2015 IECRE: PV System Certification Workshop

IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications (IECRE System)

NREL PV Reliability Workshop
26 Feb 2015
Chair: George Kelly (Sunset Technology)
Today’s Program

• Background and Current Status of the IECRE System (Sandy Butterfield, REMC Chairman)
• Current Status of the PV Sector of IECRE (G. Kelly)
• Stakeholders Perspectives
  – Financers/Investors/Owners
  – Certifying Bodies/Test Laboratories
  – Manufacturers/EPCs/ O&M Providers
• Survey Results (G. Ball)
• Lunch
• Review of PV Rules of Procedure
  – Participants rotate in 4 groups
• Issues to be Resolved (John & Alex)
IECRE PV Survey

• The goal of this workshop is to gather wide input from the PV community, leading to acceptance of the new system by all involved.

• The survey is intended to solicit input on how a PV certification scheme can help meet your needs.

• Please complete a paper copy if you didn’t fill out the survey online when you registered.
## Survey Questions Overview

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<th>SURVEY SECTION</th>
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<td>1</td>
<td>PV Plant Application</td>
<td>To help scope out whether the standards should govern different types and sizes of PV systems or just one size fits all</td>
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<td>2</td>
<td>PV Power Plant Installation Scope</td>
<td>To help identify the governing boundary of the standard i.e., From which point in the plant stage till where</td>
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<td>3</td>
<td>PV Plant Certification</td>
<td>Establish <em>certification types and requirements</em> for the certification bodies to follow within the standard’s scope</td>
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<td>4</td>
<td>Safety and Security of Power Plant</td>
<td>To help identify whether safety and security are areas to address. If so what specifically should be included</td>
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<td>5</td>
<td>Performance Verification and Validation</td>
<td>To identify items regarding performance that should be included in standard and how verification is done on data accuracy, assumptions, and metrics on ongoing basis</td>
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<td>6</td>
<td>Financial Performance</td>
<td>To identify the factors which contribute most to the successful operation of the asset</td>
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Introduction to IECRE

IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications (IECRE System)

NREL PV Reliability Workshop
26 Feb 2015
Sandy Butterfield
PV-OMC Status

Solar PV Operating Management Committee

IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications (IECRE System)

NREL PV Reliability Workshop
26 Feb 2015
George Kelly
IECRE PV Forum

• 18-Sep-2014 in Boulder, CO
  – Participation by 28 individuals representing 6 member body countries, including 4 officers of TC 82
• Initiated activities of PV OMC (per REMC Decision 12/2014) pending election of OMC officers
  – Call for nomination of officers issued in October
• Formed 1 permanent Working Group and 3 temporary Task Groups
• Made 2 formal recommendations to REMC
Recommendations to REMC

- Recommend WG001 should include as many common issues as possible in the RE system rules of procedure.
- Recommend REMC should engage in outreach to financial stakeholders (e.g., PV OMC is planning a series of workshops in Asia, Europe and North America to collect input that can be used to guide future activities)
PV OMC Task Groups

• Three temporary task groups for creation of sector documents (task leaders in parentheses):
  – TG401: Terms of Reference and Scope for PV Rules of Procedure (R. Bedi)
  – TG402: PV Rules of Procedure and applicable standards to be considered for assessments (G. Kelly)
  – TG403: Assessment procedures and documentation required for initial acceptance of CB/TL in the PV sector (S. Rai)

• Documents to be presented for review at next PV OMC meeting
PV OMC Working Group

• PV OMC formed permanent WG401 on Market Surveillance with the following scope:
  – to collect information about problems observed in existing PV systems and
  – to develop statistics over time to analyze trends

• Call for nomination of convenor and WG members circulated to NCs in October

• Some confusion about scope and numbering
Defined Structure of IEC RE
REMC + Committees + Working Groups

REMC
IEC RE Management Committee
One Member / Country

BoA
Board of Appeal

PV OMC
Solar Sector

WE OMC
Wind Sector

ME OMC
Marine Sector

WG 001 RoP
Rules of Procedure

WG 002
Assessment & Audit of QM

WG 003 CTL
Customer Testing Laboratories

WG 004
Promotion and Marketing

WG 005
In infringements

WG 401 RoP
Marketing

WG 402
Laboratories

WG 403 RoP

WG 40x
xy

RoP Task Force

WG 501 RoP

WG 502
Small Wind

WG 503 Certification Bodies

WG 504
OEM's

WG 505 Endusers

WG 506 Test laboratories

Chairman, Vice-Chairman, Treasurer,
WG401 Activities

• **Market Surveillance:**
  – To collect information about problems observed in existing PV systems and to develop statistics over time to analyze trends

• **Marketing:**
  – To promote use of the system within the PV industry

• Agreement to **do both** for now
  – Split into 2 WGs later if needed
PV OMC Officer Elections

• PV OMC Chairman:
  – Adrian Häring (Germany)

• PV OMC Vice-Chairman:
  – Sewang Yoon (Korea)

• Next meeting planned for May 5-6
  – Cologne, Germany
  – Hosted by TUV Rheinland
# PV OMC Members

11 National Committees as of 17-Feb

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USNC/IECRE Status

- Established as standing committee of USNC/CAPCC (like other IEC systems)
- Kickoff teleconference 9-Jan
  - ~100 participants from 3 industries
- Discussed draft of USNC/IECRE rules
  - Final version to be balloted in March
- Election of officers closes 27-Feb
- Next meeting 8-9 April
  - Hosted by NEMA (Rosslyn, VA)
  - Contact Joel Solis, USNC Secretary
IECRE-PV Documents

• PV Rules of Procedure (RoP)
  • Specific requirements for certification of PV power plants
  • First draft circulated in March 2014
  • Will combine work of all 3 TGs
  • Final version to be approved by REMC later in 2015

• PV Operational Documents (OD)
  • Administrative details for processing requests, record-keeping, etc.
Operational Documents

- OD 001 (Draft) Procedures for the Issuing of IECRE-PV Certificates of Conformity, IECRE-PV Test Reports and IECRE-PV Quality Assessment Reports

- OD 002 IECRE-PV Scheme rules
- OD 003 Certificate of Conformity rules
- OD 004 IECRE-PV Scheme Fees
- OD 005 IECRE-PV “On-Line” system
- OD 006 Qualification of PVCB auditors
- OD 007 IECRE-PV Test certificates

- Etc., Etc. Copy from IECEx wherever possible
PV Rules of Procedure

- Scope (TG401)
- Normative references (TG403)
- Terms and definitions (TG401)
- Acceptance of certification bodies (TG402)
- Management of the certification system (TG402)
- Extent of certification (TG401)
- Aspects of certification (TG401/403)
- Final evaluation (TG403)
- Plant certificate (TG402)
RE System Common Elements

IEC-RE System

IEC WT-CAC
Wind System

IEC ME Marine
Energy Scheme

IEC Solar
Energy Scheme

Type
1) Turbine Design
2) Turbine Testing
3) Mfg. Quality

Type
1) ME Design?
2) ME Test?
3) Mfg. Quality?

Type
1) Panel + Converter Design
2) Panel + Converter Test
3) Mfg. Quality

Project
1) Installation
2) Commissioning
3) Operation

Project
1) Installation?
2) Commissioning?
3) Operation?

Project
1) Installation?
2) Commissioning?
3) Operation?
Aspects of Certification

- Conformity assessment will be performed and certificate issued for an individual PV power plant on a specific site

- **Design Phase**
  - General
  - Site conditions evaluation
  - Design evaluation
  - Equipment evaluation
  - Structural and electrical evaluation

- **Implementation Phase**
  - Installation surveillance
  - Output characteristics measurement
  - Commissioning surveillance
  - Operation and maintenance surveillance
PV System Lifecycle

- Different audits may be required at different stages
• Requirements may depend on Operator Class (O) and Location Class (L)
PV Standards for Assessment

IEC Solar Energy Scheme

Type
1) Panel + Converter Design
2) Panel + Converter Test
3) Mfg. Quality

Project
1) Installation?
2) Commissioning?
3) Operation?

Module - 61215 / 61730
Inverter - 62109 / 62891
BOS - 62093 + others

Manufacturing Quality
– 62941 (Committee Draft)

System Design - 62548 / 62738
Installation – local codes
Commissioning - 62446 / 61829
Operation – 61724 + TBD
Maintenance – WG3 NWIP
Ensuring the reliability of PV systems through the selection of International Standards for the IECRE Conformity Assessment System

George Kelly, Sunset Technology, USA
Ted Spooner, UNSW, Australia
Guido Volberg, TUV Rheinland, Germany
Greg Ball, DNV GL, USA
Jonas Bruckner, VDE, Germany
Hardware Assessment

- **PV Modules**
  - IEC 61215 Design Qualification
  - IEC 61730 Module Safety

- **PV Inverters**
  - IEC 62891 Inverter Performance
  - IEC 62109 Inverter Safety

- **Mounting Hardware**
  - UL 2703 Mounting, Clamping, & Grounding Devices
  - TUV PfG 1794 Mounting Systems

- **BOS Components**
  - IEC 62093 BOS Qualification
  - Multiple IEC, EN & UL standards
QMS Assessment

- Guideline for Manufacturing Consistency
  - NWIP developed by PV QA Task Force (PVQAT)
  - Drafted by collaboration of 4 regional teams; collection of best practices from across the industry
  - Refers to basic requirements of ISO 9000, plus...

- Focus on PV-specific manufacturing processes and procedures to ensure quality and consistency
  - Defines key metrics and capabilities needed for PV
  - Modules produced this way will be more likely to perform according to warranty (25+ years)
System Design Assessment

- IEC/TS 62548 PV Array Design Requirements
  - PV system architectures
  - Mechanical design
  - Safety issues
  - Selection and erection of electrical equipment
  - Marking and documentation

- Needs to be coordinated with IEC 60364 series
  - Basic standards for low-voltage electrical installations

- New standard IEC 62738 under development
  - Specific to utility-scale plants
Installation Assessment

• Installation
  – No international standard (partly covered in IEC 62548)
  – Typically controlled by local government requirements
    • NFPA 70 US National Electrical Code
    • IEC 60364 series in Europe
    • Multiple building and fire codes (IBC, IFC, etc.)
    • ASTM E2766 for Steep-sloped Roofs

• Commissioning
  – IEC 62446 covers the most important requirements
  – System output measurement
    • IEC 61829 & 61724
    • ASTM E2848 & E2939
O&M Assessment

• Operation
  – IEC 61724 - guidelines for performance monitoring
  – Solar ABCs report on O&M Fundamentals
  – Sandia Labs O&M working group
  – ASTM Task Group (ICOMP)
    • Comprehensive guideline to available standards
    • Focus on power plant operation

• Maintenance
  – NWIP started in TC82 Working Group 3
    • Includes preventative and corrective maintenance
    • Both safety-related and performance-related
    • Troubleshooting and documentation of results
## RoP Standards Matrix

### Rules of Procedure

**IECRE PV**

### Applicable Standards

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## RoP Standards Matrix

### Rules of Procedure
**IECRE PV**

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Gaps to be Closed

• International Standards Needed:
  – Installation
  – Operation
  – Maintenance

• Standards Development in Process:
  – IEC TC82 – WG2, WG3
  – ASTM E44 - ICOMP
  – UL, TUV-R, VDE
  – SunSpec, Sandia, others
TC82 Areas of activity

• WG2 on Modules
  • Manufacturing quality system guidelines CD
  • Reliability & comparative testing CDs

• WG3 on Systems
  • System commissioning & documentation CDV
  • System operation & maintenance NWIP

• Coordination with ASTM E44
  • Installation, Commissioning, Operations & Maintenance Process (ICOMP)
Ensuring the reliability of PV systems through the formation of the IECRE Conformity Assessment System and the development of new International Standards

George Kelly, Sunset Technology, USA
Adrian Häring, SMA, Germany
Ted Spooner, UNSW, Australia
Greg Ball, DNV GL, USA
Sarah Kurtz, NREL, USA
IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications (IECRE System)

Thank you for your attention

Questions?
Suggestions?
Concerns?

Contact george@sunset-technology.com
Stakeholders’ Perspectives

IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications (IECRE System)

NREL PV Reliability Workshop
26 Feb 2015
Chairs: G. Tamizhmani (TUV/PTL)
and Govind Ramu (SunPower)
Stakeholders’ Perspectives

- Financers/Investors/Owners
  - Jon Previtali, Wells Fargo
  - Mike Roy, Hartford Insurance Group

- Certifying Bodies/Test Laboratories
  - Peter Bostock, VDE
  - Matthias Heinze, TUV Rheinland

10-10:30  COFFEE BREAK
Stakeholders’ Perspectives

- Certifying Bodies/Test Laboratories
  - Tadashi Obayashi, JET

- Manufacturers/ EPCs/ O&M Providers
  - Sumanth Lokanath, First Solar
  - Rue Phillips, True South Renewables
  - Joe Cunningham, Centrosolar
  - Eric Daniels, Field Energy Operations
IECRE PV Survey

• Results presented by Greg Ball (DNV GL)

• **Reminder:**
  Posters will be on display during lunch break
  12:00–1:30
2015 IECRE: PV System Certification Workshop

IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications (IECRE System)

NREL PV Reliability Workshop
26 Feb 2015
Chair: George Kelly (Sunset Technology)
Review of PV Rules

• Participants will rotate in small groups covering key topics:

1. Scope of Certification—Raj Bedi, First Solar
2. Applicable Standards—George Kelly, TC82
3. Mutual Recognition—Sunny Rai, Intertek
4. Personnel Certification—Don Warfield, NABCEP (thrown into the mix by popular demand)
## Small Groups

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Discussion

- John Wohlgemuth (NREL), Alex Mikonowicz (Powermark), and George Kelly (Sunset Technology)

- “How can the certification system we are proposing be most successful in reducing stakeholders’ risk?”

- Are we successfully addressing the issues identified by the participants? What are we missing? What are concerns with the approach? Are we trying to do too much?
Review of PV Rules

• Small group discussions:

1. Scope of Certification—Raj Bedi, First Solar
2. Applicable Standards—George Kelly, TC82
3. Mutual Recognition—Sunny Rai, Intertek
4. Personnel Certification—Don Warfield, NABCEP
   (thrown into the mix by popular demand)
Summary

• Alex’s List
Thank you for your participation

Contact george@sunset-technology.com