



| Energy

Insuring solar photovoltaic farms

Six considerations we'll ask you about when insuring the construction of a ground-mounted solar farm

Six considerations to take on board

The energy industry is constantly changing. Solar energy is one of the fastest growing renewable energy forms, and commercial solar farm projects are on the rise – constructed to sell electricity to the grid and for private commercial use by heavy industry.

In an environment like this, it's important to understand what you're walking into. That's where we come in. At Liberty, we've built up years of experience in insuring solar projects in both Asia Pacific and around the world – and we know exactly what it takes to underwrite the construction and operation of a solar photovoltaic (PV) farm.

If you come to us with a risk for quoting, here are six key considerations we'll ask you about.

1 LOCATION

The geotechnical report

This must be carried out to ensure the foundation design is appropriate for the specific site on which you are building your farm. It will test factors that can compromise the site, such as:

- Highly compressible soils
- Expansive clays
- Collapsible clays
- Sensitive clays
- Reactive elements
- Ground water
- Soil acidity

Wind tunnel testing

This will test the design and strength of the panels and their supporting structures to withstand strong winds. For higher risk sites, including tropical storm regions, testing should also be conducted to replicate site-specific conditions, such as:

- Ground cover or "roughness" – this affects wind speed and turbulence, which can aggravate wind loadings and damage the panels and tracking systems
- Nearby hills and/or valleys that might redirect the wind in unexpected directions
- Buildings or ridges of trees nearby that can similarly redirect the wind
- Wind interactions between PV panels on the perimeter of the farm and those panels on the inside, which may cause unpredicted direct and/or oscillating stresses

The hydrology report

If the site is exposed to flooding or inundation, this report will check if the design factors are in line with safety and risk mitigation measures, such as:

- Appropriate drainage – taking into account the topography
- Pile height and foundation scour protection against flowing waters
- Panel stow position out of reach of water levels
- Position and height of panels, inverters, transformers and substations, away from high water levels
- Suitable water ingress protection ratings for the electrical equipment

Claims Insight:

At Liberty, we recently saw a loss which was a direct result of an uncontrolled water flow at a site which had inadequate drainage. This caused water damage to panels in laydown areas that were awaiting assembly, and also caused structural integrity damage to piles.



2 DESIGN

Panels, trackers, piling and other critical elements of a project need to be designed to various credible standards, for example:

- The standard IEC 61215, which reflects on several elements of the solar panel's design and robustness
- The standard IEC 62817 for tracker design qualification
- The American Standard ASCE 7-16 as a basic wind design code, to which accommodation needs to be made for dynamic wind-driven interactions that can lead to unwanted events such as panel "galloping"
- The ASCE 7-16 standard or equivalent – to make sure it's robust enough to handle earthquake risk
- The IEC 62305 standard – to provide evidence that inverters and other electrical equipment are protected from lightning

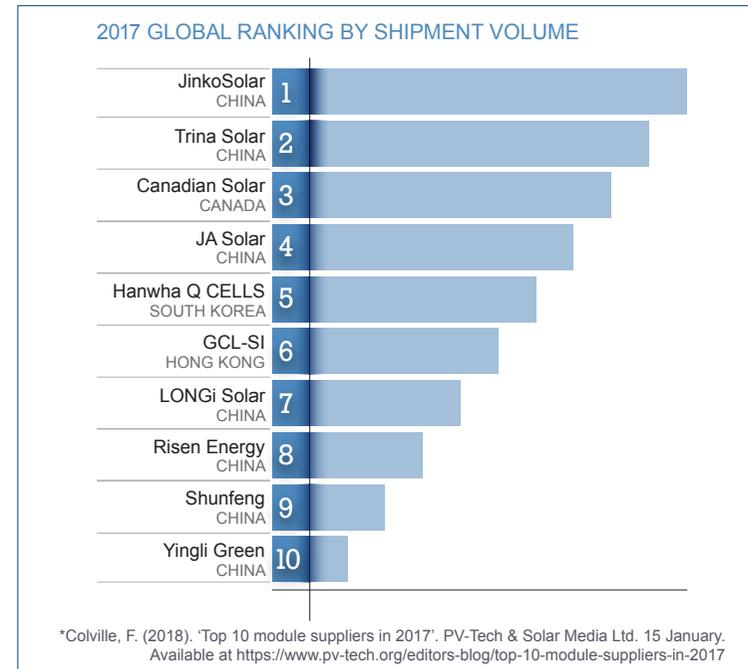


3 THE MANUFACTURING OF PANELS

Faced with rising competition in the market, it's important to ensure a solid manufacturer/supplier is selected. This means you'll need to specify in the contract with your supplier the following:

- Panel warranties – common to see at least 10-year product warranties and 25-year performance warranties
- Module complete specification
- Bill of materials
- Module quality
- Certification
- Point of delivery
- Third-party factory inspections undertaken

Who are the top panel manufacturers right now?



Six considerations to take on board

4 TRACKING SYSTEMS

Solar tracking systems are the main point of contact between the panels and supporting racks, and their flexibility makes them more vulnerable to wind events. If an axis tracking system is needed, it's important to select the right tracker supplier – bearing in mind the wind tunnel testing results.

Claims Insight:

At Liberty, we've seen instances where the tracking system wasn't sufficiently designed for the site's wind conditions, causing major loss of a significant number of panels in the solar PV farm, and the need for further wind tunnel tests and complete redesign.

5 INVERTER WARRANTIES

Not only is it important to ensure the right inverter manufacturer/ supplier is selected, but also to specify in the contract the following:

- Inverter warranties – common to see at least 5-year product warranties and 5-year extensions
- Credible manufacturer
- Inverter complete specification
- Grid compliance
- Certifications
- Point of delivery
- Independent bankability report from the manufacturer (if these can be provided)



6 ENGINEERING EXPERTISE

In recent years, we've seen an influx of construction contractors entering the solar PV field, some with little previous experience. This growth might be promising for the industry, but it's important not to discount experience.

Due diligence needs to be carried out in the selection process, focusing on years of experience and track record in solar PV. We value oversight by a respected owner's engineer, or an experienced independent engineer to verify scope, design, quality and compliance.

Some of the most commonly overlooked areas include:

- Handling of panels – contractors not knowing how to handle and store them, which can lead to issues such as micro-cracking
- Shortcuts in construction, such as securing of panels – with so many panels to install for a typical commercial project, there can be inconsistency and non-compliance in bolt fastening and securing to racks
- Lack of topography or soils knowledge – electrical equipment mounted in flood-vulnerable and/or soil wash-away zones
- Piling procedures and testing – inconsistency and non-compliance

Anything else?

Alongside our six main areas, it's also worth considering:

- Compliance with evolving regulations (AEMO) – for example recent proposals whereby new commercial solar PV or wind farms may need to be installed with synchronous condenser facilities to help strengthen the grid
- Battery storage – if you intend to incorporate this into your project talk to us, as some battery types present elevated risks
- Site security – panels and inverters are expensive and very transportable, leading to theft exposures
- Fixed automatic fire detection and suppression may be desirable for higher-risk plant such as synchronous condensers, switchgear, transformers or battery banks.



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