Howden Re

Watt now?

Reinsuring the renewable energy transition

HOWDEN

30 years of Howden

Key takeaways

1. **Climate change** and uncertain macroeconomic and geopolitical conditions have accelerated the global transition to renewable energy, presenting a significant opportunity for (re)insurers.
2. **(Re)insurance** is essential to the transition, but requires transparency and collaboration between cedents, reinsurers, and brokers, in addition to external producers and manufacturers. This ensures risks are appropriately placed and managed, providing the best outcome for all parties involved.
3. **Reinsurers** should refine their view of risk to align with the specific risks associated with each renewable asset, while **cedents** should thoroughly articulate their exposure.
4. **Howden Re** is uniquely positioned to assist (re)insurers by providing expert knowledge of renewable energy risk, intricacies of cedent portfolios, and best-in-class data to generate better reinsurance outcomes.
5. **The Reinsurance market** would provide greater value to cedents by developing more sophisticated risk transfer products that effectively address the unique risk associated with renewable energy projects. Howden Re offers bespoke products, tailored to each cedent's individual needs, to address specific portfolio vulnerabilities.

Section 1:
Powering a cleaner future

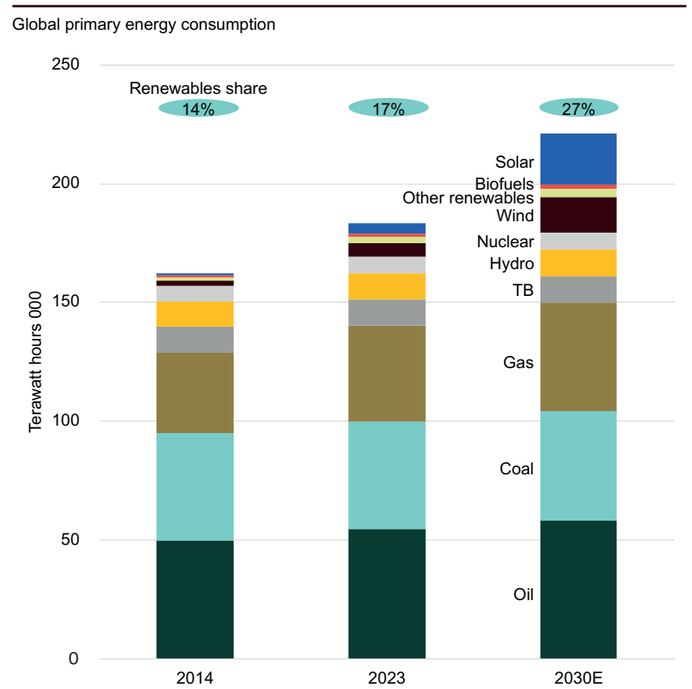
The global shift to renewable energy is in full swing, driven predominantly by the urgency of climate change alongside a backdrop of wars (which has exposed energy security risks), technology innovation and falling prices.

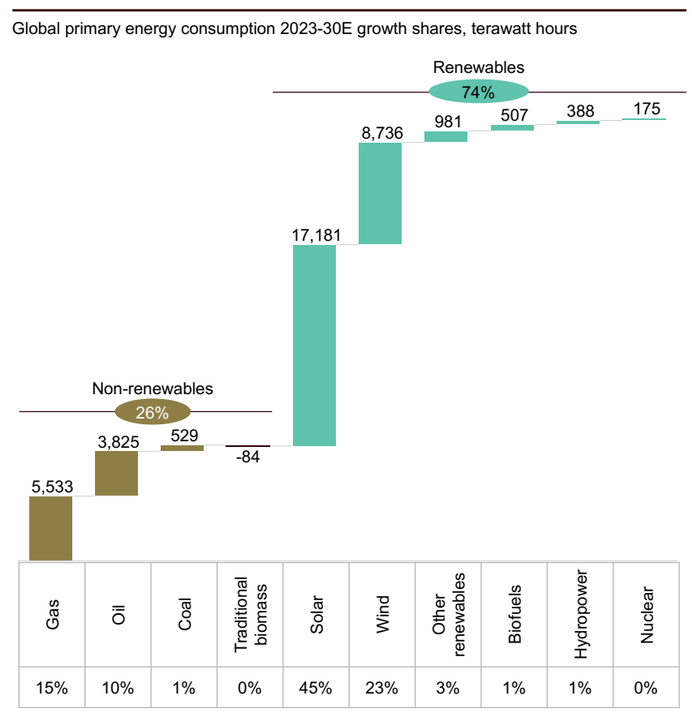
Governments worldwide are incentivising private sector investment in renewable energy projects, recognising the need to reduce dependence on fossil fuels. Recent geopolitical and macro-economic shocks highlight the risks associated with relying on fossil-fired power sources and underscore the need for enhanced energy security. At the same time, technological advancements are lowering the costs of renewable energy, making it an increasingly viable and attractive alternative to fossil-fired generation.

Commodity market turbulence, stemming from Europe's dependency on Russian gas and global import restrictions on other Russian fossil-fuel products, precipitated a scramble for alternative fossil-fuel sources, namely liquified natural gas from the US and Qatar. It significantly increased capital flows and investments toward renewables, structurally transforming the energy system. European countries, in particular, are attempting to insulate their power markets from fossil-fuel price volatility over the long term.

Figure 1: Global Primary Energy Consumption (terawatt hours)

Source: Howden Re, Energy Institute

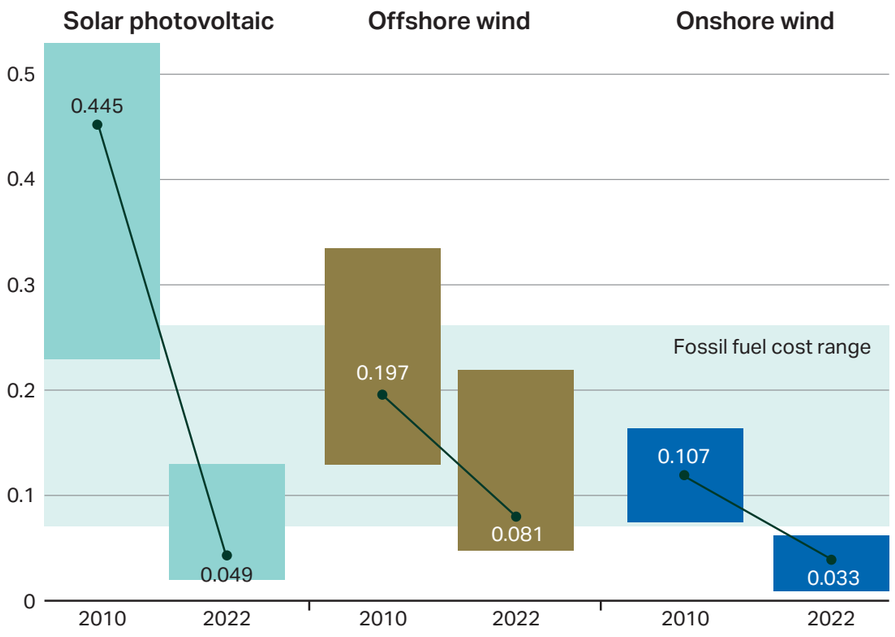




This rapid build out of new renewable energy assets (Figure 1) has dramatically changed the way capital is allocated in the energy sector, not just in Europe but globally, as other initiatives, such as the US Inflation Reduction Act redirects investment spending to cleaner technologies. Today, for every US$ 1 spent on fossil fuels, US$ 1.70 is now spent on clean energy; five years ago, the ratio was 1:1.[1]

The favourable economics of renewable energy are further accelerating the transition, as renewable sources have become cheaper than fossil fuels. Figure 2 shows how technology advancement in solar panel manufacturing have reduced solar energy costs to approximately 0.049 US$/kWh, compared to 0.080 to 0.250 US$/kWh for fossil fuels.[2]

Figure 2: Renewable energy technology costs
Source: Renewable power generation costs (2022 US$/KwH) in 2022 (irena.org)



[1] IEA (2023). World Energy Investment
[2] Renewable power generation costs in 2022 (irena.org)
[3] Swiss Re Report, Insuring Tomorrow's Energy Supply Today, 2023

Although some energy transition technologies are not strictly classified as renewable energy, they are essential to achieving overall net-zero targets. Despite the advantages of renewable resources, energy generation can be intermittent and unpredictable depending on prevailing weather conditions.[3] To address this issue, investment in battery energy storage systems (BESS), demand-response initiatives and cross-border electricity interconnectors are crucial for effectively managing the natural fluctuations in resource availability. This will allow for greater flexibility in a renewable focused grid, replacing the role currently played by gas-fired power to provide a broad range of services that support and facilitate a successfully run power grid.

Renewable energy presents a significant growth opportunity for (re)insurance that is not only economically advantageous but also essential for the future of the global economy. The rapid advancements in technology and decreasing costs of renewable energy technologies make it a viable alternative to fossil-fuels, with the potential to create millions of jobs and stimulate economic growth.

The urgency to act now cannot be overstated. (Re)insurance has a crucial role to play in this process. Stakeholders across the production value chain – from project financing, construction and maintenance to technology development, grid infrastructure and storage – are navigating a complex risk landscape that reinforces the value of risk management and risk transfer.

Section 2:
Underwriting the transition

The global renewable energy (re)insurance market is recording strong growth as it works with developers and operators to navigate the challenges and opportunities across solar-PV, offshore wind, onshore wind and BESS.

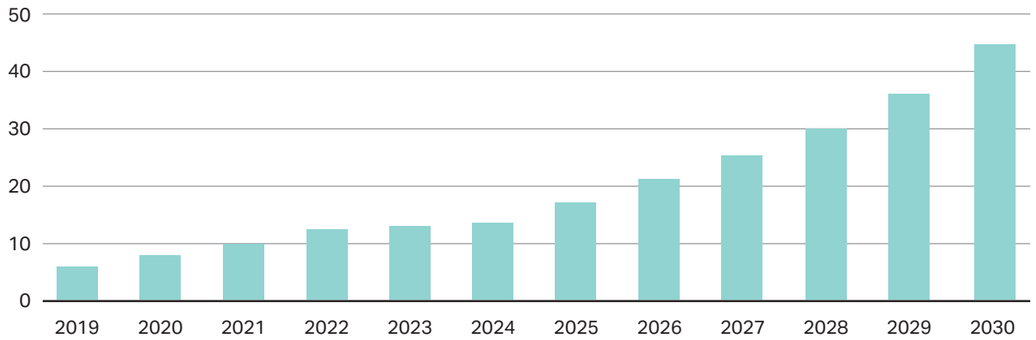
While renewable energy risks are distinct from marine, energy and power risks, there are some common exposure themes with these more traditional classes of business. Marine risks involve project cargo during the construction phase, with offshore wind considered a ‘wet’ risk that requires specialist vessels for installation and maintenance.

Energy risks include the use of natural resources, a factor that renewable energy projects also depend on. Power risks involve generating power from natural resources, which is a central aspect of renewable energy projects.

What is the renewable energy opportunity?

Growth in the renewables market and its impact on premiums is reminiscent of trends seen in the other expanding lines of business including cyber. Cyber premium growth of 24 per cent over the last decade compares to the single-digit percentage range of the broader P&C commercial sector.

Figure 3: Global cyber gross written premium projections to 2030
Source: Howden Re, Nova



The growth potential for renewable energy (re)insurance is similarly vast. Swiss Re estimates that if every national renewable energy target is achieved, the sector could generate approximately **US$ 237 billion** of cumulative premiums between 2022 and 2035.

The way cedents purchase renewable energy insurance depends largely on the type of renewable energy asset. There are numerous renewable energy classes, each requiring its own view of risk. The scope of this report focuses on four technologies: solar-PV, offshore wind, onshore wind and BESS.

Solar

Solar has typically been purchased to the full total insured value (TIV) limit, although insureds have recently been constrained by reduced nat-cat sub-limits as the frequency and severity of nat-cat claims have increased.

Onshore wind

For onshore wind, insureds often buy to full value on a single asset, while some may purchase a physical damage limit to reflect the substation and an additional business interruption limit if required.

Offshore wind

Offshore wind insurance is now typically based on the largest estimated maximum loss (EML) scenario. Typically, this limit would fall between 10 per cent and 30 per cent of the TIV.

BESS

Finally, BESS is purchased to the full TIV limit. BESS is increasingly being integrated with other renewable energy technologies, such as onshore wind and solar-PV.

Reinsurance trends

Quota share has been the preferred product for cedents operating in the renewable energy market due to the horizontal risk profile and its potential long-tailed nature. Achieving competitive ceding commissions, or overriders, has nevertheless become increasingly difficult in the current market, forcing cedents to either purchase specific excess of loss (XoL) protection and/or embed it in their marine, energy, power, property XoL programmes, depending on purchasing efficiencies.

Despite sufficient supply in the XoL market, cedents often feel unable to optimise product value. Given the nature of the class, likely loss scenarios typically fall below retentions, and reinstatement costs are potentially higher than a standalone placement.

Navigating the risk

The following analysis explores some of the key risk factors associated with renewable energy. While the technologies are integral to global sustainability efforts, they face distinctive challenges that must be addressed by the market.

1 / Design and technology
2 / Natural perils
3 / Risk profile
4 / Construction
5 / Serial loss

1. Design and technology

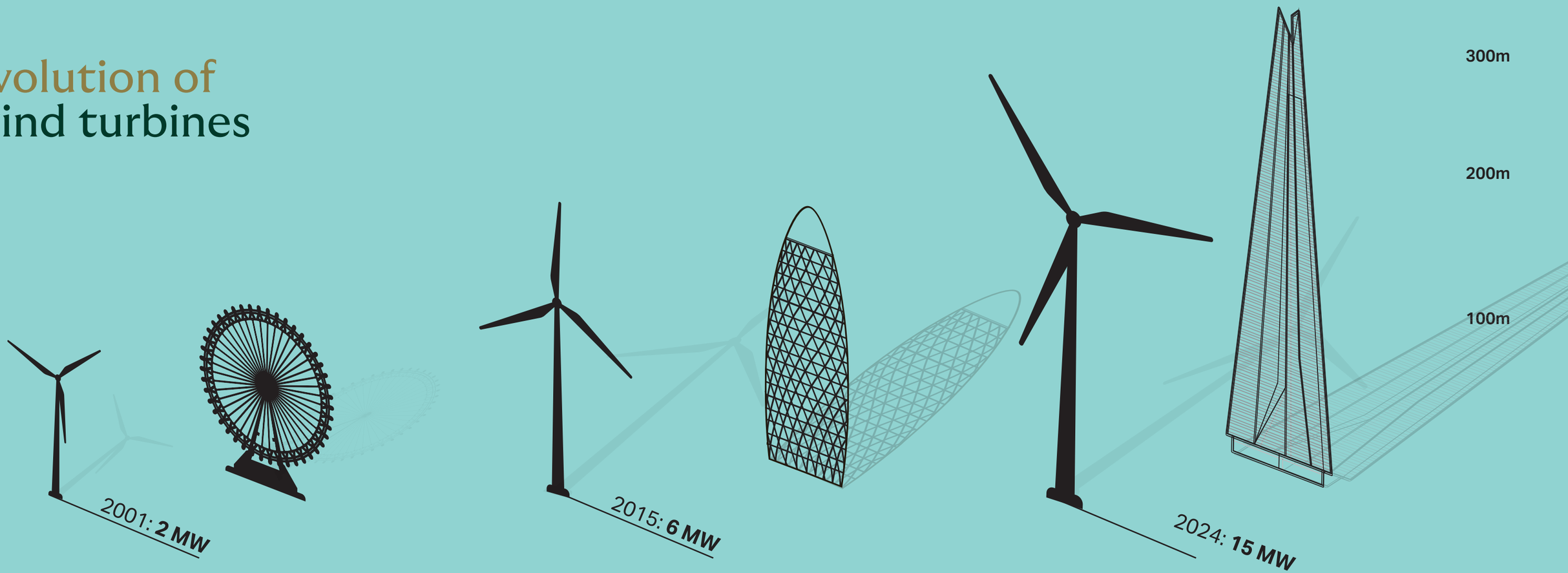
The accelerated evolution of renewable energy technologies is driving innovation in related products, such as BESS. The BESS sector has attracted substantial investment, with US$ 54 billion projected for 2024, to keep pace with the growing deployment of renewable energy assets.[4] In response to several notable (re)insurance losses linked to thermal runaway incidents—a chain reaction where rising battery cell temperatures can lead to fires—developers have increasingly adopted containerised or siloed battery configurations. This approach minimises the risk of an isolated battery cell issue escalating across multiple units. For projects that do not utilise containerisation, insurers offer support prudently, offering limited coverage with stringent terms and conditions.

The industry is now entering a new era characterised by the standardisation of technological advancements. This shift is stabilising the design of renewable energy projects, allowing stakeholders to focus more on profitability and sustainability. It also demonstrates the industry's agile response to emerging loss patterns by refining products to mitigate future risks, ensuring continued innovation and resilience in the renewable energy sector.

The rapid advancement in renewable energy technology has been particularly evident in the development of more powerful and efficient wind turbines. In recent years, turbine capacities have significantly increased as manufacturers race to develop ever larger mega-watt (MW) turbines. Surging turbine sizes and power output have dramatically improved the efficiency and scalability of wind energy projects, enabling them to generate more electricity with fewer installations. European turbine manufacturers with the largest market share, namely Vestas, GE and Siemens Gamesa, all produce turbines with a maximum capacity of over 13MW, while certain Chinese manufacturers, such as MingYang, now have prototypes capable of generating up to 18MW.

[4] IEA. (2024. June). Investment in clean energy this year is set to be twice the amount going to fossil fuels.

Evolution of wind turbines



Developers frequently order turbine prototypes from manufacturers before these models receive certification from third-party organisations. This practice introduces potential risk, as insurers are then expected to provide coverage for projects with unproven technologies and no established performance record. While insurers are protected by the original equipment manufacturer warranties up to five years following a project's completion, this does not fully eliminate the risks associated with uncertified prototypes if business interruption and defect coverage are provided. Although insurers enforce stringent terms and conditions to mitigate their liability, the sustainability and success of such projects depend heavily on the reliability and expertise of the turbine manufacturer.

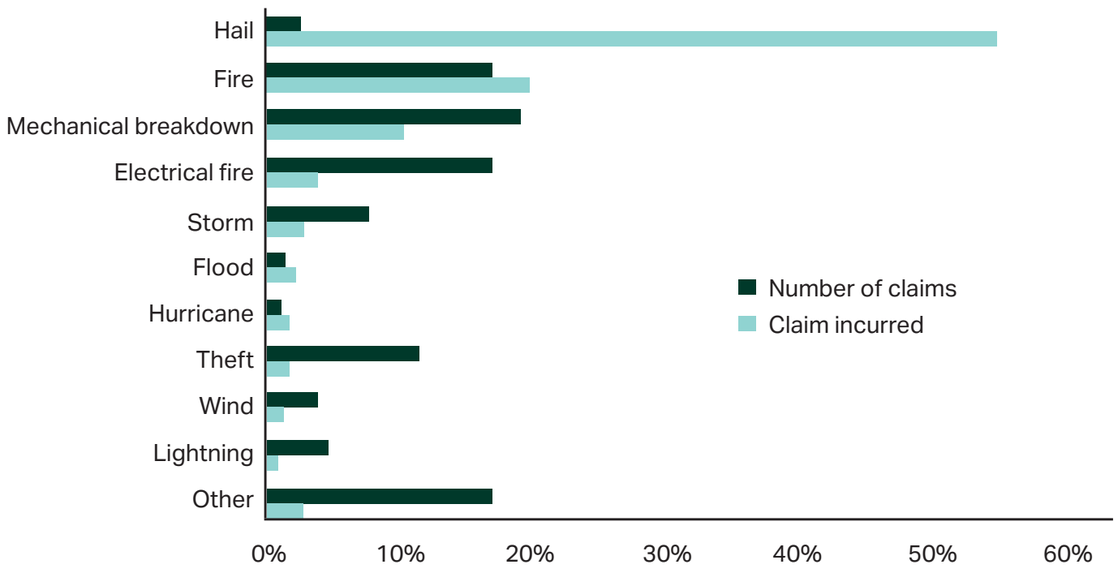
Greater transparency between cedents and reinsurers, particularly with wind turbine technology and emerging technologies such as BESS, would significantly enhance the development of bespoke reinsurance solutions. By sharing detailed data on performance, failures and operational challenges, industry stakeholders can provide (re)insurers with the insights needed to better assess and price risks. This increased openness would foster more accurate risk modelling, ultimately leading to more effective and sustainable (re)insurance coverage.

2. Natural perils

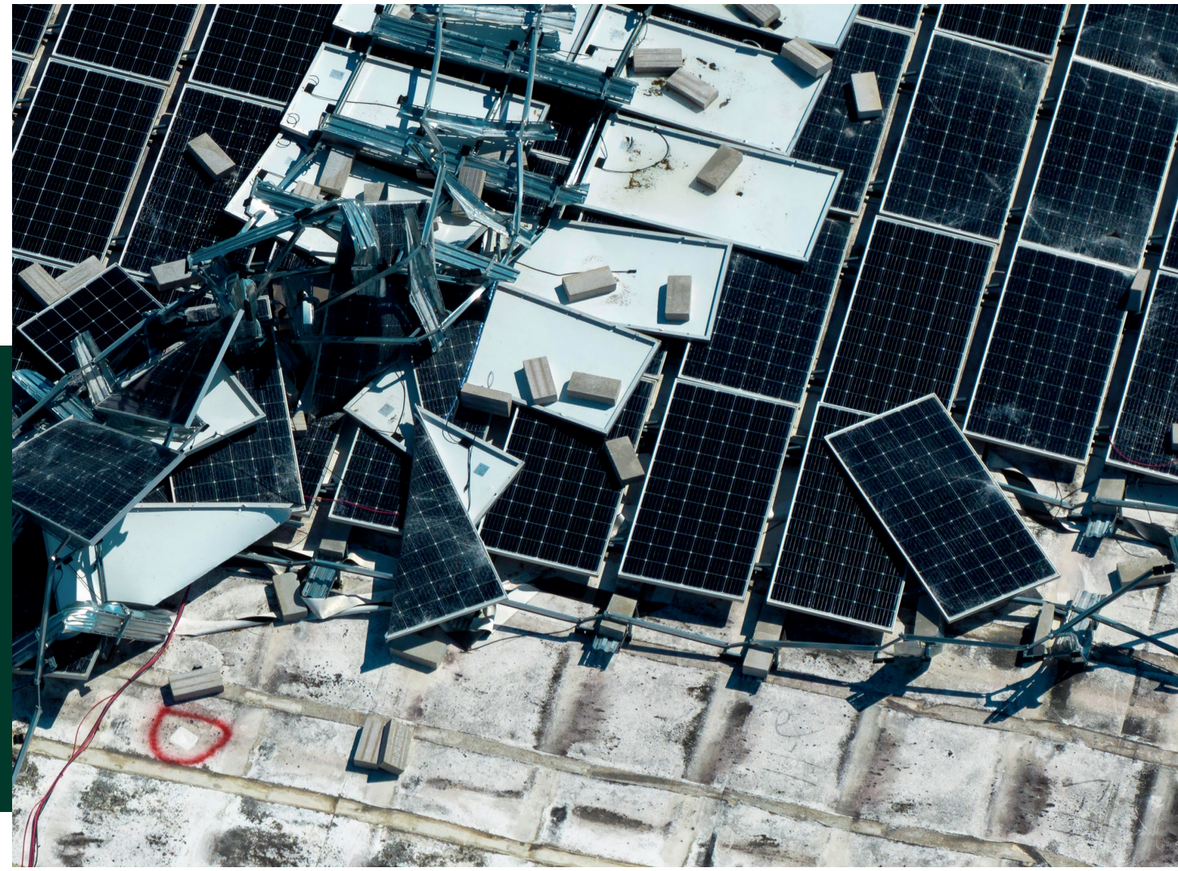
Natural catastrophes are increasingly impacting renewable energy assets. One peril that has come into focus is severe convective storms (SCS). Based on Howden data from 2013 to 2023, SCS now accounts for 36 per cent of global insured natural catastrophe losses. SCS is not unique to the renewable energy sector, with a notable uptick in SCS claims registered across the (re)insurance market in recent years.

Effective risk management is essential for ensuring project sustainability and longterm viability. While rising claims highlight the importance of robust strategies, it is important to view the data in context. Over the past five years, GCube reported that hail claims on solar farms averaged approximately US$ 58.4 million per claim and accounted for 54 per cent of total incurred costs from historical loss claims.

Figure 4: Solar losses 2018 - 2023



Source: GCube Hail No! Defending solar from nature's cold assault. Q4 2023 Report. Note: based on GCube's book.



Although this underscores the potential impact of SCS, Howden Re's analysis reveals that hail frequency on solar farms in the US remains relatively low. Remarkably, 99 per cent of farms by capacity (approximately 3,500 solar farms) were not affected by hail between 2000 and 2022, with only 105 farms impacted.

As with offshore wind farms, solar farm developers have a responsibility to implement the most advanced technology available. By incorporating innovations like tracker modules and thicker glass, developers can significantly reduce the risk of SCS losses, while also lowering repair costs and increasing profitability.

The insurance industry expects project owners to demonstrate that their solar installations are resilient against hail and other natural perils to secure competitively priced coverage. Until resilience is improved, the market will continue to restrict limits to ensure exposures remain manageable.

The development of increasingly robust and innovative nat-cat solutions in the reinsurance market would help cedents effectively navigate potential market fluctuations. By offering coverage that specifically addresses the exposure to natural perils, reinsurers can help mitigate the financial impact of such events and ensure renewable energy projects are more resilient.

3. Risk profile

The risk profile of an offshore wind project geographically presents more horizontal exposure than vertical.

This is evident when comparing the exposure of a North Sea oil and gas platform to that of a North Sea offshore wind farm. Offshore oil and gas installations (or platforms and complexes) have a high concentration of exposure in a very small area, compared to an offshore wind farm that has exposure spread across a large spatial area. The offshore substation represents the point of concentrated exposure in the event business interruption coverage is purchased. However, it is important to note that the associated exposure is lower compared to those of a platform or complex.

The peak EML for an offshore wind farm would usually be a total loss to an offshore substation, resulting in a loss of revenue, and triggering business interruption coverage or a ship colliding with six wind turbines causing a total loss. However, this amount of indemnity would only be a fraction of the overall TIV of the wind farm, whereas an event on an upstream energy installation risks a total indemnity equivalent to the full TIV.

This is reflected in the historical loss profile of each asset: the largest paid claim on an offshore wind farm is c.a. US$ 100 million versus the upstream energy Piper Alpha loss of c.a. US$ 2.4 billion (inflation adjusted); or an onshore solar paid loss of c.a. US$ 80 million versus the US$ 1.8 billion downstream energy Philips refinery loss (inflation adjusted).

The loss profile of renewable energy is still evolving, particularly as project sizes continue to increase each year. Despite this growth, reinsurers should recognise that the loss quantum in renewable energy remains smaller compared to traditional energy and power losses. This emerging trend underscores the importance of adapting risk models to reflect the unique characteristics of renewable energy projects, ensuring that loss expectations are aligned with the sector's specific dynamics.

The reinsurance market should prioritise a granular understanding of the specific risks to each renewable technology to align their view of risk with the distinct exposure and experience profile, which differs significantly from traditional energy and power assets.

For a large oil platform, exposure is spread across <1km^2, compared to a large offshore wind farm, such as the 1.2GW Dogger Bank A, exposure spreads horizontally across 515 km^2.[5]

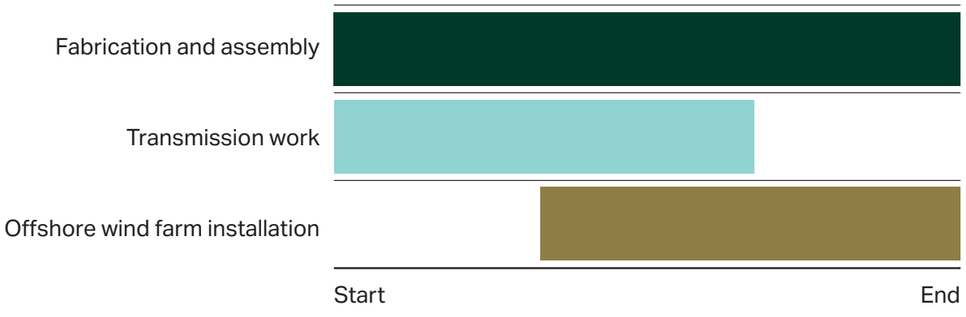
[5] Dogger Bank Wind Farm
https://doggerbank.com/about/

4. Construction

As larger and more complex onshore and offshore renewable energy projects come to market, policy periods have been extended.

Initially, these projects have limited exposure, with the risk only becoming significant when major components are installed. The installation schedule for renewable energy construction is non-linear, often leading to a rapid increase in exposure towards the later stages of the policy period. Figure 5 is an example of a Gantt schedule for an offshore wind farm construction project.

Figure 5: An example of an offshore wind farm construction programme across the policy period



Given the inherent complexity in fabricating and installing a renewable energy project on time and on budget, claims are considered more likely during the construction phase than during the operational phase. Concentrated exposure towards the end of the construction phase highlights a vital component of the underwriting process. Namely, (re)insurers must account for the staggered and evolving nature of the underlying exposure when assessing construction risks.

Cedents should clearly articulate the exposure within their portfolios to ensure that reinsurers can accurately assess the associated risks. A more detailed and transparent analysis would greatly assist reinsurers, as it would enable them to better align their underwriting strategies with the unique risk profile of these projects. This collaborative approach would not only enhance risk management but also ensure that cedents and reinsurers are better equipped to address the complexities of renewable energy construction risk.

5. Serial loss

Renewable energy projects are typically comprised of many replicated assets, introducing the potential for systemic risk. When a design or construction flaw affects one asset, similar issues may arise in other assets within the same project. Effectively managing this risk requires a deep understanding of the root cause of any serial loss to determine the appropriate policy response.

To mitigate such risks, insurance policies often incorporate a serial loss clause to address potential exposure from multiple claims arising from the same or similar source(s). For instance, clauses like LMA 5587 provide a sliding scale of indemnity, where the insurer's liability for each subsequent loss decreases, and a separate deductible applies to each claim. These clauses typically cover both physical damage and business interruption, with the latter subject to a separate waiting period for each loss. Crucially, coverage for serial losses under such clauses is contingent upon the insured taking reasonable precautions and exercising due diligence after discovering the first loss.

Given the increasing complexity and frequency of serial loss events in renewable energy projects, it is imperative for the reinsurance market to proactively support cedents. By offering tailored reinsurance solutions, the industry can better protect against the financial impact of serial loss claims, ensuring the sustainability and resilience of renewable energy investments.

Reinsurance has a long-standing history of delivering innovative and bespoke solutions to cedents, leveraging extensive knowledge and expertise to address common risks. Today, there is a significant opportunity for reinsurers to play a pivotal role in the global transition to renewable energy. By aligning their view of risk with that of cedents, and actively engaging with cedents to understand the specific issues and challenges in this sector, reinsurers can become key enablers of renewable growth and resilience.

Section 3:
How can Howden Re support you

At Howden Re, we are marine, energy and renewable energy experts, and we understand the market's unique risks.

We recognise that portfolios are typically whole account placements, particularly focused on those of critical mass. Yet, as portfolios grow and reinsurers adjust prices, we are equipped to tailor products to meet evolving needs. Our expertise allows us to navigate the risks and aggregation challenges inherent in renewable energy and we understand that it is necessary to evaluate the underlying risk and exposure to realise the cedent's best outcome. Howden Re can specifically address the following areas of concern.

View of risk

Howden Re is uniquely positioned to refine cedents' risk tolerance and foster engagement with reinsurers through expert advisory services. In particular, the team leverages its extensive renewable energy experience to present the intricacies of a cedent's view of risk to reinsurers in a succinct yet holistic manner. This is beneficial to both parties as it helps reinsurers accurately calibrate risk models and allows cedents to secure optimal placements tailored to the specific dynamics of the renewable energy sector.

Howden Re's proprietary REcon exposure management tool

Construction risk is a key element in insuring renewable energy assets. Construction project periods have long durations and fragmented exposure. It is crucial for cedents to provide exposure data that is cognisant of risk timelines to avoid overstating exposure. Howden Re's REcon tool provides analysis that allows cedents to better understand how their construction exposure over time, and provides greater insights for both quota share and excess of loss reinsurance solutions.

Bespoke reinsurance solutions

Reinsurance products should be designed to provide the most effective risk transfer, ensuring that cedents are insulated from potential losses. Howden Re offers a range of tailored solutions that can optimise a cedent's reinsurance programme. Our ability to think laterally allows us to explore creative approaches and deliver best-in-class coverages that go beyond traditional products. By leveraging our expertise and innovative thinking, we help cedents select and structure reinsurance solutions that best align with their specific risk profile, maximising coverage efficiency and financial resilience.

Partnership

Howden Re enables carriers to access renewable energy business through strategically formed Consortia and Managing General Agencies. These partnerships allow carriers to tap into diverse and profitable opportunities while collaborating with specialist underwriting teams. This ensures that complex risks within the renewable energy sector are efficiently placed and appropriately managed.

Howden Group

Howden Re not only prioritises collaboration with cedents and external partners, but also values internal collaboration within the Howden Group. To provide the best possible service, the Howden Re team works closely with Howden Specialty and Climate, Risk & Resilience to leverage the speciality of each team, providing a unified, multi-faceted offering.

Howden Specialty is recognised as a leading renewable energy insurance broker with over 100GW of BESS, hydro, onshore wind, offshore wind and solar-PV energy under management.

Climate, Risk & Resilience is a team of 70+ global climate and nature specialists that aims to reimagine the potential of insurance to meet the challenges and opportunities of the climate transition. The CRR team works with Howden Re cedents to horizon scan, both protecting the bottom line while identifying new opportunities and products.

This integrated approach allows us to deliver comprehensive solutions tailored to meet the unique needs of each cedent.

Meet the Experts

Howden Re

Simon Brooks
Managing Director
E: simon.brooks@howdenre.com
M: +44 (0) 7562 943518

James Metcalf
Associate Director
E: james.metcalf1@howdenre.com
M: +44 (0) 7562 943521

Richard Miller
Managing Director
E: rich.miller@howdenre.com
M: +44 (0) 7562 943118

Dr Mike Grout
Managing Director
E: michael.grout@howdenre.com
M: +44 (0) 7821 646726

Sally Robertson
Director
E: sally.robertson@howdenre.com
M: +44 (0) 7729 090301

Nena Atkinson
Research Associate
E: nena.atkinson@howdenre.com
M: +44 (0) 7596 874286

Howden Group

Deborah Duss
Global Head of Renewable Energy
E: deborah.duss@howdenspecialty.com
M: +44 (0) 7701 312000

Julian Alovisi
Head of Research
E: julian.alovisi@howdengroup.com
M: +44 (0) 7593 576024

Jonas Dalsgaard
Executive Director, Natural Resources
E: jonas.dalsgaard@howdenspecialty.com
M: +45 (0) 51158770

Peter Evans
Research Director
E: peter.evans@howdengroup.com
M: +44 (0)7443 377340

Charlie Lawson
Divisional Director, Climate, Risk & Resilience
E: charlotte.lawson@howdengroup.com
M: +44 (0) 7596 872870

Howden Re
One Creechurch Place, London EC3A 5AF

T: +44 (0) 20 7398 4888
E: howdenrerinfo@howdenre.com

www.howdenre.com