IEEE SCC21 Overview/Status
IEEE Standards Coordinating Committee 21 on Fuel cells, Photovoltaics. Dispersed Generation, and Energy Storage

Richard DeBlasio
SCC21 Chair/IEEE Standards Board Member/U.S. Liaison to DOE

Thomas Basso
SCC21 Secretary

IEEE SCC21 Meeting
Las Vegas, NV
August 2, 2006

SCOPE  The IEEE Standards Coordinating Committee 21 oversees the development of standards in the areas of fuel cells, photovoltaics, dispersed generation, and energy storage, and coordinates efforts in these fields among the various IEEE societies and other affected organizations to insure that all standards are consistent and properly reflect the views of all applicable disciplines.

Reviews all proposed IEEE standards in these fields before their submission to the IEEE-SA Standards Board for approval and coordinates submission to other organizations.
IEEE SCC21 Officers

R. DeBlasio – SCC21 Chair (IEEE Standards Board Member and Liaison to U.S. DOE)
S. Chalmers – SCC21 Vice Chair
T. S. Basso – SCC21 Secretary
W. Ash – IEEE Staff Liaison

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J. Daley (Chair 1547.1)
D. Dawson (PES)
W. Feero (Protection Relay Committee)
F. Goodman (Chair P1547.3)
K. Hecht (Fuel Cells)
J. Koepfinger (Chair P1547.6; IEEE Standards Board Member Emeritus/PES)
J. Bzura (Vice Chair P1547.6)
B. Kroposki (Chair P1547.4)
R. Saint (Chair P1547.2; National Rural Electric Cooperative)
D. Bassett (Vice Chair P1547.2)
M. N. Satyanarayan (Chair P1547.5)
T. Zgonena (UL Liaison)

WG Chair and IEEE SCC21 Standards Activity Development Status:


(IEEE 1547 Developed By National Team of 444 Professionals)

WG Chair and IEEE SCC21 Standards Activity Development Status (continued)


WG Chair and IEEE SCC21 Standards Activity Development Status (continued)


B. Kroposki IEEE Std 1526 (2003) Recommended Practice For Testing the Performance Of Stand Alone Photovoltaic (PV) Systems

WG Chair and IEEE SCC21 Standards Activity Development Status (continued)


J. Chamberlin IEEE Std. 1145 (1999) IEEE Recommended Practice For Installation and Maintenance of Nickel-Cadmium Batteries for PV Systems -- Work group decided to allow administrative withdrawal Dec 2004
WG Chair and IEEE SCC21 Standards Activity Development Status (continued)


Inactive IEEE SCC21 Stds. (continued)


Withdrawn  **IEEE Std. 1021 IEEE Recommended Practice for the Utility Interconnection of Small Wind Energy Conversion Systems - Withdrawn 5/1996.**

Withdrawn  **IEEE Std. 1035 IEEE Recommended Practice: Test Procedure for Utility Interconnected Static Power Converters - Withdrawn 5/95.**

Withdrawn  **IEEE Std. 1094 IEEE Recommended Practice: Test Procedure for Utility Interconnected Static Power Converters - Withdrawn 5/95.**

Withdrawn  **P1373 Draft – Recommended Practice for Field Test Methods and Procedures for Grid-Connected Photovoltaic (PV) Systems – PAR withdrawn**
Inactive IEEE SCC21 Stds. (continued)

Withdrawn IEEE Std. 1145 IEEE Recommended Practice For Installation and Maintenance of Nickel-Cadmium Batteries for PV Systems - Withdrawn 12/2004

Withdrawn IEEE Std. 1144-1996 IEEE Recommended Practice for Sizing Nickel/Cadmium Batteries for Photovoltaic Applications - withdrawn; ongoing IEEE projects will incorporate these topics

Withdrawn IEEE Std. 1262-1995 IEEE Recommended Practice For Qualification Of Photovoltaic (PV) Modules -- Revision lapsed as per WG recommendation.


Withdrawn P1479 Draft Recommended Practice For The Evaluation of Photovoltaic (PV) Module Energy Production - PAR approved Sept 1996; lapsed due to lack of industry participation.

Federal 2005 Energy Policy Act Cites and Requires IEEE Std. 1547 (IEEE 1547 Developed By National Team of 444 Professionals)
The interconnection system (within the dotted line) is designed to handle the power between and serve as the communication and control gateway among the DER, the Area EPS and the customer loads. Workshops with industry provided a forum for furthering this activity and several manufacturers are working on developing and validating standardized, advanced, universal interconnection technologies [NREL/SR-560-32459].
IEEE SCC21 1547 Series of Interconnection Standards


P1547.6 Draft Recommended Practice for Interconnecting Distributed Resources Distribution Secondary Networks

P1547.3 Draft Guide for Monitoring, Information Exchange and Control of DR Interconnected with EPS

P1547.2 Draft Application Guide for IEEE 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems

P1547.5 Draft Technical Guidelines for Interconnection of Electric Power Sources Greater Than 10 MVA to the Power Transmission Grid

Guide for Impacts

P1547.4 Draft Guide for Design, Operation, and Integration of Distributed Resource Island Systems with Electric Power Systems


DP Specifications & Performance (includes modeling)

Current SCC21 Interconnection Projects

<table>
<thead>
<tr>
<th>Title</th>
<th>Scope &amp; Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE Std 1547™ (2003) Standard for Interconnecting Distributed Resources with Electric Power Systems</td>
<td>• This Standard establishes criteria and requirements for interconnection of distributed resources (DR) with electric power systems (EPS). • This document provides a uniform standard for interconnection of distributed resources with electric power systems. It provides requirements relevant to the performance, operation, testing, safety considerations, and maintenance of the interconnection.</td>
</tr>
</tbody>
</table>

IEEE Std 1547.1 (2005) Standard for Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems | • This Standard specifies the type, production, and commissioning tests that shall be performed to demonstrate that interconnection functions and equipment of a distributed resource (DR) conform to IEEE Std 1547. • Interconnection equipment that connects distributed resources (DR) to an electric power system (EPS) must meet the requirements specified in IEEE Standard 1547. Standardized test procedures are necessary to establish and verify compliance with those requirements. These test procedures must provide both repeatable results, independent of test location, and flexibility to accommodate a variety of DR technologies. |
### Current SCC21 Interconnection Projects

<table>
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| P1547.2™ Draft Application Guide for IEEE Standard 1547 for Interconnecting Distributed Resources with Electric Power Systems | • This Guide provides technical background and application details to support the understanding of IEEE 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems.  
• This document facilitates the use of IEEE 1547 by characterizing the various forms of distributed resource technologies and the associated interconnection issues. Additionally, the background and rationale of the technical requirements are discussed in terms of the operation of the distributed resource interconnection with the electric power system. Presented in the document are technical descriptions and schematics, applications guidance and interconnection examples to enhance the use of IEEE 1547.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| P1547.3™ Draft Guide for Monitoring, Information Exchange and Control of Distributed Resources Interconnected with Electric Power Systems | • This document provides guidelines for monitoring, information exchange, and control for distributed resources (DR) interconnected with electric power systems (EPS).  
• This document facilitates the interoperability of one or more distributed resources interconnected with electric power systems. It describes functionality, parameters and methodologies for monitoring, information exchange and control for the interconnected distributed resources with, or associated with, electric power systems. Distributed resources include systems in the areas of fuel cells, photovoltaics, wind turbines, microturbines, other distributed generators, and, distributed energy storage systems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| P1547.4™ Draft Guide for Design, Operation, and Integration of Distributed Resource Island Systems with Electric Power Systems | • This document provides alternative approaches and good practices for the design, operation, and integration of distributed resource (DR) island systems with electric power systems (EPS). This includes the ability to separate from and reconnect to part of the area EPS while providing power to the islanded local EPSs. This guide includes the distributed resources, interconnection systems, and participating electric power systems.  
• This guide is intended to be used by EPS designers, operators, system integrators, and equipment manufacturers. The document is intended to provide an introduction, overview and address engineering concerns of DR island systems. It is relevant to the design, operation, and integration of DR island systems. Implementation of this guide will expand the benefits of using DR by targeting improved electric power system reliability and build upon the interconnection requirements of IEEE 1547.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
### Current SCC21 Interconnection Projects

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<tr>
<td>P1547.5 Draft Technical Guidelines</td>
<td>• This document provides guidelines regarding the technical requirements, including design, construction, commissioning acceptance testing and maintenance /performance requirements, for interconnecting dispatchable electric power sources with a capacity of more than 10 MVA to a bulk power transmission grid.</td>
</tr>
<tr>
<td>for Interconnection of Electric Power</td>
<td>• The purpose of this project is to provide technical information and guidance to all parties involved in the interconnection of dispatchable electric power sources to a transmission grid about the various considerations needed to be evaluated for establishing acceptable parameters such that the interconnection is technically correct.</td>
</tr>
<tr>
<td>Sources Greater Than 10 MVA to the Power</td>
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<tr>
<td>Transmission Grid</td>
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<tr>
<td>P1547.6 Draft Recommended Practice</td>
<td>• This standard builds upon IEEE Standard 1547 for the interconnection of distributed resources (DR) to distribution secondary network systems. This standard establishes recommended criteria, requirements and tests, and provides guidance for interconnection of distribution secondary network system types of area electric power systems (Area EPS) with distributed resources (DR) providing electric power generation in local electric power systems (Local EPS).</td>
</tr>
<tr>
<td>for Interconnecting Distributed Resources</td>
<td>• This standard focuses on the technical issues associated with the interconnection of Area EPS distribution secondary networks with a Local EPS having DR generation. The standard provides recommendations relevant to the performance, operation, testing, safety considerations, and maintenance of the interconnection. In this standard consideration is given to the needs of the Local EPS to be able to provide enhanced service to the DR owner loads as well as to other loads served by the network. Equally, the standard addresses the technical concerns and issues of the Area EPS. Further, this standard identifies communication and control recommendations and provides guidance on considerations that will have to be addressed for such DR interconnections.</td>
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<tr>
<td>With Electric Power Systems Distribution</td>
<td></td>
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<tr>
<td>Secondary Networks</td>
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</table>

### States with Interconnection Mandates prior to 2005 EPACT

- IA, ME, MN, and others are in process or being considered.
- And FERC, RTOs/ISOs, MADRI, and others are in process or considering interconnection.

Source: Navigant Consulting, Inc. 2005
Contact Information

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• NREL
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• IEEE SCC21 -- IEEE Standards Coordinating Committee 21 on
  Fuel Cells, Photovoltaics, Dispersed Generation, & Energy Storage
  http://grouper.ieee.org/groups/scc21/

• IEEE Std 1547 Series of Interconnection Standards --
  http://grouper.ieee.org/groups/scc21/dr_shared/