

## **PV Module Reliability Workshop – Discussion Notes**

**Thursday, February 26, 2015**

### **IECRE: PV System Certification Workshop Stakeholders Perspectives Discussion**

- As motivation for standards: “If we can reduce the amount of deliberation, that would be extremely useful” (quote from investor).
- For system-level issues:
  - Incorrect wire management is common.
  - Inverter failures are common; might benefit from location-specific tests.
  - Soldering is most common issue.
- Should use a risk model with frequency/severity numbers to assess risk.
- Washing should be optimized to maximize return on investment.
- Q: Can the standards keep up with the technology?  
A: We intend to write a standard that will be relevant to a PV system for 20 years; should be able to write an operations and maintenance protocol that is applicable to changing technologies.
- For measuring acceleration factors, while measuring activation energies is difficult, it can be possible to use documented failure statistics. These statistics may be more relevant than a component-level test that may be affected by packaging.
- Insurance companies use hail and other data when setting their rates – will be interesting to see how much damage was done to rooftop PV this year in Boston during the wintery weather.
- Standards writing is slow, but our goal is to speed that up.
- The IECRE certification could be pass/fail, but there may be valuable information identified during the review – what should be the role of the report and what should be in the report? There is value in the report; if an independent engineer does a more complete analysis, they should not need to repeat what is in the report.
- The level of detail of the report will depend on the size of the system as indicated in the standards – the approach is unified, but the application can be tailored to the need.
- Q: What will the standard do to reduce the cost of insurance?  
A: Insurance industry may price it higher if we don't have standards and treat all projects at high risk. Underwriters start with base rate and determine credits and debits based on risk pool.
- Residential systems are majority by number or systems, but not by total dollars of investment. What should be covered in IECRE?
- What formula shall we use with severity and risk?
  - Insurance companies develop sophisticated models using frequency and severity numbers for loss cause.
- What is included in soiling test?
  - Fraunhofer DE conducts the test globally based on local site conditions, and reviews O&M practices in place.
  - Model to determine when to wash and when not to wash driven by energy loss.
- Inverter session – equipment vendor has their own reliability assessment criteria. How do standards keep up with technology changes?
  - Use technology and out-of-box thinking to keep up.

- Use a standard approach and tweak only if necessary through learning.
- Address the changing requirements on a component level with failure modes assessment.
- Report failures from the field (through IECRE WG 402) to complement physics-based models which may not be relevant or available initially.
- We don't see quantum jumps in technology that can make standards obsolete, so this may not be such a big problem.
- Is there need for standardization of risk models from insurance to insurance?
  - Some companies do publish (e.g., wind, snow, hurricane, hail, lightning, etc.).
- What is value of IECRE in terms of deliverables? May need balance between easy-to-understand certificates vs. detailed customized reports.
  - All independent engineers' (IE) reports look different based on various best practices and do not relate to any standards. Goal is to have outcome which will provide valuable information along with certificates, something along the lines of IE report.
  - VDE suggested dividing out amount of information necessary in the standard.
  - IE scope will start with baseline of IECRE system and then identify any additional gaps.
  - Underlying methods will be standardized, based on system characterization and/or class.
- How will IECRE fit into broader financial risk model? Site location, deal flow, cost of capital, policy, tax, federal, local, state matters, etc.
  - Reduced risk perception will help lower financing costs.