IEC 62670 Update

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NREL PV Module Reliability Workshop

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History and Background

- Began as CPV version of IEC 61853-1
  - PV module performance testing and energy rating - Irradiance and temperature performance measurements and power rating
- Lacked the necessary foundation of CPV standards
- Now an umbrella/placeholder for CPV module performance assessment methods

Basic Needs in CPV Standards:

Standard Conditions

- PV: IEC 61215 (PV Module Qualification)
- CPV: IEC 62670-1
- Project Leader: Sandheep Surendran
- Status: Targeted for voting by national committees in Spring 2012

Basic Needs in CPV Standards:
Reference Spectrum for DNI

- PV: IEC 60904-3 - Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data
- CPV: IEC 60904-3 Ed 3.
- Project Leader: Keith Emery
- Status:
  - Draft being circulated presently
  - Targeting voting by national committees in Spring 2012

Basic Needs in CPV Standards:

Power Measurement Methods

- PV: IEC 60904-1 - Measurement of photovoltaic current-voltage characteristics
- CPV: IEC 62670-3 (expected)
- Project Leader: Sandheep Surendran / TBC
- Status:
  - Methods have been under development
  - Targeting publication in 2014

Basic Needs in CPV Standards:
Solar Simulator Requirements

- PV: IEC 60904-9 - Solar simulator performance requirements
- CPV: IEC 60904-11 (?)
- Project leaders: Liang Ji and Steve Askins
- Status:
  - Requirements are currently under development

IEC 62670-1
Standard Conditions

- Concentrator Standard Test Conditions
  - Analogous to PV STC (IEC 61215)
- Concentrator Standard Operating Conditions
  - Analogous to PV standard reference environment for NOCT measurement (IEC 61215)

IEC 62670-1
Standard Conditions

Parameter	CSTC	CSOC
DNI	1000 $W \cdot m^{-2}$	900 $W \cdot m^{-2}$
Temperature	25 °C (cell)	20 °C (ambient)
Wind Speed	n/s	2 $m \cdot s^{-1}$
Spectrum	Direct normal AM1.5 spectral irradiance distribution consistent with conditions described in IEC 60904-3.	

IEC 62670-1
Standard Conditions

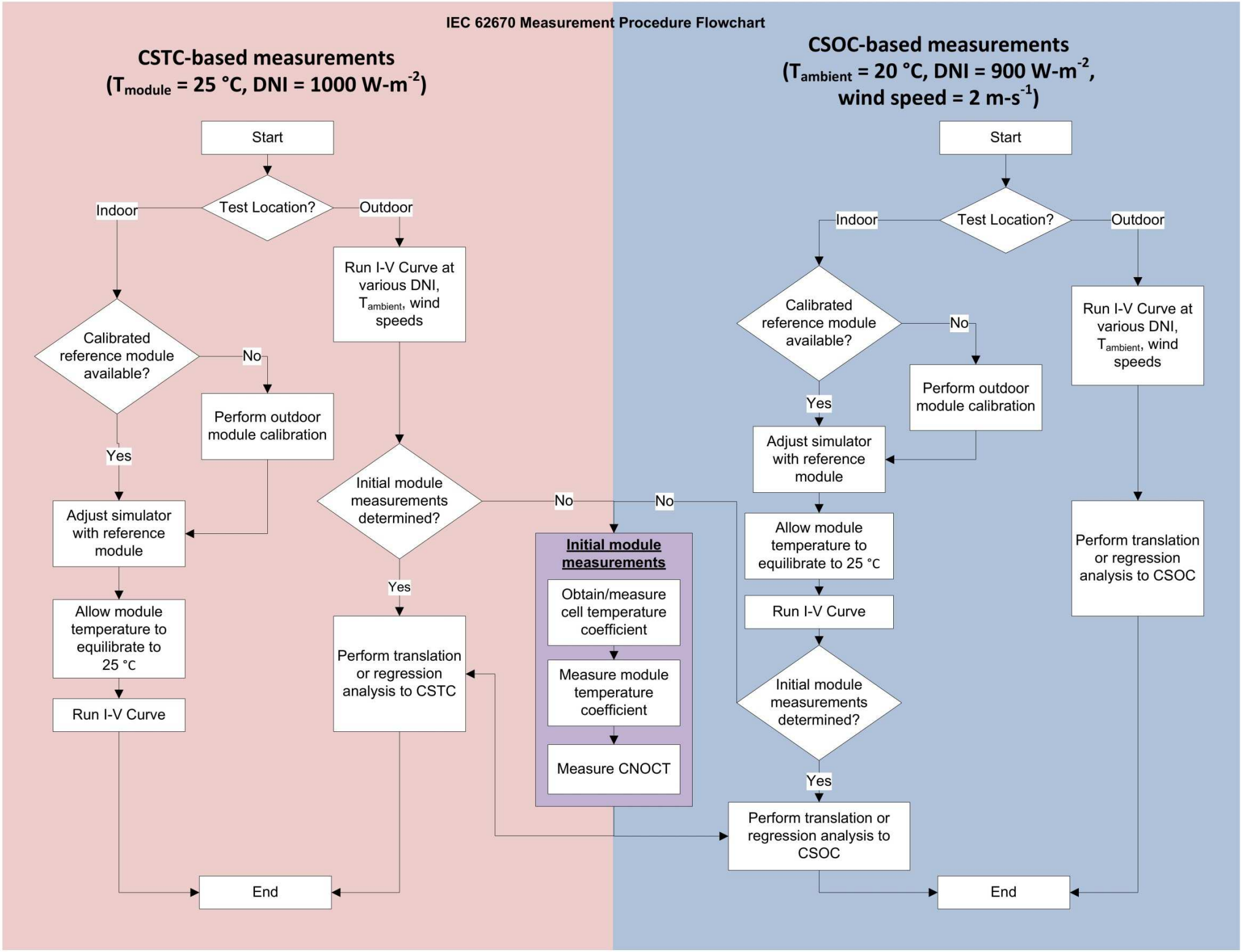
Parameter	CSTC	CSOC
DNI	1000 $W \cdot m^{-2}$ vs. 1000 $W \cdot m^{-2}$ GNI	900 $W \cdot m^{-2}$ vs. 800 $W \cdot m^{-2}$ GNI
Temperature	25 °C (cell)	20 °C (ambient)
Wind Speed	n/s	2 $m \cdot s^{-1}$ vs. 1 $m \cdot s^{-1}$
Spectrum	Direct normal AM1.5 spectral irradiance distribution consistent with conditions described in IEC 60904-3.	

IEC 62670-2
Energy Rating

- Empirical method for predicting system performance based on extended duration monitoring and analysis
- Project Leader: Pierre Verlinden
- Targeting publication December 2012

IEC 62670-3
Power Rating Methods

- Indoor and outdoor methods for assessing module power at CSTC and CSOC
- Method for assessing angular misalignment sensitivity


IEC 62670 Measurement Procedure Flowchart
CSTC-based measurements
(T_{module} = 25 °C, DNI = 1000 W-m^{-2})
CSOC-based measurements
($T_{ambient}$ = 20 °C, DNI = 900 W-m^{-2}, wind speed = 2 m-s^{-1})
Start
Test Location?
Indoor
Outdoor
Calibrated reference module available?
No
Yes
Perform outdoor module calibration
Adjust simulator with reference module
Allow module temperature to equilibrate to 25 °C
Run I-V Curve
Run I-V Curve at various DNI, $T_{ambient}$, wind speeds
Initial module measurements determined?
No
Yes
Initial module measurements
Obtain/measure cell temperature coefficient
Measure module temperature coefficient
Measure CNOCT
Perform translation or regression analysis to CSTC
Perform translation or regression analysis to CSOC
End

IEC 62670-X
Spectral and Cell Temp Effects

- Project Leader: Kenji Araki
- Currently under development/discussion