IEEE Power & Energy Society
Wind & Solar Power Coordinating Committee
2016 Annual Report

http://sites.ieee.org/pes-wspcc/

Chair:	Debra Lew
Vice-Chair:	Robert Zavadil
Secretary:	Durgesh Manjure
Technical Committee Program Chair:	Andrew Leon
Web Master:	Miaolei Shao

The role of WSPCC is to 1) coordinate wind and solar activities within PES and ensure that critical issues are addressed while minimizing overlap, and 2) to coordinate PES work with relevant industry groups such as AWEA, UVIG, NREL, NERC, and CIGRE.

1. Significant Accomplishments:

Wind and solar power continues to grow at a rapid pace in the utility industry and commensurate with that growth, activities in this area have also grown quickly. In 2016, WSPCC coordinated across 20 different subcommittees, working groups or task forces on various aspects of wind and solar, as shown in Table 1.

Table 1 – Summary of Existing Wind and Solar Subcommittees, Working Groups, and Task Forces in PES Technical Committees in 2016.

PES Committee	SC, WG or TF Name	SC, WG or TF Leader & Email
Analytic Methods for Power Systems (Joydeep Mitra mitraj@msu.edu)	Capacity Value of Solar TF under Reliability, Risk and Probability Applications SC	Chris Dent is Vice-chair of SC and lead of TF (chris.dent@durham.ac.uk)
	EMT Modeling of Wind Turbine Generators and Parks TF under former General Systems SC of T&D	Juan Martinez-Velasco (Martinez@ee.upc.edu)
Electric Machinery (Kiruba Haran kharan@illinois.edu)	Wind Energy Machines and Systems SC	Mohamed El-Sharkawi (elsharkawi@ee.washington.edu)
Energy Development & Power Generation - (Mike Basler mikebasler@basler.com)	Distributed Energy Resources SC	K. Strunz (kai.strunz@tu-berlin.de)
	Integration of Renewable Energy SC	Tom Key (tkey@epri.com)
	Wind and Solar Plant Collector Design WG	Doug Price (doug.price@dnvgl.com)
	Wind Farm Collector System Grounding for Personal Safety TF	Gopal Padmanabhan (Gopal.Padmanabhan@res-americas.com)
	Wind and Solar Power Plants System Impacts and Interconnection Requirements WG	Chris Brooks (cbrooks@thinkesc.com)
	Renewable Technologies SC	Rama Ramakumar (rama.ramakumar@okstate.edu)
	Technologies for GHG Mitigation & Adaptation SC	Pengwei Du (pengwei.du@ercot.com)
Power System Dynamic Performance (Pouyan Pourbeik ppourbeik@peace-pllc.com)	Dynamic Performance of Renewable Energy Systems WG	Pouyan Pourbeik (ppourbeik@peace-pllc.com)
Power System Operation, Planning & Economics (Hong Chen hong.chen@pjm.com)	Integration of Wind and Solar Generation into Power System Operations TF	Jianhui Wang (jianhui.wang@anl.gov)
	Bulk Power System Operations with Variable Generation TF	Aidan Tuohy (atuohy@epri.com)
	Conventional & Renewable Energy Supply Planning TF	Joseph Yan (joseph.yan@sce.com)
Power System Relaying & Control (Mike McDonald mikemcdonald@ameren.com)	Modifications to Fault Study Programs for Wind Turbine Generators WG (PSRC CTF24)	Sukumar Brahma (sbrahma@nmsu.edu) or Evangelos Farantatos (efarantatos@epri.com)
	Guide for Protection of Wind Plants WG (PSRC CTF25)	Martin Best (mbest@ucseng.com)
Surge Protective Devices (Ronald Hotchkiss ronhotchkiss@msn.com)	Wind Power Facilities Electrical Protection Guide WG	Kenneth Brown (kbrown@leviton.com)
	Photovoltaic Facilities Electrical Protection Guide WG	A.J. (Tony) Surtees (surtees@ieee.org)
Transformers Steve Antosz (santosz@comcast.net)	Standard Requirements for Wind Turbine Generator Transformers WG P60076-16	David Buckmaster (dbuckmaster@tfllc.us)
	Guide for Application in Distributed Photovoltaic Transformers in Power Generation Systems WG PC57.159	Hemchandra Shertukde (shertukde@hartford.edu)

During the 2016 PES General Meeting in Boston, there were 42 wind and solar-related sessions, as shown in Table 2.

Table 2 – Summary of Wind and Solar Related Sessions at 2016 PES General Meeting in Boston.

Day/Time	Session Type	Title
Sunday 8-5	Tutorial	Energy Forecasting in the Smart Grid Era (SB Back Bay B)
Monday 1-5	Panel Session	Offering, pricing and managing uncertainty and variability in power system operations with significant renewable energy integration (HC-201)
Monday 1-4	Panel Session	Opportunities and challenges for international integration and multi-sector coordination of energy systems (SB-Constitution A)
Monday 1-5	Paper Session	Best Conference Papers on Planning, Operations, and Electricity Markets (HC-202)
Monday 3-5	Panel Session	Stochastic Modeling and Analysis of Distribution Systems/Microgrids (HC-210)
Monday 3-5	Panel Session	International Interconnection Requirements for Renewable Energy Plants (HC-209)
Monday 5-8	Poster Session	Wind and Solar Power Coordinating Committee Poster Session (HC-Hynes Hall D)
Monday 5-8	Poster Session	Energy Development and Power Generation Poster Session (HC-Hynes Hall D)
Monday 5-8	Poster Session	PSDP Monday Evening Poster Session (HC-Hynes Hall D)
Monday 5-8	Poster Session	PSPI Committee Poster Session (HC-Hynes Hall D)
Monday 5-8	Poster Session	PSACE DSAS Poster (HC-Hynes Hall D)
Monday 5-8	Poster Session	PSACE SES Poster (HC-Hynes Hall D)
Tuesday 8-10	Transactions Paper Session	Transactions Paper Session T03 (HC-110)
Tuesday 8-10	Panel Session	Impacts of Environmental Regulations on Power Markets: Mechanism Design, Equilibrium Analysis and Economic Evaluation (SB-The Fens)
Tuesday 8-10	Panel Session	Incentive Compatible Pricing, Payment, and Cost Allocation of Market-Based Grid services (SB-Public Garden)
Tuesday 8-10	Panel Session	Implications of DG Interconnection Requirements (HC-101)
Tuesday 8-12	Panel Session	Operating the power system without synchronous generators (SB-Republic A)
Tuesday 8-12	Panel Session	Optimal Integration of Variable Renewable Generation into Power Systems – Grid Expansion vs. other Flexibility Options
Tuesday 8-12	Panel Session	Harnessing Power Electronics for System Stability through Feedback Control of FACTS, HVDC and Wind Power Plants
Tuesday 8-12	Panel Session	Microgrid and DERs in the Evolving Distribution System
Tuesday 8-5	Tutorial	Microgrids: Overview, Design, Analysis, Operation, Control, and Applications (HC-201)
Tuesday 9-12	Panel Session	Modernizing Grid Planning with DER in New England: New Methods for Determining Distribution System-Wide Hosting Capacity and Locational Value of DER
Tuesday 10-11	Panel Session	Working Group: Sustainable Energy Systems for Developing Communities (SB-Fairfax B)
Tuesday 10-12	Panel Session	Stochastic Methods for Power System Modelling, Control and Optimization (SB-Public Garden)
Tuesday 1-2:30	Panel Session	Future of the grid in MA (HC-206)

Tuesday 1-3	Transactions Paper Session	Transactions Paper Session T15 (HC-111)
Tuesday 1-4	Panel Session	Framework of Sustainable Energy System: Green and Reliable Perspectives (SB-Fairfax A)
Tuesday 1-4	Panel Session	Current R&D in Photovoltaics: technology and grid (SB-Gardner)
Tuesday 3-5	Panel Session	Flexible Energy Systems (SB-Jamaica Pond)
Tuesday 3-5	Transactions Paper Session	Transactions Paper Session T22 (HC-110)
Wednesday 8-10	Transactions Paper Session	Transactions Paper Session T05 (HC-110)
Wednesday 8-12	Panel Session	New Power System Planning (SB-Republic B)
Wednesday 10-12	Transactions Paper Session	Transactions Paper Session T24 (HC-110)
Wednesday 10-12	Panel Session	Challenges in Design of Wind and Solar Power Plant Grounding System for Personal Safety (SB-Berkeley)
Wednesday 10-12	Panel Session	New England Innovating Technology and Standards for Grid Integration of Distributed Energy Resources and Microgrids (HC-206)
Wednesday 8-11	Panel Session	Smart Integrated Renewable Energy Systems (SB Liberty A)
Wednesday 8-12	Panel Session	Reactive Power Capabilities of Wind Turbine Generators and Representation in Load Flow Studies (HC-208)
Wednesday 1-3	Transactions Paper Session	Transactions Paper Session T01 (HC-109)
Wednesday 1-3	Panel Session	Advanced Inverter Functions for Massachusetts Solar Carve-Outs and Renewable Portfolio Standards (SB-Gardner)
Wednesday 1-5	Super Session	Managing Demand in a Variable Supply World (HC-210)
Thursday 8-10	Panel Session	EMT-type Wind Generator Models: Benchmarks and Demonstrations of Applications (SB-Boston Common)
Thursday 1-4	Panel Session	Challenges to Operate a Large Transmission Grid with minimal or No Connected Synchronous Generators – Going Towards 100% Penetration of Power Electronics-Interfaced Generation (SB-Gardner)

The 2016 PES General Meeting in Boston also included 21 wind and solar-related committee meetings as shown in Table 3. These include 1 by EMC, 5 by EDPG, 3 by PSDP, 2 by PSO, 3 by PSPI, 6 by T&D, and 1 by WSPCC.

Table 3 – Summary of Wind and Solar Related Committee Meetings at 2016 PES General Meeting in Boston.

Day/Time	Committee	Title
Sunday 2-5	PSDP	CIGRE JWG C4/C6.35/CIRED Modeling and Dynamic Performance of Inverter Based Generation in Power System Transmission and Distribution Studies (SB-Riverway)
Monday 11-12	EDPGC	IPSC Distributed Generation WG (SB-Exeter)
Monday 11-12	PSPI	Energy Forecasting WG Meeting (SB-Back Bay A)
Monday 3-4	EDPGC	EDPGC Renewable Technologies Subcommittee (Olmstead)
Monday 3-5	PSPI	Conventional And Renewable Energy Supply Planning WG (SB-Back Bay A)
Monday 4-5	EDPGC	RTSC-Photovoltaics WG (SB-Exeter)
Tuesday 5-6	EDPGC	EDPGC Distributed Generation and Energy Storage Subcommittee (SB-Back Bay C)
Tuesday 8-10	T&D	Wind Farm Collector System Grounding for Personal Safety TF (SB-Jamaica Pond)
Tuesday 9-12	T&D	Distributed Resources Integration WG (SB-Liberty B)
Tuesday 10-11	T&D	EMT-type Modeling of Wind Turbine Generators and Parks TF (SB-Beacon G)
Tuesday 10-11	PSPI	Modern and Future Distribution System Planning WG (SB-Back Bay A)
Tuesday 10-12	T&D	Wind & Solar Plant Collector System Design WG (SB-Backbay C Pond)
Tuesday 1-3	PSDP	PSDP Working Group on Dynamic Performance of Renewable Energy Systems (HC-208)
Tuesday 2-4	PSDP	PSDP Task Force on Contribution to Bulk System Control and Stability by Distributed Energy Resources Connected at Distribution Networks (SB-Dalton)
Tuesday 5-6	EDPGC	EDPGC Distributed Generation and Energy Storage Subcommittee (SB-Back Bay C)
Tuesday 5-7	EMC	EMC Renewable Energy Machines & Systems Subcommittee Meeting (SB-Fairfax A)
Wednesday 8-9	PSO	Task Force Meeting on Advanced Future Bulk Power Systems with Massive Distributed Resources (SB-Jamaica Pond)
Wednesday 8-10	WSPCC	Wind and Solar Plant Collector Design Working Group (SB-Boston Common)
Wednesday 1-3	T&D	Wind & Solar Power Plants System Impacts & Interconnection Requirements WG (SB-Jamaica Pond)
Wednesday 4-5	T&D	Integration of Renewable Energy into the T&D Grids Subcommittee (SB-Liberty C)
Thursday 12-1	PSO	Task Force Meeting on Bulk Power System Operations with Variable Generation (SB-Boston Common)

In 2016, PES requested liaisons to SCC21, which, among other activities, oversees the standard for interconnection requirements for distributed resources (P1547 which is currently under revision) as well as the smart grid series 2030. Debra Lew of WSPCC, in conjunction with Chris Searles from the Energy Storage and Stationary Battery Committee, have become the liaisons from PES to SCC21. Debra and Chris have met with the SCC21 and P1547 officers to better understand their goals and activities and have begun attending regular committee meetings.

2. Benefits to Industry and PES Members from the Committee Work:

In its role as a coordinating committee, WSPCC provides the following benefits to the industry and PES members.

WSPCC assists PES Technical Committees in initiating new wind and solar-related activities. For example, during the annual WSPCC meeting at the PES GM, it was recommended that a best practice handbook on wind and solar integration was needed. This concept is now being implemented by Charlie Smith in the Nov/Dec 2017 issue of the IEEE PES Magazine in which articles will focus on: lessons learned and best practices in renewables integration; storage; wind/solar forecasting; distributed energy resources; inertia-less power systems; markets; and how generation and transmission planning needs to evolve with higher levels of renewables. Over 50 co-authors are in the process of writing these articles.

WSPCC keeps PES members and Technical Committees informed of and coordinated on solar and wind activities within PES. This helps PES Technical Committees identify potential collaborations and avoid unnecessary overlap. For example, WSPCC became aware of a potential overlap in in scope between the T&D/Distribution Subcommittee/Distribution Resources Integration Working Group and the EDPG/Integration of Renewable Energy into T&D Grids Subcommittee/System Impacts and Interconnection Requirements of Wind and Solar Power Plants Working Group. WSPCC is working with the involved groups so that work scopes that do not overlap can be defined and liaisons between groups to facilitate coordination can be established.

3. Benefits to Volunteer Participants from the Committee Work:

As a coordinating committee, WSPCC does not write standards or conduct technical work. Rather, it coordinates wind and solar activities among PES Technical Committees. WSPCC is a resource for members who want to get more involved with wind and solar. WSPCC can help direct members who are seeking deeper involvement in specific technical areas.

4. Recognition of Outstanding Performance:

At the July PES GM, WSPCC recognized outgoing Chair Richard Piwko for his decade-plus of service in leading the WSPCC. Richard initiated WSPCC in 2005 and served as Chair until 2016. During this time, Richard led WSPCC through a very fast growth of industry interest in this area, saw WSPCC through PES reorganizations, and fostered coordination between WSPCC and outside organizations. Richard's service is very much appreciated by WSPCC and PES.

5. Coordination with Other Entities (PES Committees, CIGRE, standards, etc.):

WSPCC maintains liaisons with other organizations that work on wind and solar power. These reports are included in WSPCC's annual meeting minutes. Reports from the 2016 Boston meeting included:

- UVIG – Charlie Smith
- AWEA – Michael Goggin or John Dunlop

- CIGRE Wind and Solar Activities – Charlie Smith
- CANWEA – Tom Levy
- IEA Wind Task 25 - Michael Milligan, Charlie Smith or Mark O'Malley
- NREL – Paul Denholm
- International Wind activities – Antje Orths
- IEC SC 8A – Charlie Smith

6. New Technologies of Interest to the Committee:

New technology areas discussed at the WSPCC annual meeting included: system operations with high penetrations of distributed energy resources; low short circuit ratio issues with high penetrations of wind/solar; energy systems integration including not only electricity but also thermal and transportation sectors; low-inertia power systems and inertial response from renewables.

7. Significant Plans for the Next Period:

We expect that coordination with SCC21 and the implications of a revised 1547 will be a big part of 2017 activities.

8. Global Involvement

WSPCC has global involvement, but has not focused on country residence of members. As a result the following statistics are estimated based on email addresses. WSPCC will begin capturing more location information from our 2017 annual meeting onwards to firm up these estimates.

Total Number of committee members	Officers from regions 8,9 and 10	Subcommittee officers from regions 8, 9 and 10	Subcommittee members from regions 8,9, and 10
140	0	0	16

Submitted by: Debra Lew, Chair, WSPCC **Date: 1/31/17**