Swiss Re

Market perspectives: exploring the state of play in the energy transition

Introduction

The global energy transition continues to accelerate, drawing sustained investment into green infrastructure and technologies. As scaling accelerates beyond 2030, **this momentum presents an opportunity but also a complex challenge for the re/insurance industry.** The traditional Oil and Gas industry is simultaneously undergoing structural changes and shifts in portfolio compositions.

Amid this rapid change, **the insurance industry can't just follow the expansion,** instead, it must enable sustainable growth. Not only providing capital but also underwriting insights built on technical insight, risk knowledge and a clear understanding of risk exposure, loss experience and accumulation potential.

From construction to operation, each project has its own risks. **Many renewable energy technologies remain unproven at scale,** and markets are still experimenting with a wide variety of solutions. Risks such as natural catastrophe exposure and serial losses for example must be factored in from the outset.

Geopolitical changes and supply chains also shape this market – from project approval and financing, to the production and cost of components. Despite the uncertainty this can create, **projections still show a growing market for renewable energy as part of the energy transition.**

In this report, we aim to provide a view of the current and future renewable energy market, including the re/insurance challenges and opportunities shaping it.

Swiss Re's Energy Centre of Competence is built to support our clients and partners through this risk landscape. Our experts combine deep technical knowledge with a strong understanding of market dynamics to support clients at every stage from risk knowledge, to risk transfer and technology solutions.

If you're navigating the risks and opportunities of the energy transition, we're here to help. **Get in touch to find out how we can support your business** with smart capacity, and long-term partnership.

Miguel Senac and Michele Cibrario,
Co-heads Energy Centre of Competence

24 %

Wind is expected to contribute USD 9 billion in 2030 (33% of total premiums). 24% is driven by onshore projects.
(Source: Swiss Re Institute)

26 bn USD

Swiss Re Institute estimates that renewable energy could generate premiums of up to USD 26 billion in underwriting year 2030.
(Source: Swiss Re Institute)

55 %

Share of solar in total renewable installations will rise to 55% (2030) from the current 42% (2024).
(Source: Swiss Re Institute)

8.5 TW

We project renewable energy capacity to rise from 4.4 TW (2024) to 8.5 TW (2030), with a compound annual growth rate of 11% globally.
(Source: Swiss Re Institute)

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In this report, we aim to provide a view of the current and future renewable energy market, including the re/insurance challenges and opportunities shaping it. Drawing on new figures and analysis from Swiss Re Institute, we offer insights into global investment, capacity and premium trends, regional developments, and the technological shifts influencing underwriting decisions and claims. We hope these perspectives help our clients stay ahead of the curve, navigate risk with greater confidence, and make informed decisions in the energy transition.

Explore the report: **Click** to go to section

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Global renewable capacity & premium projections by 2030

Source: capacity and premium projections, Swiss Re Institute

North America

13% of projected capacity / 26% of projected premiums

North America is expected to contribute up to USD 6.9 billion to global premiums in 2030, mainly driven by the US (up to USD 4.8 billion) – predicted to be among the largest markets globally. Here, premiums are expected to come from solar capacity (37% of total), wind (32%) and hydropower (29%).

Central & South America

5% of projected capacity / 10% of projected premiums

We see several flagship projects being developed for wind and solar power production in Central and South America, together with many small-scale projects, which is testament to the rapid development of these markets. Notable investment inflows are also coming from the US and Europe.

Africa

2% of projected capacity / 5% of projected premiums

South Africa, Egypt and the Maghreb region in Northwest Africa are leading the way when it comes to solar and wind power production at scale on the continent. Currently, these projects are largely being driven by regional investors.

Europe

18% of projected capacity / 31% of projected premiums

Europe is anticipated to generate estimated premiums worth up to USD 8.3 billion from renewable energy. This is expected to be driven by wind (up to USD 4.1 billion, 50% of total), mainly onshore (up to USD 2.6 billion). Germany (up to USD 1.6 billion) is expected to account for close to 19% of renewable premiums from Europe, followed by the UK (up to USD 0.8 billion), France (up to USD 0.7 billion) and Spain (up to USD 0.6 billion).

Asia Pacific

62% of projected capacity / 28% of projected premiums

Asia-Pacific is expected to generate around 28% (up to USD 7.4 billion) of the estimated 2030 global insurance premiums. Solar will contribute up to USD 2.1 billion, wind up to USD 2 billion, and hydro up to up to USD 2.8 billion. China, meanwhile, is expected to account for 42% of Asia's total renewable energy premiums in 2030 (up to USD 3.1 billion, 12% of global) mainly driven by solar (up to USD 1 billion).

Projections and trends in selected growth markets

01

Middle East

Saudi Arabia and UAE have made several commitments relating to renewable energy investments by 2030 (mainly solar PV). These investments are largely being driven by state-backed and sovereign wealth actors.

02

India

India's energy market is experiencing rapid growth, with a major shift towards renewable sources. The country has set up targets for non-fossil fuel capacity and carbon neutrality, which will have to be achieved while facing challenges relating to increasing energy demand and reliance on fossil fuels. Renewable energy capacity grew from 78 GW in FY 2014–15 to 199 GW in FY 2023–24, with solar accounting for 80% of this new capacity. Public policies aim for 50% non-fossil fuel capacity by 2030 and carbon neutrality by 2070.

03

China

China warrants special attention in the global renewable energy landscape due to the scale and complexity of its transition efforts. By 2030, the country aims to reduce CO_2 emissions per unit of GDP by more than 65%, while increasing the proportion of non-fossil fuels in its energy mix to 25%.

Financing the transition: capital and technology converge

Key takeaway:

As global capacity for renewables continues to expand, with solar and wind leading the charge toward a projected 8.5TW by 2030 (source: Swiss Re Institute) the implications for re/insurance are profound. Underwriting must keep pace. This means smart capacity backed by risk knowledge, coordinated placement and long-term discipline.

The green transition

The current sustained flow of investment into green technologies and infrastructure is not a passing phase. It reflects a structural shift that is expected to extend well beyond 2030. As illustrated in the graph on the right, global investments into the energy transition, mitigation and adaptation are projected to exceed USD 80 trillion by 2040 (source: Swiss Re projections based on figures from the International Energy Agency (IEA)). A growing share of this capital will be directed toward scaling technologies which are proven to deliver, perform and scale. Moving from today's experimentation and development phase, into focused deployment.

Many of these investments although labelled under broader categories like climate mitigation or adaptation have a clear energy generation component. And they often fall within the construction, power and utilities, and renewable energy portfolios of insurers – depending on the insurer. This also applies to nuclear projects, particularly during the construction phase. Clear reporting is needed to avoid these occupancies results to being included in other portfolios.

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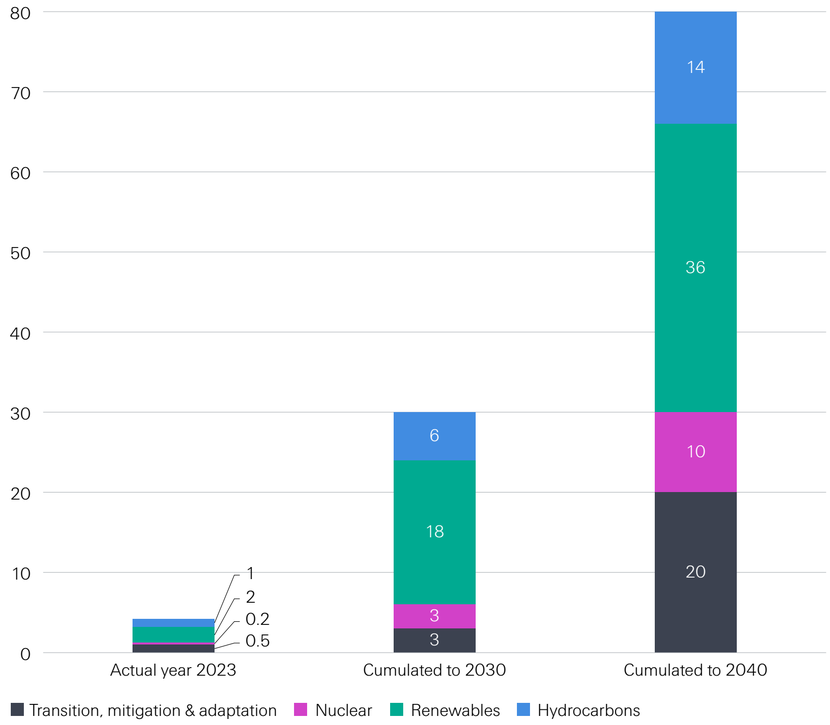
Green transition total investments (USD trillions)[1]



[1] Source: Swiss Re Energy Centre of Competence projections, based on International Energy Agency, World Energy Outlook 2023 and 2024 figures

The Energy transition

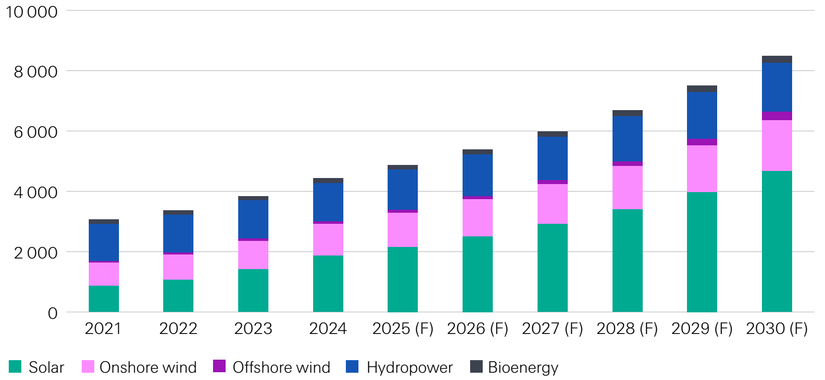
A subset of the green transition concerns specifically energy production, therefore not comprising the mitigation and adaptation investments in heavy industry or societal infrastructure. In this definition we still include the investments in selected hydrocarbon technologies (such as natural gas, LNG, carbon re-injection and underground storage or emissions reductions from electrification of platforms) and we also include electricity grid upgrades.

The Renewable electricity growth story (measured in GW)

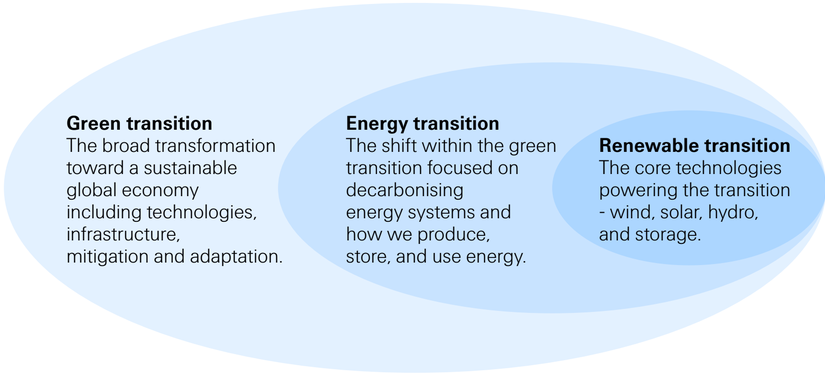
A further subset of the transition is the growth of renewable energy assets producing electricity. Thisspecific subsegment attracted investments of 2.2 trillion in 2024 and is expected to attract a cumulated 36 trillion by the end of 2040 (Swiss Re Energy Centre of Competence projections).

This spans a range of technical solutions and geographies, which are already showing signs of specialisation. Australia, for example, is fast becoming a global hub for solar energy and battery energy storage systems (BESS), driven by its natural advantages in solar irradiation. Meanwhile, China has established itself as a centre for solar panel manufacturing as well as other components.

Global cumulative installed renewable electricity capacity by technology, GW[1]



[1] Source: data to 2024 from IRENA Renewable Capacity Statistics 2025; projections from Swiss Re Institute



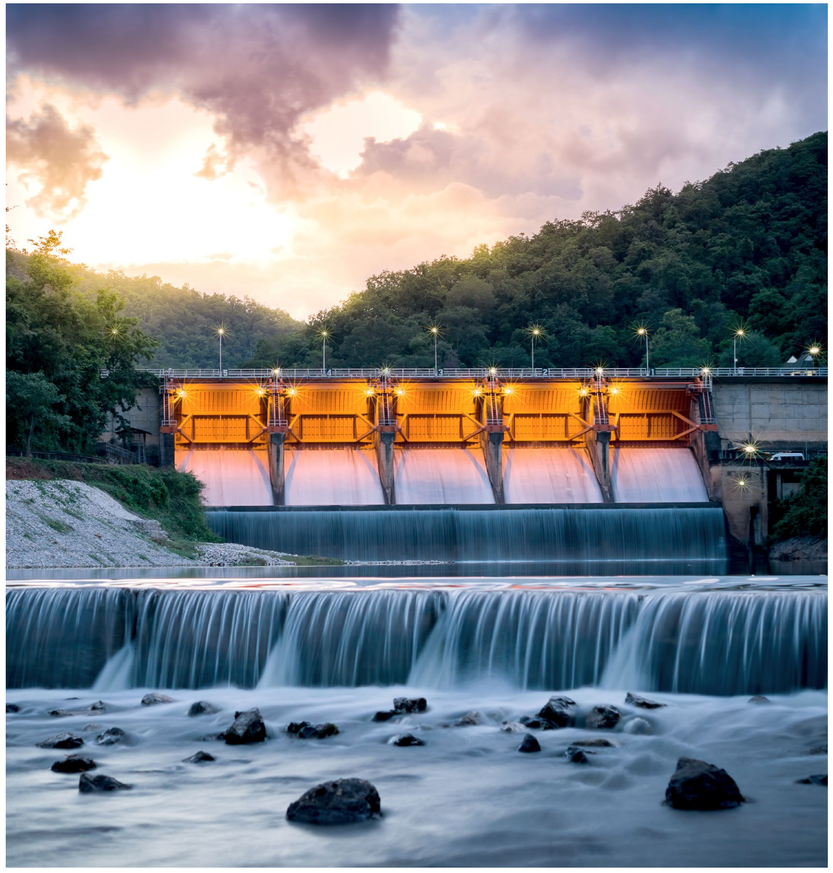
Key takeaway:

The performance of this portfolio of highly innovative assets needs to be carefully monitored. Separate treaties would be a very efficient way to have a clear line of sight on their performance.

Evolving insurance structures in the renewable energy market

Key takeaway:

With greater technology standardisation, predictable outputs and performance, and accumulated asset value, this evolving risk landscape will become more suitable for standalone treaty-based structures. Facultative capacity will remain relevant as an option for larger and less proven risks.



As the renewable energy market matures, its risk profile evolves, driving innovation in the structure of insurance solutions.

A global, diversified premium landscape

By 2030, projected premiums will reflect a geographically diverse market. Europe and Asia-Pacific are expected to account for the largest shares (31% and 28% respectively) driven by strong policy support, capital inflows, and a maturing project pipeline. North America follows with 26%, while Central & South America (10%) and Africa (5%) represent growing but still emerging premium pools. This global spread reinforces the importance of regional technical knowledge and underwriting expertise – not only to adapt to different risk environments and regulatory frameworks but also to tailor re/insurance structures to local market maturity.

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From complex construction to scalable operational portfolios

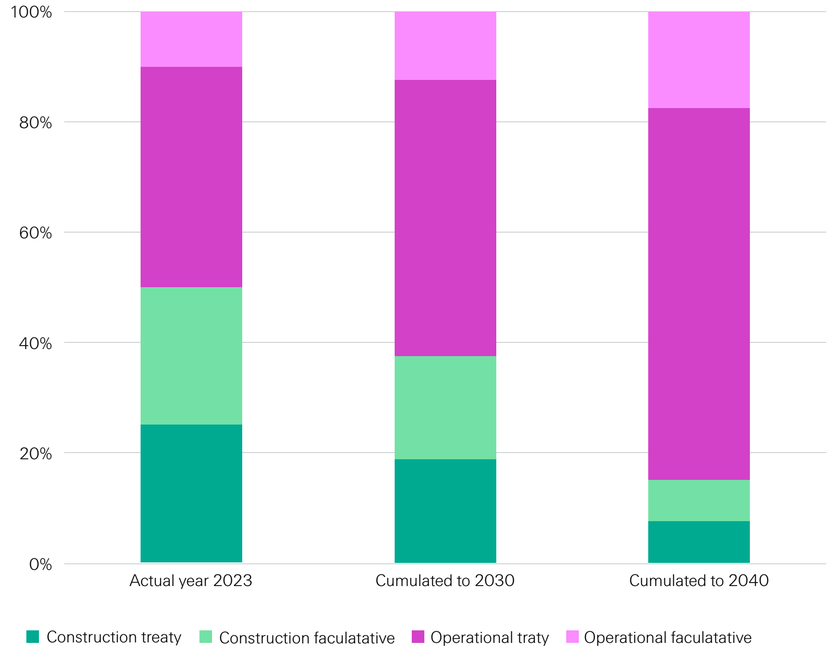
Today's renewable energy books remain heavily influenced by large-scale construction projects of new generation facilities, grid infrastructure, and storage. Many of these have used facultative placements suited to innovative and complex risks. This phase reflects a dynamic and innovation-heavy environment, demanding close technical collaboration with brokers and underwriters to understand the risks involved.

Looking ahead, more developed and differentiated portfolios are expected to develop as assets become operational. The global installed base will expand, and so the operational share of the portfolio will increasingly dominate re/insurance books.

Meanwhile, the construction share of portfolios is set to decrease over time, with an expectation that it could stabilise at around 5–10%. This reflects the natural transition as infrastructure enters production, leaving a long-term base level of construction, maintenance and decommissioning.

Given the complexity of this book and the need for transparency, there is a strong case for standalone renewable energy treaties. For insurers, this would allow them to separate more volatile segments of their portfolio into standalone books.

Indicative reinsurance placements across construction and operational phases, % of book



Source: Swiss Re Energy Centre of Competence, projections only

Heatmap: exposure landscape

Understanding how risk is distributed across the renewable energy landscape is essential for informed underwriting and portfolio management. A heatmap approach helps visualise where exposures are currently concentrated distinguishing between “cold” (lower-risk), “medium” (moderate-risk), and “hot” (high-risk) zones. These zones reflect varying levels of technological maturity, claims experience, geographic volatility, and accumulation potential. As the market evolves, so too will the location and intensity of these risks making continuous reassessment critical to sustainable growth.

Cold

- Good operational wind risks for onshore small turbines with good maintenance contracts with Original Equipment Manufacturers.
- Well managed and maintained assets.
- Specialised involved parties.

Medium

- Offshore windturbines without Business Interruption / Delay in Start Up Insurance.
- Electric onshore transportation risks.
- E-fuels plants.
- Outdoor modular BESS with adequate spacing and reliable Original Equipment Manufacturers.
- General construction risks with adequate conditions.
- Contract comprising remediation measures against fleet-wide reliability issue.

Hot

- EAR subsea cable risks.
- Floating offshore windfarms and solar PVs (not fixed to bottom).
- General risks with prototypes/large turbines.
- Congested maritime routes.
- Cat exposed.
- Solar thermal.
- Indoor BESS.
- PVs exposed to hail and wind.
- Hydro construction risks such as tunnelling works, DSU and loose materials in dams.
- Exposure to strikes, riots and civil commotion (SRCC) and / or cyber.

Claims perspective: technology-specific risk and loss patterns

The transformation of the global energy system brings both opportunities and complexities to the re/insurance industry. As renewables take centre stage in energy portfolios, the claims landscape evolves alongside it.

Current loss patterns in this sector show both cross-asset vulnerabilities, such as weather events damaging equipment, and technology-specific characteristics. Each renewable energy technology comes with its own claim drivers: mechanical breakdowns and component failures in wind; fire and storm exposures in solar; and thermal runaway and containment issues in BESS. They can be long-term vulnerabilities that will shape underwriting and claims management, and are vital to tackle for a sustainable insurance market.

Many of the current pain points stem not only from external hazards, but from design, execution, and equipment operation. In BESS, for example, we've seen high-severity fire losses linked to design flaws and inadequate thermal management. In wind and solar, claims are increasingly tied to extreme weather volatility including hailstorms, lightning and wind as assets are deployed in exposed geographies. Meanwhile, human factors such as installation quality, maintenance discipline and project oversight can also influence losses, particularly in fast-growing markets with limited experience.

Technical underwriting must be tightly connected to real-world claims intelligence. Further, the ability to engage early during design and procurement is becoming a key differentiator. Our claims teams increasingly work hand-in-hand with underwriters and clients to learn from each event.

Ultimately, building sustainable portfolios in the renewables space will depend on a continuous data-and action-based feedback loop between underwriting and claims teams at reinsurers and cedents. Swiss Re's specialty claims teams are committed to driving this dialogue, helping clients manage volatility, avoid repeat losses, and support the long-term viability of the energy transition.

Jochen Müller
Head Specialty Claims

Key takeaway:

The implications for re/insurers are clear: industry players cannot approach renewables as a commoditised or fully standardised risk class.

Common claims drivers across selected renewable and low-carbon technologies

Claims drivers	Wind	Solar	BESS	e-Hydrogen	LNG
Environmental factors	High winds, lightning, ice, sand/ dust erosion	Hailstorms, snow load	Temperature extremes, humidity, dust	Water freezing in the electrolyser stack	–
Mechanical failures	Gearbox, bearings, blades, hydraulics	Wind damage	Shock, vibration, mechanical impact	Enhanced crack growing; Blistering of carbon fibres	Structural weakening due to cold stress
Electrical failures	Generator, inverter, transformer, grid connection faults	Electrical faults, poor connections	Short circuits, instability, connection issues	Electrolyser: I) High voltage, short circuit due to electrodes corrosionII) Fluctuating power levels from photovoltaic, membrane degradation	–
Fire / explosion risk	Lightning-related fires (indirect)	Fire from electrical failure, vegetation, animals.	Thermal runaway of cells	Leaks causing fire/explosion Wide flammable range (4% – 75% in air by volume)	Leaks causing fire/explosion Spilled pool of LNG ignited is very difficult to extinguish High-pressure vessel leakage: jet fire
Material degradation, design & manufacturing	Faulty (prototype) design Quality issues in general and design problems for newer turbines	Faulty erection, poor materials or design	Manufacturing defects, poor system integration	Hydrogen embrittlement, HTHA	Cold stress (–162°C) weakening metal structures
Operational / human error	Poor maintenance, control system failure, installation errors	Improper installation, vegetation management	Inadequate maintenance or operation	Faulty workmanship (installation)	Poor maintenance Lack of safety system Facility sitting (layout)
Theft / vandalism, SRCC	Damage to wind farm properties	Theft of panels and components	Theft or vandalism of containerised BESS	–	–

Source: Swiss Re P&C Re Specialty Claims

Our capabilities: partnering for a resilient energy transition

At Swiss Re we are already working alongside our clients at the forefront of renewable technology, investing into the knowledge, data, and expertise our clients need to navigate this complex risk landscape.

The energy transition is creating a complex risk landscape for insurers and operators to navigate. New technology, climate change and large, complex projects can leave gaps in risk knowledge and underwriting data. We combine our comprehensive capacity, risk insights, local market knowledge, and digital solutions, to help you provide ulti-line insurance product offerings that support the development of new technologies.

Leveraging our 160 years of risk knowledge, local market expertise, and long-standing contribution to industry best practice (such as the Solar Code of Practice), the Energy Centre of Competence provides the market with the expertise to navigate a complex landscape.

Miguel Senac
Co-head Energy Centre of Competence

Michele Cibrario
Co-head Energy Centre of Competence

Leverage 160 years of risk expertise

By collaborating closely with the Centre of Competence, our underwriters, clients and brokers, now have even more expertise at their fingertips.

Efficient risk placement from breaking ground to decommissioning

Our Centre of Competence acts as a coordination hub so you can efficiently arrange capacity through our lines of business.

Local teams, global networks

Our Centre of Competence is a coordination and expertise team, working with your existing underwriting partners.

More publications

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Unlocking the oceans 11GW of floating offshore wind capacity could be installed by 2030, but what are the challenges for insurance portfolios?
Battery energy storage systems See how increasing penetration of renewables demands more flexibility of the power grid in matching supply and demand, the risks of BESS and the technologies to monitor.

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