Powering growth

Innovative insurance solutions for on- and offshore wind power
After many years of vigorous growth followed by a moderate slump, the wind energy sector has stabilised. Many large-scale projects are ongoing or planned, including offshore installations in Asia and onshore wind parks in North America. Wind turbine generators (WTGs) are now regarded as a reliable and profitable source of clean and renewable energy. Ever-larger turbines with higher megawatt outputs are being planned in ambitious onshore and offshore projects.

These developments place wind farms under increasing cost pressure, both in the construction phase and in ongoing operation. The renewable energies and wind power specialists at Munich Re have developed an array of targeted insurance solutions to create optimum conditions and security for investors and operators.

Wind power plants are generally covered against physical damage, accidents and natural hazards by conventional insurance products. Our solutions go further: We offer our support in end-to-end risk management, including preparedness for extreme losses.

Munich Re collaborates closely with the wind power industry, investors and banks to identify gaps in lifecycle coverage that pose a financial threat to wind projects at all stages of the value chain. In the following pages, we give an initial impression of what we do – and how you can benefit from it.

More power to wind power

Once reliant on subsidies and tax incentives for business viability, wind power now contributes 36% to the European renewable energies mix as the most important source. This is good news, as wind energy can help replace fossil fuel use and address global warming. As the industry continues to expand and competition increases, tailored risk-transfer solutions can play a key role in cost efficiency and long-term profitability.

1 Source: Eurostat 2018
Different risks and stakeholders

The wind power value chain is complex, involving different project and operation phases, risks, stakeholders and interests. Our solution: tailored concepts to meet individual needs in each scenario. These fall into four main categories, which can be freely adapted and combined.

Serial Loss Cover

The **Serial Loss Cover** provides comprehensive protection against the large-loss scenario dreaded by all manufacturers and suppliers, enhancing the credibility of guarantees.

EPC Cover

An **EPC Cover** protects engineering, procurement and construction (EPC) contractors and component suppliers against the impact of large warranty claims due to faulty construction, material, production or workmanship.
O&M Cover

The O&M Cover protects owners and investors of wind farms against unscheduled maintenance cost overrun, and enables them to take advantage of lower-cost operation & maintenance (O&M) contracts from independent service providers.

Lack-of-Wind Cover

With a Lack-of-Wind Cover, operators can cushion the impact of profit losses in less windy years, while a Wind Energy Yield Cover extends the security based on the actual power generation.
The risk of serial losses is especially pronounced when manufacturers integrate new technologies or up-scale to larger sizes. If, for example, the design of a new WTG component includes systematic defects, these could remain undiscovered until after installation or even after years of operation.

The loss suffered by the WTG manufacturer during the guarantee period or due to other contractual liabilities can constitute a substantial financial burden: a serial loss may involve hundreds of WTGs, each of which may cost tens of thousands of euros. Under the full-service agreements (FSA) common in the industry, the manufacturer is liable not only for rectifying defective components, but also for any technical availability guarantees provided.

In the case of offshore wind farms, guarantee costs are often ten or even twenty times higher than in onshore facilities, due to logistics costs and weather-related delays.

Credible guarantees, secure balance sheet

Our Serial Loss Cover provides greater certainty in financial planning, with innovative solutions that benefit not only WTG manufacturers, but also suppliers of components like gearboxes, rotor blades or bearings. As we explicitly cover defects (non-physical damages), losses arising from issues that require measures to keep the WTG running are also included. In addition, the Serial Loss Cover protects WTG manufacturers in the event that a supplier is unable to fulfil agreed back-to-back guarantees for defective components. In short, our solutions give you peace of mind and protection against this technical large-loss scenario in the wind industry.

Better business with optimised quality and risk management

The solution supports risk management as well as quality assurance and control. It delivers a cost-effective alternative to traditional property insurance, which is particularly relevant considering that large-scale risks like serial losses pose a greater threat than technical frequency losses.

Overview of wind energy risk insurance covers

<table>
<thead>
<tr>
<th>Hazards covered</th>
<th>Property cover</th>
<th>Machinery guarantee cover</th>
<th>Serial Loss Cover</th>
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</thead>
<tbody>
<tr>
<td>Fire</td>
<td>yes</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Natural catastrophes</td>
<td>yes</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Physical damage (PD)</td>
<td>–</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Individual failures</td>
<td>–</td>
<td>yes</td>
<td>–</td>
</tr>
<tr>
<td>Serial losses</td>
<td>–</td>
<td>limited</td>
<td>yes</td>
</tr>
<tr>
<td>Defects (non-PD)</td>
<td>–</td>
<td>–</td>
<td>yes</td>
</tr>
<tr>
<td>– Faulty material</td>
<td>–</td>
<td>–</td>
<td>yes</td>
</tr>
<tr>
<td>– Faulty production</td>
<td>–</td>
<td>–</td>
<td>yes</td>
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<tr>
<td>– Faulty design (certified)</td>
<td>–</td>
<td>–</td>
<td>yes</td>
</tr>
<tr>
<td>– Poor workmanship</td>
<td>–</td>
<td>–</td>
<td>yes</td>
</tr>
<tr>
<td>Suppliers’ warranty default</td>
<td>–</td>
<td>–</td>
<td>yes</td>
</tr>
<tr>
<td>Availability guarantee (onshore)</td>
<td>–</td>
<td>–</td>
<td>yes</td>
</tr>
<tr>
<td>Multi-year cover</td>
<td>–</td>
<td>–</td>
<td>yes</td>
</tr>
<tr>
<td>Policy cancellable following claims</td>
<td>yes</td>
<td>yes</td>
<td>–</td>
</tr>
</tbody>
</table>
The Serial Loss Cover in combination with optimised risk management can reduce overall insurance costs by replacing traditional machinery guarantee covers.

**Long-term guarantee protection**

For protection of up to five years, we have developed a long-term guarantee solution. In the onshore segment, it can be concluded for the entire WTG fleet. It remains in effect until the end of the manufacturer’s guarantee period (up to a maximum of five years). For (large-scale) offshore projects, we offer an individual project-based cover.

We also protect you against serial losses arising from guarantees in connection with faulty design (certified), material defects, defective production and poor workmanship or maintenance – even if the error was caused by your supplier.

**How serial losses arise**

**Multiple WTGs can fail due to:**

- Issues based on the same cause, such as design or production faults, and related to each other both temporally and materially.
- Problems resulting from the delivery of components/material that have the same defect.

**Onshore covers include an availability guarantee**

Do you guarantee a minimum level of technical availability? In cases of serial losses, large numbers of WTGs involved may mean that repairs and component replacements take a long time. If the WTGs have to be switched off, the delay may result in loss-of-revenue indemnification payments. Our Serial Loss Cover addresses this risk.

**Offshore covers include offshore logistics costs**

Your full-service agreement obliges you to assume costs for special vessels. Chartering ships on a short-term basis can be extremely costly. Replacing large components at sea can pose a major challenge. Our solution can cover these aspects up to an offshore sublimit. Cover for weather-related delays is optional.

**By compensating for both impact and frequency, we help you keep all the angles covered.**
EPC Cover

Our EPC Cover protects contractors and component suppliers against the impact of large warranty claims due to faulty design (certified), faulty materials, defective production or bad workmanship.
Engineering, procurement and construction (EPC) contractors face a constant stream of new technical and logistical risks. The EPC contractor responsible for foundations, for example, guarantees proper design, material quality, production, shipment, installation and long-term stability of the foundations for about a dozen suppliers and subcontractors. The owners of the wind farm usually insist on liabilities of 50% to 100% of the total contract value in the form of extensive multiyear guarantees.

These EPC guarantees are not usually covered by conventional insurance. Should a foundation supplier fail in the event of insolvency or a large guarantee loss, the obligation to cover remaining losses falls on the EPC contractor. This adds up to a significant exposure to extremely large liability claims.

Complex construction and wind farm project risks

The installation of foundations and cables involves risks that could jeopardise the success of an entire project and even threaten the financial viability of an EPC. This places great importance on quality assurance and control in the offshore industry. Any component defects that are not detected can cost millions once installed offshore.

- **Material defects:** Faulty steel foundations substantially reduce the operational lifespan of wind power plants. In one case in 2014, a wind farm operator sued an EPC contractor due to inconsistent quality of the foundation steel. Repairs had to be carried out, resulting in losses of several hundred million euros.

Problems can also arise in transit. Rough seas can expose foundations to incalculable forces, which can lead to severe metal fatigue during the crossing.

Technical problems with cables and transmission technology can also result in a significant loss of revenue. For example, the failure of an export cable in the German North Sea could disconnect up to three wind farms for months on end.

- **Design and construction risk:** The foundations of large offshore wind farms are subjected to extreme forces. If underestimated in design and construction, these stresses can significantly reduce the service life of foundations. Design faults are typically a systemic failure – which might affect the whole wind farm. The event becomes a serial loss.

- **Manufacturing and installation defects:** Welding and corrosion protection technologies entail major risks for the entire supporting structure.

Steel foundations, especially those termed jacket foundations, are made up of individually welded pipes. Welding is a challenge, especially when parts are difficult to access. This may result in strength and stability issues. Defective corrosion protection due to poor workmanship may have similar consequences.

There is also a risk that inter-array cables may not be installed correctly, for example if the bend radius is not maintained or a cable is not laid deep enough in the seabed. Premature cable failures can bring an entire wind farm to a standstill.

Your benefits: More liquidity, higher bankability, enhanced competitive strength

Major guarantee losses may be rare, yet they must still be included in risk management considerations. The fact that they are not covered under a wind farm’s Contractors’ All Risks (CAR) policy or Operational All Risks (OAR) cover means they can have devastating consequences for the EPC contractor and its suppliers. It is precisely this gap in cover that Munich Re’s EPC Cover closes.

The cover not only protects an EPC contractor’s balance sheet in the event of a major loss, but also gives the company the liquidity required to take action. The coverage of an EPC contractor’s guarantees is also a persuasive argument when seeking financing from banks and potential investors. Without an EPC Cover, the shortage of liquidity or even bankruptcy of a general contractor would not only have catastrophic financial consequences, but would also cause significant delays to repair work.

An EPC Cover makes it easier for firms in the offshore sector to act as EPC contractors, enabling them to provide the requisite high guarantees. This makes the market more attractive to EPC contractors, with positive long-term effects such as increasing competition for contracts and lower bids.
O&M Cover

The cover protects wind farm owners and investors against the impact of significant operation and maintenance risks. It is tailored for each wind farm project and business plan – and designed to reduce capital expenditure needs.

Original equipment manufacturers (OEMs) of wind turbine components typically provide 2–4-year warranties for their products. After the expiry of OEM warranties, the wind farm owner can choose between full-service agreements (FSAs) with the OEM and basic operation and maintenance (O&M) contracts with independent service providers (ISPs). Basic O&M contracts may be available at lower cost, but generally exclude large repairs or the replacement of entire components. To cover this risk, which increases as the wind farm ages, operators have traditionally to build up large capital reserves.

Planning for unscheduled maintenance costs

Taking advantage of lower-cost offers from an ISP reduces operating costs, but requires a separate solution to plan for the costs for major component replacements, considered unscheduled maintenance.

Even if a best estimate of average unscheduled maintenance costs over the entire service life exists, these costs largely depend on the quality of the WTG and the experience of the ISP, leaving risks uncovered.

Combine your ISP contract with our O&M Cover

Our O&M Cover closes the gap between OEM warranties and ISP service liabilities. Munich Re offers the cover to owners and investors of wind farms for up to ten years in operation. The coverage includes unforeseen and unscheduled maintenance costs exceeding best-estimated reserves. Additionally, we offer coverage against loss of revenue due to downtimes resulting from the replacement of insured major components up to a downtime sublimit. As a result, profitability can be significantly enhanced, especially during the initial years of operation when the capital burden is typically large.
Comparison of O&M service concepts

Various O&M service concepts are available, depending on the size of the installation and costs involved, with varying levels of impact on the project’s OPEX.

Conventional O&M concepts:

→ OEM full-service agreement: provides comprehensive O&M services, including unscheduled maintenance and availability guarantees (typically 95% operational availability).

→ Independent service provider (ISP) contract: offers standard O&M services (e.g. basic wear & tear measures).

→ Munich Re O&M Cover: avoids risky gaps in standard O&M Cover, optionally in conjunction with downtime (loss of revenue due to unscheduled maintenance) and our Lack-of-Wind or Wind Energy Yield Covers.
Lack-of-Wind Cover

Don’t let low-wind years take the wind out of your sails: meet operating costs and financing obligations – and generate profits.

Experience over recent decades has shown that the strength and duration of wind in individual regions and years or months can fall far short of even the most conscientious forecasts. Lower power generation reduces revenue, yet operating costs, financing and return targets remain unchanged. In response, Munich Re offers covers against turnover losses.

Lack-of-Wind Cover – Our standard wind-only cover

Our Lack-of-Wind Cover is a straightforward solution that protects your revenue stream in poor wind years. The cover structure is based mainly on three modelled parameters: wind data (supplied from a weather data provider), your wind farm efficiency and your WTG power curve (taken from your project documentation).

Example: Covers for modelled output (North Sea)

The Lack-of-Wind concepts are based on a modelled turnover that is calculated from reanalysis wind data (Hindcast) at hub level (1), the specific turbines’ power curves (2), the wind farm’s efficiency and a fixed price per megawatt-hour (3). If power generation falls under a predefined threshold (minimum wind power revenue), the cover cushions the impact of the loss (4). Whenever productivity falls below the red line, Munich Re steps in. Since this cover can also be concluded for several consecutive years, it offers investors long-term protection against a loss of income due to a lack of wind.

Wind-speed readings can be translated into energy yield figures by means of turbine-specific power curves, which make allowance for the fact that WTGs switch on only when the wind speed reaches a specified threshold value and achieve their full output as the wind speed increases.

The annual average wind speed 100 metres above the water at any given point in the North Sea fluctuates considerably. The long-term average here is just under 10 m/s, but the average in low-wind years such as 2003 may remain far below expectations. To assess a project, historical wind speed data derived from state-of-the-art models, e.g. by ECMWF or NASA, are used.
Depending on the location of the wind farm, we can also offer a combination with various types of derivates that address volatility in both wind strength and energy prices. Our experts will work with you to define an insurance structure to meet your risk appetite and long-term needs.

**Strong business growth throughout weak wind years**

You benefit in many ways from our Lack-of-Wind solution: Operators and investors receive steady revenue from the wind farm and can concentrate on business growth without worrying about volatility of wind – even in years when it is not blowing strongly. Using model parameters only, independent of the specifics of your wind farm, has a number of clear advantages:

- The investor does not need to prove any loss or deliver any revenue statements
- The modelled wind yield can be determined as early as one day after the event
- Settlements can be paid out on short notice

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**Power production**

A wind farm’s modelled annual turnover (in millions of euros) is calculated by multiplying the modelled annual energy yield with a factor reflecting the feed-in tariff or negotiated price per GWh. In 2003, for example, the yield turned out to be €35m less than the expected value of about €310m per year (long-term average).

**Revenue**

The two lines indicate the range that would be covered by a Lack-of-Wind policy. If the turnover falls below the red line, the cover cushions the loss up to an agreed limit (orange line). A wind farm’s modelled annual energy yield (in gigawatt-hours (GWh) per year) is the sum of the hourly energy yield figures. This considers both the number of WTGs and their respective degrees of efficiency.
Wind Energy Yield Cover

Close the gap in cash-flow security – and enhance your bankability, profitability and long-term business viability.

For even greater planning security, wind investors increasingly seek to close the gap between the modelled wind power revenue of a Lack-of-Wind Cover and the real performance of their wind farm. Analyses of wind farm data have shown deviations between model and reality exceeding 10% of the annual revenue stream. The main sources of uncertainty and deviation include:

- Wind farm developer’s wind survey
- Layout, surroundings, topology and roughness of the wind farm area
- Differences between realised versus specified power curves of each WTG
- Wake effects
- Unscheduled downtimes

Measured by real annual wind power yield

Munich Re’s innovative Wind Energy Yield Cover (WEYC) incorporates most of the above additional risks related to the performance and availability of wind farms. Investors are protected against an actual shortfall in revenue measured against the expected cash flow in any operation year. Once the yield from wind energy has undercut the predefined annual minimum, the WEYC pays out. Following aspects are taken into account:

- Actual annual power generation (based on SCADA, curtailment excluded)
- Technical non-availability of WTG (if not covered by service contracts or other insurances like OAR)
- Fixed power prices
Cooperating for far-reaching protection

Comprehensive coverage requires enhanced commitment and transparency. For example, wind farm operation reports and SCADA data must be provided to allow analysis of the wind farm’s annual performance. The availability and quality of data affect premium calculations. Based on close cooperation, the WEYC risk transfer solution can be offered on a multi-year basis, tailored to wind farms in operation as well as to greenfield projects.

The right WEYC parameters for your needs

Each wind power project is unique. This is why our experts work closely with each client to customise the cover. Munich Re can offer risk transfer solutions in the form of derivatives as well as insurance or reinsurance. The WEYC parameters that we can adapt to your requirements include:

- Structure: derivative (put, collar or swap) or insurance/reinsurance
- Power generation threshold
- Power price
- Contract period
- Payout interval
- Contractual agreements

Reduce your cost of capital

The major benefit of our WEYC is a steady and predictable cash flow. As the cover is based on actual power generation figures and operation data, the basic risk (compared to Lack-of-Wind) is reduced to a minimum. This can substantially widen the circle of potential wind investors and optimise financial terms. If the cover is taken into account while negotiating financing, the savings on cost of capital may even exceed the insurance premium.
Talk with us –
And power your business

Our solutions give you more planning certainty and broaden your scope for growth in a dynamic market. And we cover far more than the traditional technical risks: with our innovative loss coverage concepts, we provide protection against financially threatening scenarios. Let’s talk about tailored solutions that keep you solvent, profitable and competitive – even in potential crisis situations.

Our commitment to renewable energy industries

Munich Re supports the wind power industry with a broad spectrum of insurance solutions. And this is just the beginning of our role in renewable energies. In Green Tech Solutions, Munich Re pools expertise and resources in the field of renewable energies. We offer various innovative insurance solutions for wind, solar, biomass and other green technologies on a global scale. Munich Re also makes strategic investments in wind and solar farms. This combination benefits investors, operators and project developers in two ways: we deliver technical expertise that can improve a project’s performance, and all stakeholders enjoy the security of Munich Re’s solid, financially strong position and AA rating.
Get in touch and get started

We look forward to working with you.

Serial Losses, O&M, EPC Cover

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