

Protection against lack of solar irradiation

Insufficient solar irradiation can put solar farm operators under immense pressure. To protect them against loss of income resulting from this threat, Swiss Re has developed a dedicated index-triggered insurance product.



The gathering momentum of renewable energy generation is accompanied by the inherent unpredictability of renewable power sources and the corresponding financial risk.

This risk affects renewable energy producers and an ever-growing number of stakeholders along the entire value chain.

Weather plays a crucial role in the power output of the main renewable energy segments of wind, solar and hydropower. Any shortage of renewable resources can critically impact the power production potential.

Renewable energy production is on the increase around the world. Although a promising development by itself, the energy resources involved are inherently volatile. Accordingly, the growing production output is placing an increasing financial risk on energy producers and other stakeholders along the value chain, particularly in the wake of climate change.

Swiss Re's Lack of Solar Irradiation Insurance offers a tailor-made, innovative mechanism to manage unpredictable earnings fluctuation and associated financial distress due to variations in solar irradiation. It uses a simple and transparent structure based on an agreed official solar irradiation index. This allows solar farm operators and investors to concentrate on growing their business while maintaining a more stable cash flow.



Cover

Protection of solar farms against loss of income due to lack of solar irradiation based on **the location, setup and technology** of a given solar farm. **Swift and easy settlement triggered by official solar irradiation statistics** provided by an agreed third party (eg NASA).



Advantages

- Effective mechanism to **manage earnings volatility**
- **Protection against financial distress**
- **Simple** and **transparent** structure
- **Can be tailored** to individual risk appetite
- Effective instrument to meet **investment targets**
- Swift **pre-agreed** payment based on index values





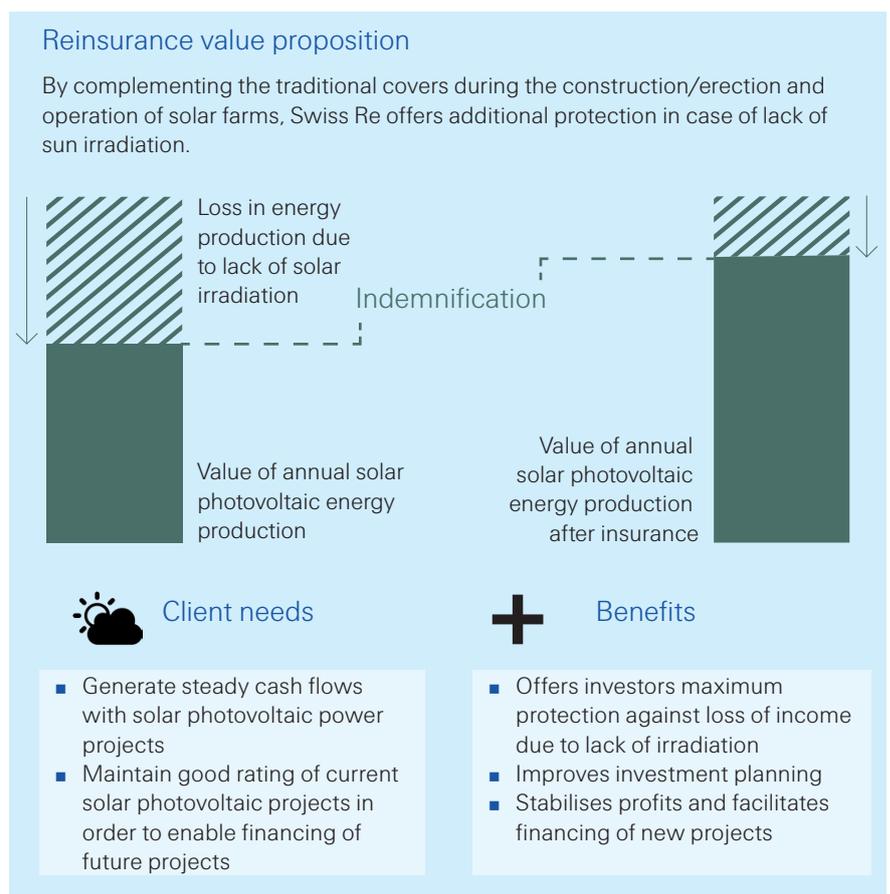
Stakeholders	Impact without cover	Benefits with cover
Solar farm operators	<ul style="list-style-type: none"> ■ Impact on operating performance, fluctuating cash flow ■ Potential difficulties to cover operating costs and investor compensation ■ Declining interest from investors, downgrade of bond rating 	<ul style="list-style-type: none"> ■ Stabilisation of expected cash flows ■ Projectable impact of adverse weather conditions on revenue ■ Good bond rating can be maintained ■ Improved investment planning, profit optimisation ■ New project financing opportunities through increased investment security
Developers and installers	<ul style="list-style-type: none"> ■ Lower demand for solar photovoltaic technology if generation becomes more volatile 	<ul style="list-style-type: none"> ■ Potential increase in demand for solar energy-related products
Governments	<ul style="list-style-type: none"> ■ Investments in solar energy may be considered to be unpredictable ■ Declining public consent to grant financial support for green energy projects 	<ul style="list-style-type: none"> ■ Agreed green energy targets can be met in a more predictable way ■ Financial incentives for investment in solar power generation industry can be more easily justified
Banks/mutual funds/private investors	<ul style="list-style-type: none"> ■ Borrowers potentially defaulting on their loan payments ■ Drop in return on investments 	<ul style="list-style-type: none"> ■ Increased investment security through profit stabilisation and project risk reduction
Primary insurers	<ul style="list-style-type: none"> ■ No differentiation from competitors ■ No insurance solution for clients' needs 	<ul style="list-style-type: none"> ■ Additional cross-selling opportunities, as product provides a platform to discuss other earnings protection products ■ Complements product range of traditional insurers and makes their offer to clients more compelling

Problem statement and value proposition

The success of solar photovoltaic energy projects is heavily dependent on the predictability of revenue stream tariffs and prudent resource forecasts.

With continuous change in the atmospheric composition, the solar resources available on the earth's surface have become increasingly volatile. Particularly in years with relatively little sunshine, solar farm operators may sustain large losses as they struggle to cover operating costs and financial obligations and meet return targets.

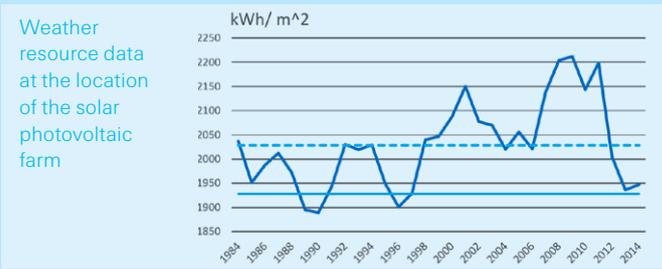
With insurance against lacking solar irradiation, operators and investors receive steady revenue from solar photovoltaic farms and are thus able to concentrate on growing their business while maintaining a more stable cash flow.



Index triggered cover

Based on the individual location, setup and technology of the solar farm, Lack of Solar Irradiation Insurance promises a tailor-made mechanism to manage earnings volatility and associated financial distress using a simple and transparent structure based on an agreed solar irradiation index (eg from NASA).

Calculation of the modelled turnover



- Incident radiation and air temperatures at the earth's surface at the location of the insured's exposure are taken from an agreed third-party data source. This data is used to create a suitable index (deemed generation) and an index trigger.
- Temperatures are taken into account as the efficiency of a photovoltaic module is inversely affected by any change in ambient temperature.

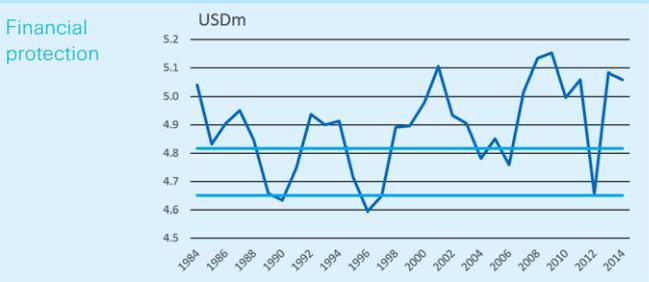


- Incident radiation is converted to energy on the collector surface subject to the appropriate tilt of the surface.
- The effective irradiation available for photovoltaic conversion is derived by adjusting for optical losses.
- This value is translated into deemed energy figures based on photovoltaic conversion rate modules.
- The farm's modelled annual energy yield is the sum of the daily energy yield figures, adjusted for system efficiency.



- The modelled annual turnover of a solar photovoltaic farm is calculated by multiplying the modelled annual energy yield with a factor reflecting the feed-in tariff or a negotiated price per unit.

If turnover falls short, the cover provides:



- The index trigger determines when payment to the insured is due. This is the case if deemed generation calculated for the cover period falls below a given threshold, for example to below 95% of its historical average, as a result of reduced solar irradiation.
- The two blue lines indicate the range which would be covered by the lack of solar irradiation insurance.

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