

Rubber stamping bankability

Plant certification | Certifying the quality and performance of an entire PV array has been a notable development in the past two years. Sara ver Bruggen looks at the extent to which developers, investors and insurers are turning to plant-level certification to guarantee the design, construction quality and performance of a PV system



Credit: First Solar

Several of the top independent solar PV certification agencies now include in their offering to the industry plant- or system-level certification.

Experience gathered in the field by certification agencies, such as VDE and TÜV Rheinland Energy and their partners has shown that the quality of individual components is not enough to predicate the quality and the operational performance of the plant itself. Plant design, planning phases and installation procedures and practices also have an impact.

The perceived need for such comprehensive and holistic types of qualifications has begun to gain currency for several reasons. "In the past the risk was accepted. But as PV plants have emerged as assets, ensuring the technical as well as financial bankability of the plant over its operational lifetime requires qualification that goes further than the component-level," says Willi Vaaßen, director of the Global Competence Centre PV Power Plants, at TÜV Rheinland Energy.

TÜV Rheinland Energy has provided its comprehensive solar power plant certification for projects in Germany, other parts of Europe and Japan. More recently the agency has been promoting certification in emerging solar PV markets, such as South Africa.

The plant certification concept emerged from the findings of a study by the agency between 2012 and 2015, of a sample of PV plants from TÜV Rheinland Energy's global portfolio of 14GW of inspected PV plants. The study's sample comprised 100 separate PV plants, ranging between 100kW and 30MW in size, mostly based in Germany and Europe, but with the US, Africa, the Middle East and Latin America accounting for 20% of the sample.

The main findings of the study revealed that 30% of the plants inspected between 2014 and 2015 showed what the agency classified as "particularly serious" and "serious" defects, including safety issues. More than half of these defects were

due to incorrect procedures or actions during installation. The study concluded that potential-induced degradation (PID) followed by module soiling in arid climates are two of the most common causes of failures and impacts on the performance of PV plant operations.

Growing demand

Certification agency VDE, in partnership with testing house Fraunhofer ISE, has been offering PV plant-level certification for a couple of years. PV developer First Solar has been an early adopter, earning the Quality Tested mark from VDE and Fraunhofer ISE for a PV plant in New Mexico in the US in 2014. In 2015 First Solar's Luz del Norte 141MW solar project in Chile also earned the certification.

"In western Europe, where the level of experience is high, partly because so many projects have been developed in markets, such as Germany and the UK, there was not such a need for this level of certification," says Matthias Jäger, at Allianz Climate Solutions, the renewable energy advisory subsidiary of global insurer Allianz.

Allianz Climate Solutions joined the VDE and Fraunhofer ISE partnership in 2015 to broaden the scope of their Quality Tested qualification by ensuring that all project risks, both financial and technical, are well documented, through the risk assessment, so that they can be understood by the stakeholders.

As new markets have opened up, investors and lenders are starting to call for it. "We have been seeing demand in Turkey, Kazakhstan, the Middle East and North Africa (MENA), including Iran and Egypt, as well as Latin America. Parties such as banks and investors in these new emerging PV markets are afraid to have bad quality projects," says Jäger.

However, for First Solar, not every plant

First Solar's Macho Springs project in New Mexico was the first to receive the VDE/Fraunhofer ISE Quality Tested certificate

it builds has the certification. According to Azmat Siddiqi, senior vice president, quality and reliability at the company the sorts of projects that require the Quality Tested certification are likely to be those that will be sold on once operational. As more private wire power purchase agreement (PPA) commercial projects happen, these may also require the certification. In each case this level of certification provides assurances that the plant will operate reliably over its lifetime and will generate the income and the returns that investors expect.

"Bankability is all about return on investment. Investors want to know if, and also how well, the project was built to standard so its economic performance may be reliably predicted in the pro forma over a 20 or 25 year term," says Siddiqi.

First Solar's first plant to earn the Quality Tested mark, the 50MW Macho Springs plant in New Mexico, was sold on to a new investor, Southern Company subsidiary Southern Power and Turner Renewable Energy, in 2014 after it was built.

"First Solar has always offered module-level certification as part of our terms. The Quality Tested certification has definitely provided further, added assurance of performance at power plant level. While we cannot disclose the terms of the sale for this power plant – which was a pilot offering of the certification – let me say that it definitely enhanced the value and desirability of the asset. So we were able to 'check-off' the bankability aspect of QT certification," says Siddiqi.

As a developer, the onus is on First Solar to obtain the certification. However, different parties involved in a project can require the integrated services from VDE, Fraunhofer ISE and Allianz Climate Solutions, be it a bank or investor, an engineering, procurement and construction (EPC) firm or a future investor, or buyer.

Usually investors and banks order technical due diligence on a project. The certification can replace this technical due diligence and can even go beyond it in terms of risk assessment.

"While technical due diligence focuses on technical risks, the risk assessment also includes financial and macro economical risks. Furthermore the technical assessment includes module testing, in Fraunhofer ISE's labs," says Jäger.

Streamlining procedures

VDE does not want developers and owners to see the certification as an additional cost



Credit: TÜV Rheinland Energy

Electrical engineers from TÜV Rheinland Energy carry out an inspection of a plant in Germany during the commissioning phase. Plant-level certification requires inspections before, during and after project construction

that increases the plant's capital expenditure.

"Complex or large-scale power plant projects often use multiple independent engineers in the course of their project quality assurance. By having a comprehensive standard to refer to, project developers can streamline their quality assurance processes. This streamlining also potentially reduces the number of involved independent engineers, as VDE comes in and performs the quality assurance and certification, resulting in lower costs for overall quality assurance," says John Sedgwick, president of VDE Americas.

The Quality Tested portfolio can be customised on a project-by-project basis. Overall it comprises 300 individual points, or specifications. These can be added to or taken away depending on each project and the customer. There is a minimum pass requirement that must be met in order to receive the certification. Customers have the option of adding additional services that they request, and these extras are mentioned in the final test report.

But broadly, the certification spans several main areas. The first is verifying PV system design, ensuring proper planning and engineering, which includes validating of existing reports such as the energy yield prediction and structural analysis.

Next is proofing selected components for the project, including checking they meet international standards. Then the planning of each installation work package is checked, for example reviewing contracts with various sub-contractors assigned to different parts of the project, from foundation building, to module and inverter installations.

Documentation relating to the actual construction phase is also reviewed, to ensure professional workmanship throughout. The portfolio also covers lab testing of module performance based on samples.

Extensive on-site inspections are also carried out too, including visual inspections

of the installation and the complete system. The safety and functionality of the PV power plant is also reviewed for compliance with latest procedures and standards, in electrical safety and other areas. The PV generation plant is tested on-site to determine the power output of the system.

"The way VDE/Fraunhofer's Quality Tested certification works is that the organisation comes in at the early stage of the project to check design, engineering and component selection, among other things. After construction, we do a site inspection and check the commissioning of the power plant. "We don't just come in after the power plant has been connected to the grid," says Sedgwick.

Educating investors

Vaaßen says it is TÜV Rheinland Energy's aim to have 100% of large-scale PV plants that are built to be evaluated to achieve power plant-level certification status. But he concedes that today the demand for this type of certification is far below the target, saying: "A big part of the challenge is that investors don't know these risks yet. But the more they come to understand these risks the more they will want to have this level of inspection and the certification that comes with it."

TÜV Rheinland Energy is trying to educate investors, as well as lenders and insurers by running workshops to discuss its various findings. "There is a need to overcome a mindset among investors that want to save costs, particularly the capital outlay costs. If they are a developer, for example, they are under pressure to deliver a project within budget and within time, so they want to save money," Vaaßen says.

In Turkey, within the last two years, Allianz Climate Solutions organised a roadshow with the country's main banks and lending institutions, in order to give presentations about the Quality Tested certification.

Other insurers are interested in adopting this certification into their own prequalification services and pre-insurance packages and they are able to compare it against their own insurance requirements. It can be used to reduce or streamline the insurer's own due diligence which they would have to do when putting together their own insurance offer.

Having the Quality Tested certification could serve as a pre-qualification and make it easier for the PV power plant to apply for insurance. VDE, Fraunhofer and Allianz Climate Solutions are working with these insurance companies to make sure that

Quality Tested certification fits their own requirements. "The goal is indeed for insurers to be able to reduce the effort needed for their due diligence," says Keith Punzalan, project manager, market research and external liaisons at VDE Institute in Germany.

There is also work to develop international standards around PV plant-level certification. Historically PV plant components have had to comply with international standards, such as the IEC 61215 standard for PV modules, as an example.

IEC Technical Committee 82 is meeting to discuss several system or installation-related standards, which VDE is contributing to.

Sedgwick thinks plant-level certification will follow on from component-level from the IEC, though exactly when is not known, as the process of designing an international standard can take between three and five years. "It will simplify the process of obtaining this type of plant-level certification as it will standardise, internationally, the procedures and requirements for it," he says.

In the meantime, plant-level certifications that are available to the industry are like a good housekeeping seal of approval in the absence of certification according to international standards. ■

The steps involved in PV plant-level certification

Historically PV plant components have had to comply with international standards, such as the IEC 61215 standard for PV modules, as an example. But this does not take into consideration how a large and often complex PV plant is planned, designed and constructed. Plant-level certifications cover the entire process.

According to TÜV Rheinland Energy, for a PV plant that is 40-50MW in size, the inspections and other work that will be required for the plant to receive the agency's comprehensive solar plant certification can be in the range of 50 man days. These span several days each for the reviewing of the contracts and for the yield data analysis, within the planning phase.

During the plant build, which can take three months or more, inspectors may end up visiting the project either weekly, or three to five times, each spanning one-to-two-day visits, over the course of the build.

Then, acceptance testing can require three to five people and can require a week-long visit to the plant. It is the phase that accounts for half of the man days spent.

Such thorough inspections of plants during planning and installation is becoming more important because of the number of parties involved in delivering large-scale solar plants, says Willi Vaaßen of TÜV Rheinland Energy.

Often, PV plant developers will appoint a main EPC firm, which will then often be under pressure to meet tight deadlines and to reduce the cost of the build. Aspects of the job are sub-contracted out, and often sub-contractors will also sub-contract, according to Vaaßen, all of which can increase the chances of bringing in a provider lacking in knowledge and experience in PV plant development, or avoids taking necessary steps to provide quality assurance during construction in order to save on costs.

In emerging solar markets interest in plant-level qualification is being driven by the higher perceived risks related to project development in these markets. "You could be dealing with installers that are not as experienced as one would like, and whose project development and installation procedures should be verified for completeness. Also, the lack of track record in solar in a particular market means that there is more uncertainty regarding the performance of the PV plant," says VDE Americas president John Sedgwick.

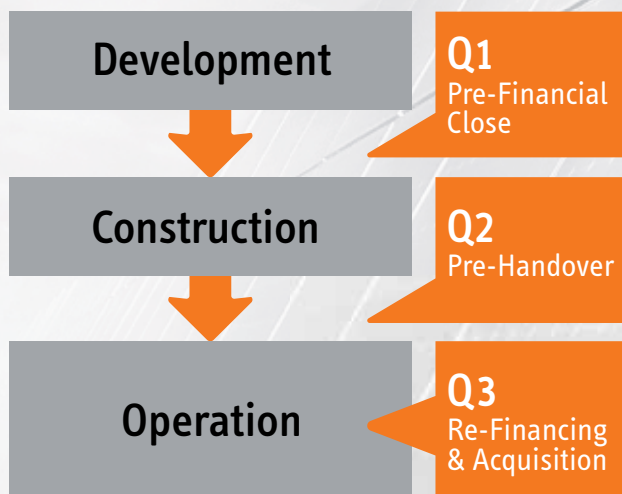


Drones can be used for visual and thermographic inspections of a plant during commissioning.

Credit: TÜV Rheinland Energy

PQ Rating

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