are included as Additional Insureds under Principal Controlled policies. This is in response to a recent trend of some manufacturers/suppliers pushing contractual terms onto project developers, which effectively makes the insurance provisions the first port of call in the event of a defect issue rather than any warranty provisions under the supply agreements. The contractual agreements will need to be fully reviewed and agreed to ensure that there are no gaps in cover between the contractual requirements and coverage positions are willing to provide

Conclusion: the outlook for 2022

While we expect to see rating levels continue to increase, it will not be at the pace as we experienced during 2021. Greater interaction between the global markets will have the effect of stabilising both rates and policy terms/conditions, culminating in improvements in available capacity for most projects. Insurers will continue to focus on Nat Cat and Technology exposures to projects, so project owners who can demonstrate that they have undertaken a review of these exposures and have incorporated mitigation into their project design will see greater benefits in their insurance outcomes.



Mark Thompson is Broking Director, Construction Risks at Willis Towers Watson Sydney

Mark.thompson@willistowerswatson.com



Beijing

Introduction: rapid expansion of renewable energy in China during 2021

Chinese installed renewable energy capacity continued to soar during 2021. By the end of September, the installed capacity of renewable energy power generation in China had reached 994GW, of which hydropower installed capacity was 384 GW (including 32.49GW of pumped storage), wind power of 297 GW, photovoltaic power of 278 GW and biomass power of 35.361 GW.

The Chinese government continued to focus on its "New Infrastructure" strategy during 2021 to stimulate the domestic economy. Last year the government expanded the construction of large-scale wind power and solar farms in the Gobi and other desert areas to thoroughly implement its goal of carbon peak and carbon neutralization, of a scale of approximately 100 GW. These projects are mainly distributed across six provinces (regions), being Inner Mongolia, Qinghai, Gansu, Ningxia, Shaanxi & Xinjiang and Xinjiang production and Construction Corps. They are being launched in an orderly manner according to the principle of "one mature, one started". The government will inspect the large-scale wind power photovoltaic base on a monthly basis, and in a timely fashion to grasp the construction progress of the base, supervise and promote the base construction and ensure the completion of each project on time.

Wind power

From January to September 2021, the newly installed capacity of wind power connected to the grid in China was 16.43 GW, including 12.61 GW of onshore wind power and 3.82 GW of offshore wind power. In terms of the distribution of the newly installed capacity, the Middle East and the South regions account for about 60%, and the "Three North" region accounts for the remaining 40%. By the end of September 2021, the accumulated installed capacity of wind power in China amounted to 297 GW, including 284 GW onshore and 13.19 GW offshore.

However, by the end of last year there were signs that the government had started to reduce its approval for new stations, and this will continue into 2022.

Onshore Wind

Chinese Onshore Wind insurance premiums continued to grow in 2021, although the loss ratio for this class of business in the Chinese insurance market has remained high during the past few years. Most Chinese insurers have suffered an overall underwriting loss on the Operational phase of their Onshore Wind portfolio, especially after the expiry of various wind turbines' maintenance warranty

periods; however, the loss ratio for the Construction phase for this portfolio has been much lower than the Operational phase. Due to the previous fierce competition in the local market, the premium increases for Onshore Wind power in the Chinese insurance market have tended to be more severe compared to 2020, and deductibles have certainly had to be increased.

Offshore Wind

The prospects for the Offshore Wind insurance market in China are much better than for its Onshore Wind counterpart. Most Chinese insurers have made an underwriting profit from underwriting Offshore Wind projects, both for their Construction and Operational phases, although premium rates and deductible levels have remained low in comparison to international markets. Offshore Wind project loss ratios also remain at a low level; furthermore, there have not been many Offshore Wind accidents/losses reported during 2021's windstorm season.

Premium rates for Offshore Wind projects in China remain at the same level as during 2021, despite some Chinese insurers' aggressive response to various Offshore Wind insurance tender processes. However, in light of risk accumulations in certain Chinese regions, most international reinsurers have completely withdrawn their Offshore Wind capacity from China. As a result, Chinese insurers will have to use their retentions to cover Offshore Wind risks because of a lack of an appropriate reinsurance treaty in the international markets. As more and more offshore projects have entered their operational phase, they are finding that there is insufficient capacity within China to fully protect their assets. As a result, we fully expect rates for Offshore Wind projects to harden significantly in the near future. It should also be pointed out that the use of Marine Warranty Surveyors (MWS) is still not standard practice for Offshore Wind projects in China.

Because most of the current tariffs for Offshore Wind imposed by the government have been dramatically reduced or cut off at the end of 2021, operational costs are in urgent need of improvement. Due to COVID-19 and the inadequate production of wind turbines by the manufacturers, the price of wind turbines is increasing; furthermore, the shortage of offshore installation vessels has also added to the cost and might also serve to delay the completion of Offshore Wind projects in China.

Solar

From January to September 2021, 25.56 GW of PV newly installed capacity was achieved nationwide, including 9.15 GW of centralized PV power stations and 16.41 GW of distributed PV. By the end of September 2021, the cumulative installed capacity of solar power came to 278 GW. In terms of the layout of new installed capacity, the regions with the highest installed capacity are North China, East China and central China, accounting for 44%, 19% and 17% of the new installed capacity in China respectively.

Even though Solar is the most popular new energy source in China, the insurance industry regards it with suspicion as its loss ratio has remained high during 2021. Due to severe weather such as typhoons and the poor flood season in Southwest China and the south coast, some insurers have suffered substantial Solar losses, particularly with regard to floating solar plants. Deductible levels have not proved to be sufficient and are now being updated. But there is also good news - Ping An Insurance has reopened the window for the Solar market (although their required deductible levels are higher than the market benchmark) and furthermore other major insurers have begun to reduce their capacity or impose low indemnity limits for natural perils. Solar premium rates are also increasing compared to 2020.

Hydropower/pumped storage

From January to September 2021, the newly added hydropower grid connected capacity in China was 14.36 GW. By the end of September 2021, the installed hydropower capacity in China amounted to about 384 GW (including 32.49 million KW pumped storage). Four units of Baihetan Hydropower Station have been put into operation, as well as the first units of the Lianghekou Hydropower Station, which are added to the hydropower portfolio of Three Gorges Group.

For small hydropower stations, as the government has executed its “Green Hydropower” policy; one-third of the existing hydropower stations found to be below the required standard have had to be closed. And in

support of the goal of ensuring peak carbon and carbon neutralization, pumped storages have also increased significantly during 2021.

The attitude of the Chinese insurance market is polarized between large and small Hydropower plants; underwriters prefer to provide cover for medium and large Hydropower plants, which have better resistance to natural hazards. Similarly to the Solar market in certain areas, some small Hydropower plants in Southwest China have been seriously damaged by rainstorms, floods, debris flow and landslides during the past five years. Most Chinese insurers have stopped writing small hydropower stations in China, except some interests belong to large, state-owned power group such as Huaneng and State Grid. However, rates for larger Hydropower plants remain either stable or slightly increased.

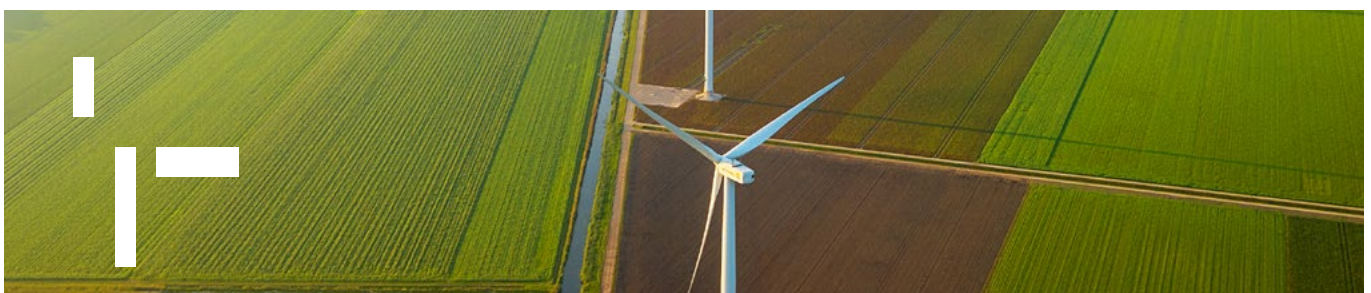
Conclusion: bouncing back from the bottom

The Chinese domestic insurance market is still relatively soft by international standards, but there now some signs of rates and deductibles bouncing back from the bottom. Some major Chinese domestic insurers with international ratings began to focus more on their profit during 2021 and will pay more attention to this during 2022. For international projects with Chinese interests, Chinese insurers are willing to provide support at better returns than in the domestic market. Different insurers have various definitions of what constitutes a Chinese interest, as well as various appetites in terms of writing overseas risks. For local projects, it seems that all local markets have come to some unconscious agreement to raise both rates and deductibles.



Motto LV is head of New Energy, Power and New Energy, Construction, Power and Infrastructure, Willis Towers Watson China.

motto.lv@willistowerswatson.com



North America

The North American Renewables market saw tightening of terms and conditions in 2021, in large part due to continued construction and operational losses. Deductibles and natural catastrophe limits drove the tightening of terms and conditions; overall price increases remained selective, with stronger corrections to portfolio outliers.

Traditional markets remain strong insurers to the space, while others continue to find their niche within the Renewables market. New markets are identifying Renewables as a growth engine for their portfolio; one major carrier expected to enter the middle and large commercial market for Renewables clients in 2022.

Capacity changes

Solar Photovoltaic risks continue to expand their footprint into hail prone areas of Texas, Oklahoma, and Colorado. Growth in these states is affecting pricing and capacity for convective storm coverage, including hail. Frequency of losses remain in focus, with clients, brokers and engineers all searching for adequate hail limits for affordable pricing. For Construction risks on Wind and Solar, capacity is reserved for clients selecting quality general contractors as this market shows signs of oversaturation, with new contractors competing for Renewables business.

Renewal trend forecasts

The last several years have seen a firm market specific to deductibles, limits and pricing. The market appears to have peaked during the 1st and 2nd quarter of 2021; with deductibles and limits adjusted, insurers feel better positioned to grow their portfolios. Insurers continues to show signs of stabilization and are expecting to grow by expanding their capacity. Rate changes are forecasted to remain stable: 2%-7% rises are likely to be the norm, with a greater emphasis on insurance to value. Exposure valuations will remain in focus during 2022, due to supply chain constraints, increased cost of raw materials and increased demand for renewable assets.

Conclusion: 2022 outlook

North American insurers continue to balance loss severity and growth. Corporations, governments and consumers alike are driving social change towards renewable energy; these forces emphasize the need for partner insurers committed to growing alongside their clients. Renewables capacity will continue to take market share, and a real focus on quality insurance programs will be a recipe for success for buyers, insurers and brokers alike.



Alex Forand is US Head of Power and Utility Broking, Willis Towers Watson.

alex.forand@willistowerswatson.com



Dubai and the wider Middle East markets

Only a handful of global insurers - but those that remain still competitive

Following the well-publicised retrenchment of underwriting authority back to London and other major underwriting hubs during the last two years (which we referenced in last year's Review) the regional presence of most of the major global Renewables insurers has continued to decline in this region. Indeed, there are now only a handful of global players with offices in this region compare to a few years ago, and only one or two who can offer meaningful lines for regionally based programmes.

However, those that can still play in this region continue to offer more competitive terms than their counterparts in London, Singapore and elsewhere; they therefore often still form the backbone of the most competitive local programmes. Indeed, due to the milder than expected reinsurance renewals seasons at January 1 2021, July 1 2021 and again at January 1 2022, these insurers can continue to differentiate themselves and in so doing contribute to the gradual easing of the hard market conditions that we have referenced elsewhere in this Review.

Upswing in indigenous capacity

In the meantime, we can now advise a definite upswing in indigenous market capacity. Buoyed by a moderation in the international reinsurance market climate, we have not only seen a noticeable increase in the amount of capacity offered by these markets, but we have also been able to welcome several new local players.

The combination of increased competition from those global insurers, together with the increased capacity offered by the indigenous market, therefore presents an excellent opportunity for projects located in this region to benefit from a shift in atmosphere in this market.

Increasing interest from traditional Power underwriters

But on top of these factors is a dawning realisation by existing "pure play" Power underwriters that they must expand their underwriting footprint to increasingly include Renewables in their overall Power portfolios. We are seeing more and more evidence of this trend, especially given the recent diversification of any traditional power companies into the renewables arena. So as this diversification continues to gather pace – as the move to improve ESG credentials suggests we can expect more interest from traditional Power underwriters in the Renewables space as we move further into 2022.

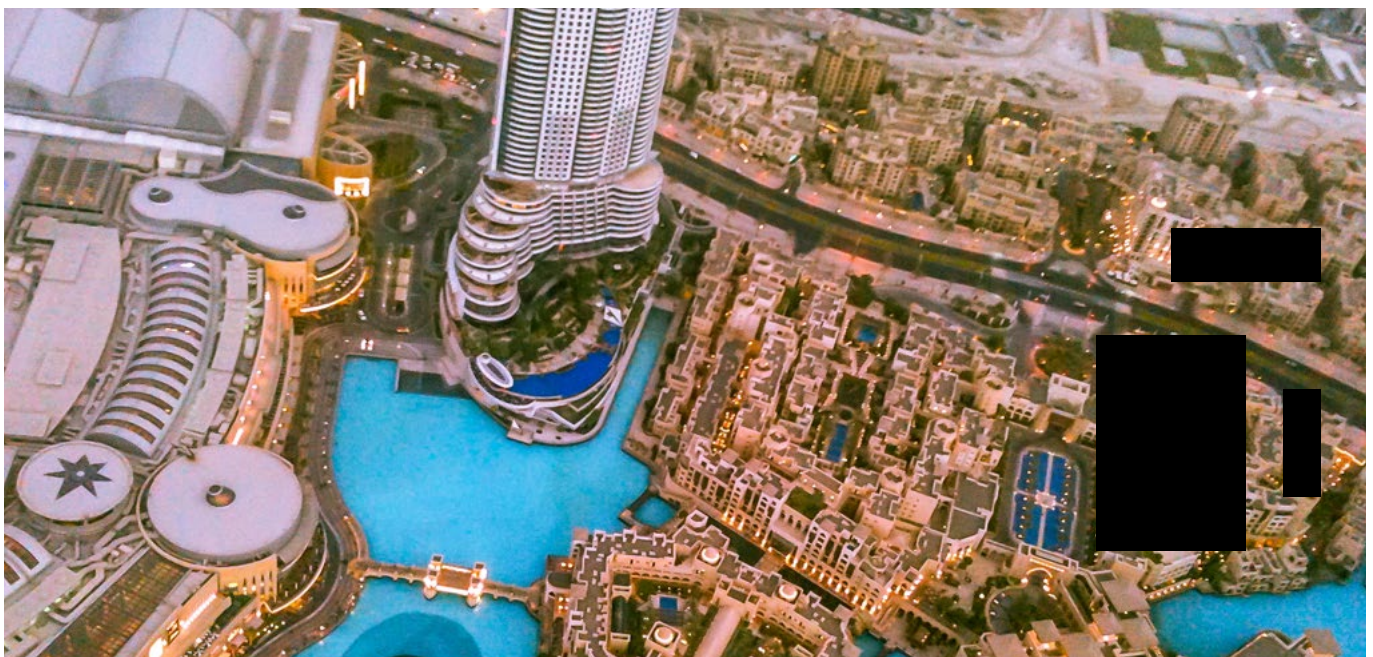
Conclusion: better times ahead for buyers?

In summary, all of these factors suggest a more dynamic and competitive local Renewables market for 2022, which regional buyers should waste no time in capitalising on.



Mark Hiles is Global Head of Power Broking, Willis Towers Watson.

Mark.Hiles@willistowerswatson.com



Latin America

Renewable industry developments

Onshore Wind and Solar continue to take the largest share in renewable investment in Latin America, and this tendency is expected to continue. Solar energy auctions have been and are still held in various countries throughout 2021; Chile, Brazil, Colombia and Ecuador stand out.

Hydrogen as an alternative renewable source of energy is starting to emerge also in Latin America, and we expect this to become more significant during 2022 and beyond.

Furthermore, energy storage is starting to be developed actively in the region (with a specific auction in Colombia in that respect), being a key component for further development of solar and wind driven generation energy projects.

Insurance capacity concentrated - but new markets are emerging

Insurance capacity for renewable risks in the Latin American Power markets continues to be concentrated within the major Power insurers. However, some new have recently entered, a short list of market entries and movements below:

- One major insurer has shut down its Latin America and Caribbean underwriting office in Miami
- Another has announced the creation of a new centre of excellence energy team in the UK, although their Power & Utilities (including Renewables) underwriters maintain a certain authority in the region
- A new start-up has commenced underwriting - a strategic partnership between a major global insurer and a US-based Renewables underwriter

Insurance markets continue to be extremely cautious in deploying their capacity - especially the construction of wind parks which deploy large wind turbines. In general, natural perils continue to be major concerns. The overall market trend of a tendency to decrease line sizes still remains.

Combined construction and first year operating policies

In general terms, for renewable project construction risks it is still possible to obtain coverage for a combined program construction/1st year of operation policy period, although insurers are imposing restrictions. This feature remains highly significant for any renewable programme with phased handovers, and as such this factor is very important to consider in any such placement.

Current rating increases more modest than last year

Renewals for what are perceived to be excellent risks are still expected to incur rating increases, albeit at a lower level than last year - indeed, in some cases reductions can be obtained. However, portfolios with significant losses or technical complications are still expected to attract double-digit rate increases.

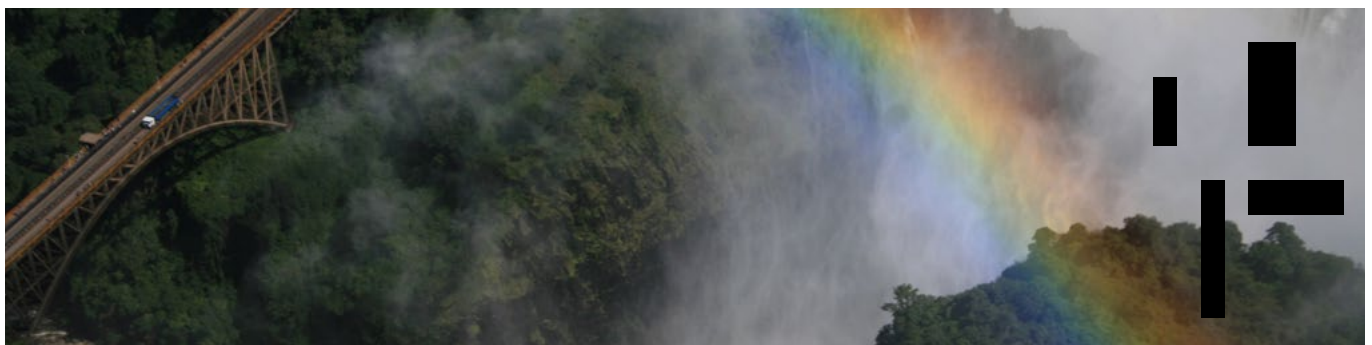
Brazilian deregulation

In terms of quality of policy wordings, it is important to mention the ongoing market deregulation in Brazil, which will allow the offering of tailor-made wordings in a more flexible way, even though it is expected that its implementation could take some time to come into effect. This should pave the way for more seamless solutions for clients and facilitate agreements with their financing parties on the implementation of lenders' insurance requirements. It should also create cost savings where lines of cover (which have to be separated because of product segmentation in the current regulation) could become part of one programme, along with what is commercially available within the insurance market.



Marc Vermeiren is Power & Utilities Leader, Latin America, Willis Towers Watson.

Marc.Vermeiren@WillisTowersWatson.com





Singapore

General outlook

Moving into 2021, the Renewables insurance market in Singapore has seen some increase in available capacity with more insurers offering renewables as a new line of business. Underwriters see the Renewables portfolio as the next growth area and are focusing more on wind and solar technologies as a starting point.

Lloyd's Asia has started the Renewables consortium, supported by several major Syndicates. Another major insurer has also set up a dedicated Renewables desk in Singapore. Existing players are also looking to expand their Renewables portfolio. Medium to larger size operations can be fully supported by the current insurers based in Singapore.

Greater willingness of markets to take on leadership positions

By the end of 2021, we were seeing a greater willingness from some insurers to take on leadership positions. Whilst the available pool of leaders is still limited, buyers now have a choice in that they can pick different leaders for different technologies. For existing business with a good loss history and preferred target clients, there is strong appetite for increased lines as insurers grow more comfortable with their Renewables experience.

Renewal trends

Recent renewals are still subject to stringent underwriting, but there has been some cooling down on rate rises, with a general loading of around 15% to 20% compared to 2020. There is a push by insurers to maintain deductibles that are aligned with the various risk profiles. Underwriters want to keep the expiring coverage unchanged or even to impose restrictions for programmes with losses. Small solar plants continue to be a challenge, due to the market's minimum premium requirements. Moreover, the existing increases in premium still fall short of what insurers perceive to be technical rates.

Key underwriting considerations

Good technical information is still key to attracting capacity and attractive terms from the market. As underwriters become more familiar with the Renewables portfolio performance, there is a greater emphasis on technology manufacture, equipment warranty status, proven technology, O&M scope and weather/natural catastrophe exposures.

To overcome the small premium factor and capture a sizeable premium pool, underwriters are open to offer package deals for operators with multiple locations. As a combined portfolio, it helps to entice underwriters to take an interest in the risks and for the operators to avoid minimum premium stipulations on each location if placed on stand-alone basis. Unfortunately for small operators that only have a single site, they face higher insurance costs due to continued lack of market interest.

Conclusion: the outlook in 2022

Singapore-based insurers continue to focus on the bottom-line and push for rate rises to improve profitability. With the increase in renewable energy activities in the region, we see this as huge opportunity for the entry of newcomers to the market; the increased capacity generated would naturally inject fresh competition in the marketplace.



Siew Hui Lim is Director, Willis Towers Watson Singapore
SiewHui.Lim@willistowerswatson.com



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Editor: Robin Somerville

Robin.somerville@willistowerswatson.com

Sub-Editor: Steve Munday

Steven.munday@willistowerswatson.com

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Beijing

18th Floor, West Tower, Twin Towers,
B-12 Jian Guo Men Wai Avenue
East Chang'an Street
Chaoyang District
Beijing 100022
China
Tel: +86 10 5657 2288

Buenos Aires

San Martin 344
Floor 25
Ciudad Autonoma de Buenos
Aires C1004AAH Argentina
Tel: +54 11 5218 2100

Calgary

308-4th Avenue SW
Jamieson Place
Suite 2900
Calgary, Alberta T2P 0H7
Canada
Tel: +1 403 261 1400

Chicago

233 S. Wacker Drive
Willis Tower
Suite 1800
Chicago, Illinois 60606
United States
Tel: +1 312 288 7700

Dubai

Business Central Tower
Tower A Floor 37
Dubai Media City
PO Box 500082
Dubai
United Arab Emirates
Tel: +971 4 455 1700

Dublin

Elm Park
Merrion Road
Dublin 4, D04 P231
Ireland
Tel: +353 1 661 6211

Houston

811 Louisiana Street
Suite 2200
Houston, Texas 77002
United States
Tel: +1 713 754 5400

Johannesburg

Illovo Edge
1 Harries Road, Illovo
Johannesburg 2196
South Africa
Tel: +27 11 535 5400

Lima

Avenida De La Floresta 497
San Borja 602, 603, 604
Lima
Peru
Tel: +51 1 700 0202

London

51 Lime Street
London, EC3M 7DQ
United Kingdom
Tel: +44 (0)20 3124 6000

Madrid

Paseo de la Castellana 36-38
6ª Planta
28036 Madrid
Spain
Tel: +34 914 23 34 00

Miami

1450 Brickell Avenue
Suite 1600 Floor 16
Miami, Florida 33131
United States
Tel: +1 305 854 1330

Moscow

11 Gogolevsky Boulevard
Floor 8
Moscow 119019
Tel: +7 495 956 3435

New York

200 Liberty Street
Floor 3, 6, 7
New York, New York 10281
United States
Tel: +1 212 915 8888

Oslo

Drammensveien 147 A
0277 Oslo
Norway
Tel: +47 23 29 60 00

Paris

Immeuble Quai 33
33 - 34 Quai de Dion Bouton
grande Hauteur
Floor 1
92800 Puteaux
France
Tel: +33 01 41 43 50 00

Rio de Janeiro

Edifício Palácio Austregésilo de Athayde
Av. Presidente Wilson, 231
Room 501
Rio de Janeiro 20030-021
Brazil
Tel: +55 21 2122 6700

Santiago

Avenida Andrés Bello 2457
23rd Floor
Torre Costanera Center
7510689, Providencia, Santiago
Chile
Tel: +56 2 2386 4000

Singapore

1 Raffles Quay South Tower
Floor #28-10
Singapore City 048583
Singapore
Tel: +65 6 591 8000

Sydney

Level 16
123 Pitt Street
Sydney, New South Wales 2000
Australia
Tel: +61 29 285 4000

Tokyo

Hibiya Park Front 13F
2-1-6 Uchisaiwai-cho
Chiyoda-ku, Tokyo 100-0011
Japan
Tel: +81 3 6833 4600

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