Solar America Board of Codes and standards
-- Solar ABCs --
National and International Standards Coordination Panel
June 2008 Meeting Notes

Attendees:

Luis Alegria	Evergreen Solar	Bill Marion	NREL
Gobind Atmaram	FSECr	Peter McNutt	NREL
Howard Barikmo	Sunset Technology	Alex Mikonowicz	SolarWorld
Ward Bower	Sandia	Gary Nakarado	Regulatory Logic
Bill Brooks	Brooks Engineering	Carl Osterwald	NREL
Michael Coddington	NREL	Kurt Scott	Atlas MTT LLC
Keith Emery	NREL	William Shisler	PTL - ASU
Ryan Gaston	Dow Chemical	Mani Govindasamy Tamizhmani	PTL - ASU
Michael Gostein	Atonometrics	Holly Thomas	DOE-GFO
Jennifer Granata	Sandia	Cecile Warner	NREL
Michael Kempe	NREL	Chuck Whitaker	BEW
Sarah Kurtz	NREL	John Wohlgemuth	BP Solar

<Electronic copies of each of the following presentations are available on the Solar ABCs web page>

Monday, June 02, 2008

Welcome and Introductions. Presentations covering

- Intro to Solar ABCs
- Intro to NISC

Carl Osterwald E44.09
Next ASTM E44.09 meeting: Nov 17-18 Miami Beach (ASTM Committee Week)

NOCT issues raised (covered in E1036) Consider writing a separate NOCT measurement standard that takes into account the various mounting configs that a given module might be used. MPPT vs Voc.

Inter-lab Power measurement uncertainty was discussed.

Looked at E1596 document. Real time and accelerated PV module weathering. Jennifer Granata and Kurt Scott were willing to contribute to a new standard (or a revised E1596). But maybe we are too early to write a test procedure to measure life

expectancy. So what testing needs to be done to define appropriate test. Kurt said he would be willing to help make the current version "G3" compliant so that it would at least pass ballot.

E1036 –. Seems like a new standard (pulled out of 1036) would be the best approach for a more thorough module temperature evaluation, but utilizing or referencing the new IEC module temp standard (currently a CD). Ryan Gaston would be willing to work on the NOCT/module temperature issues

Michael Gostein would like to see the objectives and scopes for the prioritized gaps list.

EVA Gel content – Is that going to be pursued (Michael Kemp)? Suggests a mechanical stress test (doesn't creep at 75C or 120C) instead of a gel content test.

Tuesday, June 3, 2008

Sarah would like to spend some time discussing with the group the possibility of having a national database of system performance for a broad variety of systems.

Howard Barikmo: IEC TC82, WG1 - Glossary
Cecile Warner questioned who was on WG 1 from the US (Steve Chalmers was, no one is now), and wondered why there was a dearth of primary English speakers on that committee.

John Wohlgemuth: WG2 – PV Modules
Discussed the apparent lack of progress on adoption of 61730 (Module Safety Testing) by UL. Many felt there should be pressure placed on UL to schedule a meeting to finalize. UL needs to define dates for the process of adopting 61730. This issue should be raised at the next Solar ABCs Steering Committee Meeting. Tim Zgonena was contacted during a break. He has been working to address a requirement in 61730 (All plastics need an Relative Thermal Index) that has been troubling those in Japan and Germany who have been trying to implement the standard. Tim is nearly complete setting up the ability to address this requirement using existing UL standards and a process that will take weeks to months rather than months to years. Promised to have a draft of the revised US 61730 by the end of July, a meeting in the September time frame, and will look at putting together a brief description of the plastics thermal evaluation to forward to the group in advance of the revised standard.

Chuck Whitaker: WG3 – PV Systems, WG6 – Balance of System Components
Gave status update on various documents (see presentation).

Sarah Kurtz: WG7 - Concentrator Modules
Key issues: cell temp vs ambient temp. Flash testing could reasonably be done on concentrators at 25 C for the same reasons as flat plate modules. 1000 W/m^2 vs 850— Sarah says it will probably end up at 1000 for indoor flash testing/module rating 850 for outdoor system-level testing (except where outdoor is used in lieu of flash tests).

Howard Barikmo: JCWG –Small renewable energy and hybrid systems for rural electrification
Showed Alain Schmitt's presentation. Future progress is in question given Alain's retirement.

Alex Mikonowicz: USTAG
went through the USTAG process, access to documents; docs under review.

Discussed 61853-1 (Module power test procedures) went through page by page. John W provided sample data from his in-house testing.

Ended the day with an intro discussion of the Kurtz Ultimate PV Database

Wednesday, June 4, 2008

Michael Coddington: IEEE SCC21
overview of SCC21 activities. Significant activities on 1547 series of Utility Interconnection Standards. Also went over the Renewable System Interconnection project reports.

Peter McNutt: Current SCC21 PV Standards—
current work primarily involves batteries.

The rest of the day was spent discussing potential activities for each of the three standards groups. See Action Items list below

During Lunch, Sarah Kurtz and Cecile Warner led a discussion of the needs for and potential characteristics of a national PV performance and reliability database. What would the purpose/use be? Need to define. A few quality data sets would be better

than a large number of questionable data sets. Extended this discussion to data needs for the PV model validation project.

Next meeting

Fall, Phoenix

Suggestions for Action Items

ASTM:

- NOCT determination document (Gaston, Whitaker, Shisler, Marion, Kurtz
- Gel Content vs Mechanical Stress/Creepage test for encapsulants (Kemp)
- Kurt Scott said he would be willing to help make the current version of E1596 "G3" compliant so that it would at least pass ballot.

IEC:

- Get 61730 adopted by UL
- ASU is going to validate module power and energy rating documents (61853-1, 2, 3).
- Review documents for USTAG
- Enhanced module diode thermal testing (add to 61215, 61646) (Gaston, Shisler, Granata) Prior to next meeting: look for existing general diode test procedure (Gaston to coordinate)

IEEE:

- Module Power Rating
- Products:
    - Module nameplate (start with EN50380, a European standard addressing procurement requirements for PV modules) (Solar ABCs + Luis, Ryan, William, Michael G.) do under IEEE.
        - Year 1: develop draft; IEEE PAR approved
    - Inverter performance (eff/mppt/tolerance) (is this IEEE if IEC is already working on it) (Jennifer, Ward
    - Trackers (is this IEEE if IEC is already working on it) (Jennifer, Ward
    -
- System Power/energy rating (prior to and post installation) (Solar ABCs folk + Jennifer, Marion/Kurtz/Emery/Gaston)
    - Break into pieces decide which pieces to work on now
    - Define user of info and their needs for info to determine what info they will need
    - Model validation? (see below)

    - Simple system power rating
        - pre-sales
        - pre construction
        - post construction
    - Simple system energy rating
    - Model validation plus definition of info to provided to customer
- Derates:
    - Soiling (including snow)
    - Wiring
    - Shading
    - Temperature vs mounting
    - Mismatch
    - Inverter performance
    - Albedo
    - Diffuse vs direct-
    - Radiation models
    - Weather data
    - Load profiles (std alone)

- Develop a procedure for validation PV Performance Models. Will need a consistent set of design information input weather info and measured performance. (see data needs list, attached)

- Module and array dc connectors, especially BIPV (possible candidate for upcoming SAI Supply Chain Development funds—see Ward)

- Standards on cells and wafers—SEMI may be addressing this (IEEE or IEC?)

Modeling Software Verification Database –

The list below is a start at to defining the range of data needs that various programs might need:

- Measured and synthesized weather and performance data for installed systems
  - GHI, POA, DNI, Tamb, WndSpd (at what height), WndDir, RH, Bpress, precip, UV(?), date and time, <spectrum/airmass, atmospheric info for determining spectrum, ref cell>, Albedo
  - Pac, Idc, Vdc, (string level and aggregate), Tmod, date and time
  - Measurement uncertainty
  - Various configurations:
    - Cell Technologies
    - System size
    - Inverters
    - Locations
    - Mounting types
  - 6 mo minimum: at least late winter – late summer, spring preferred over fall; mutli-year preferred
  - Data rate—can any programs handle sub-hourly data?

- System Design information
  - Module
    - Mfg/model
    - Qty
    - 61215 perf info
    - Spectral response
    - Actual power
    - Range/ Std Dev of Vmp and Imp (or other mismatch info such as Vmp/Imp of each module)
    - AOI response
    - Measured IV curves at various irradiance and temp
    - Module position in array by S/N
  - Inverter
    - Mfg/model/SN
    - CEC efficiency data (Eff vs Power and input voltage)
    - Vop range
    - Max power vs voltage
    - Max input or output current
    - Startup/shutdown/Standby/nighttime losses
    -
  - Array electrical design

        - Modules/string
        - #of strings per combiner
        - # of combiner/inverter
        - # of inverters
        - Wiring details (combiner, fusing, etc.)
            - Layout of combiners/inverters/step up transformers
            - Connector losses
            - Conductor sizes and lengths
- Structure
    - Orientation
        - Tilt
        - Azimuth
    - Tracking
        - 1 or 2 axis
        - Axis orientation
        - Axis tilt
        - Tracking limits
        - Backtracking
        - Wind stow
        - Tracking Accuracy
    - Type (roof integrated, ground mount, etc.)
    - Other issues that impact thermal or optical performance
        - Standoff height
        -
    -
- Array design
    - Spacing (E-W, N-S)
    -
- Detailed Shading information (hourly/daily/monthly)
- Detailed Soiling info (what period, what kind of bird)