Wind and Solar Plant Interconnection Working Group[1]

Wind and Solar Power Plant Interconnection and Design Subcommittee

IEEE/PES/ED&PG-C

IEEE/PES General Meeting, Portland, OR

August 8, 2017 (Wednesday)

8:00 a.m. – 10:00 a.m.

Room: DP-Mt. Bachelor

Agenda

Time	Topic	Lead	Vote?
8:00	1. Introduction, IEEE policy matters, and WG scope	Chair	
08:10	2. Agenda and previous meeting minutes	Chair,	Yes
08:15	3. Review of 2018 IEEE PES GM Activities 3.1. Panel sessions 3.2. Tutorials 3.3. Other committee or working group meetings	Chair, Round Table	
08:30	4. EDPG/EMC/T&D/PSDP Sponsorship of Bulk Power System Connected Inverter-Based Resources Performance and Testing projects 4.1. PAR for P2800 Recommended Practice on Performance (Link on myProject) 4.2. PAR for P2800.1 Guide on Testing (Link on myProject)	Chair, Niu, Cummings, Hoke, Pourbeik, Chen/Baker, Enayati, Zaman	Yes
09:00	5. Liaison Reports 5.1. PES (T&D/DRIWG, EMC/REMSSC, EDPG/WSPPID, PSDP) 5.2. SCC21 (1547, P1547.1, P1547.2, P1547.9, others) 5.3. NERC (IRPTF, SPIDER) 5.4. FERC	Round Table	
09:30	6. Other updates 6.1. Website 6.2. Member Roster	Chair, Secretary	
09:45	7. Next meeting(s)	All	
09:55	8. AOB	All	
10:00	9. Adjourn		

[1] formerly known as "System Impacts and Interconnection Requirements of Wind and Solar Power Plants WG"

Minutes

1. Introduction, IEEE policy matters, and WG scope

1.1. Call to Order - Chair
1.2. IEEE Patent Policy
1.3. Review of new WG name and scope
1.4. Review of member roster and introduction of new attendees

New Working Group (WG) Name - As a result of the reorganization of IEEE PES technical committees, this WG was moved here from T&D committee. The WG name doesn't have "System Impact" anymore as it resonates more with T&D.

A member asked why it only says solar in the scope at one place. Chair responded that NERC specifically mentioned about the gap in solar that's why it only says solar but it covers both wind and solar.
The WG has six (6) voting members and all were in the room so we had quorum. Rules say more than 50% members need to be present either on phone or in the room. IEEE SA staff was present in the room. IEEE SA said they will get the voting right at the end of the meeting if this is a member's second consecutive meeting.

23 attendees were present.

The Chair and Secretary maintain the working group roster with individuals' affiliation, interest areas, and membership status (voting member, non-voting observer). Per the EDPG Policies and Procedures, voting members are expected to attend a minimum of 4 of every 6 meetings to qualify for and retain membership. When a member is absent for more than two consecutive scheduled regular meetings and fails to participate by correspondence, the member may be removed from working group membership, subject to a review of the circumstances by the working group officers. Only members are eligible to vote during the working group meetings while observers are always welcome to join the discussion. Observers can be considered for voting membership, once they attended two consecutive scheduled regular meetings.

The Chair asks whether there is anyone aware of any essential patents relevant to the standards discussed today. Any technical discussion related to any patent one have, needs to be disclosed. The intent is to make sure the WG is not favoring anyone who has patent and can benefit from the direction WG takes

Scope

- Serve as a focal point for technology and solutions providers within the Power and Energy Society (PES) for addressing issues related to interconnection performance requirements, testing, and validation of transmission- and distribution-connected wind and solar plants.
- Contribute expertise from the manufacturers and developers perspective on grid interconnection standards, grid supportive functions and plant control modes to meet modern grid codes.
  - Lead knowledge transfer on best practices for interconnection performance requirements, including closing gaps of existing North American interconnection requirement for large-scale solar plants, taking into account requirements of ISOs, RTOs, FERC, NERC, distribution and transmission providers.
  - Contribute to plant-level testing and verification, e.g. of DER per 1547.1, including plant controller.
- Conduct activities to promote the sharing of knowledge and experience among diverse organizations working on similar issues through the conduct of symposia, workshops, paper sessions, (joint) panel sessions, and tutorials.
  - Liaison with IEEE PES T&D Distributed Resources Integration Working Group

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(DRIWG), IEEE PES EMC Renewable Energy Machines and Systems Subcommittee (REMSSC), IEEE Standards Coordination Committee 21 (SCC21), and NERC/WECC Inverter-Based Resource Performance Task Force (IRPTF).

- Publish working group papers to document results of working group activities and to share working group positions on issues related to wind and solar plant interconnection.
  - Possibly publish a best practices for interconnection performance requirements paper.
  - Possibly contribute to an 1547.2 application guide or set of recommended practices in the future as the technology evolves as well as to the revision of 1547.1 for testing and verification of DER.

2. Agenda and previous meeting minutes

2.1. Approval of Agenda

2.2. Approval of Minutes of WG meeting at PES GM 2017 in Chicago, IL (July 18, 2017)

Was the agenda approved? Yes

Were the minutes approved? Yes

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3. Review of 2018 IEEE PES GM Activities

3.1. Panel sessions

Tuesday, August 7	8:00 AM - 12:00 PM	RECENT VIOLENT SYSTEM UPSETS AND LESSONS LEARNED – Part I • Implications for future 1547 revisions	OC-B115

Tuesday, August 7	1:00 PM - 5:00 PM	RECENT VIOLENT SYSTEM UPSETS AND LESSONS LEARNED – Part II	OC-B115

Wednesday, August 8, 2018	10:00 AM - 12:00 PM	Application of IEEE Std 1547 and Operating Experiences of Grid-Supportive Distributed Energy Resources	OC-C121

Thursday, August 9, 2018	8:00 AM - 10:00 AM	Implementation of the revised IEEE 1547, Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces	OC-Portland Ballroom 257

3.2. Tutorials

Monday, August 6, 2018	1:00 PM - 5:00 PM	IEEE 1547 Interconnection Standard	OC-A106

3.3. Other committee or working group meetings

Monday, August 6, 2018	1:00 PM - 4:00 PM	Wind & Solar Power Coordinating Committee	OC-D131

Tuesday, August 7, 2018	8:00 AM-9:00 AM	PSDP Working Group on Dynamic Performance of Renewable Energy Systems • Present the two new PARs for BPS-connected IBRs (Pourbeik)	DP-Mt. Hood

Tuesday, August 7, 2018	8:00 AM - 10:00 AM	Distributed Resources Integration WG • Present the two new PARs for BPS-connected IBRs • Outreach for IEEE P1547.2 • Outreach for IEEE P1547.9 through T&D/DRI-WG Energy Storage Task Force	DP-Mt. Bachelor

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Tuesday, August 7, 2018	1:00 PM-3:00 PM	EMC Renewable Energy Machines & Systems Subcommittee Meeting • Present the two new PARs for BPS-connected IBRs (Baker)	OC-E141

Tuesday, August 7, 2018	3:00 PM-7:00 PM	IEEE/NERC • Present the two new PARs for BPS-connected IBRs	OC-D139

Wednesday, August 8, 2018	10:00 AM-12:00 PM	EDPG Wind and Solar Power Plant Interconnection and Design Subcommittee (Past Name: Integration of Renewable Energy into T&D Grids Subcommittee) • Present the two new PARs for BPS-connected IBRs	DP-Three Sisters

Thursday, August 9, 2018	8:00 AM-11:00 AM	EDPG - Committee Meeting	OC-C122

Friday, August 10, 2018	8:00 AM-12:00 PM	Electric Machinery Committee Meeting	OC-C120

Tom Key shared with the group that the Subcommittee sponsored the tutorial yesterday.
Chair presented takeaways from the Violent system upsets sessions.

4. EDPG/EMC/T&D/PSDP Sponsorship of Bulk Power System Connected Inverter-Based Resources Performance and Testing projects

1) Jens Boemer reports there has been significant progress on two ends, summarized in the following table:

Project Authorization Request (PAR)	Scope	Status/ Timeline	Lead	Next Steps
P2800 Link on myProject	Recommended Practice on Performance (Individual Project) P2800_PAR_Detail.pdf	Draft Initial Ballot 06/2021 Submission to RevCom 10/2022	Tbd., for the time being: EPRI Dr. Jens Boemer +1.206.471.1180 jboemer@epri.com	Submitted to NesCom on 7/27. Needs review by EDPG, EMC, T&D, PSDP, SCC21, NERC IRPTF, others? Presentation(s) to Joint Sponsors at 2018 IEEE PES General Meeting in Portland (see schedule below)
P2800.1	Guide on Testing	Draft Final	c/o China State Grid	Submitted to NesCom on

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Link on myProject	(Entity Project) P2800_1_PAR_Detail.pdf	Initial Ballot 12/2021 Submission to RevCom 10/2022	Dr. Chenhui Niu International Department NARI Group Cooperation +86 13451870987 niuchenhui@sgepri.sgcc.com.cn	7/27. Presentation(s) to Joint Sponsors at 2018 IEEE PES General Meeting in Portland (see schedule below)

P2800 Discussion

- Chair presented the mapping of existing standards in North American and gaps and explained that in the context of the mapping slide, BPS could include sub transmission and transmission that is not specifically under NERC/FERC purview.
- Bob Cummins (NERC) commented that BES is subset of BPS. NERC writes standards for BPS (like PRC024) applying to specific voltage level. Reliability risk lies in aggregate of multiple plants. NERC won't consider <100 kV. But they are very supportive of this effort.
- NERC does not develop design standards; they develop performance standards
- Pouyan Pourbeik commented that P2800 has to be consistent with other standards that already exist. He also stated that vendors need to be engaged in this effort as we don't want to create something that equipment cannot do
- Chair – Any IEEE standard is voluntary. It is enforced only if a process refers to it. He gave an example that in IEEE 1547-2018, they differentiated between capability and actual utilization of the capability. Specified a range of parameters (e.g. allowed to move the protection settings). P2800 can use the same approach

2) Dr. Chenhui Niu gives a presentation on P2800.1 (the testing guide)
    - Dr. Niu shared the purpose and need for the project
    - P2800.1 is proposed as an Entity Standard
    - State Grid of China has assigned 8 resources (not full time) to support this project. Currently they have two teams that undertake country's national standards
    - Pouyan Pourbeik commented that this platform could be the best place to define the type test for individual inverter. Vendors can do factory test for LVRT tec. Industry has good handle on the plant level testing. It is the individual unit level testing where everyone does their own things so it needs a standard that can be developed using this platform.
    - There was a good discussion on Entity vs Individual standard. Malia Zaman from IEEE responded to a question that those who are not entities can still participate but it is up to the WG to allow that. One can always be an observer
    - Need minimum of three (3) entities to propose a standard under Entity method. Members were concerned with only 3 entities developing a standard.
    - It was commented that it would not be wise to develop the standard without engaging equipment vendors. Members are excited about this project and they want to be involved. There was a concern Entity method could be a bit prohibitive for participation. Need commitment to engage the expertise. Dr Niu commented that he is open to involve experts in the process and will share the work with the P2800 work group. He will also try best to schedule web conferences in the development process to promote participation
    - Malia commented that IEEE has other entity projects where the WG provides meeting

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minutes and draft standard language and everyone interested can have access to these documents

3) Andy Hoke gives an update on P1547.1 (for DERs) and how that can inform P2800.1
4) Malia Zaman gives a presentation on IEEE SA's "entity" versus "individual" projects
5) Bob Cummings gives an update as NERC IRPTF Liaison with a focus on P2800 (the performance RP)
6) Kay Chen and Wes Baker give an update as EMC Liaison on EMC's interest in joint sponsorship of both projects
   Wes mentioned that their subcommittee thought P2800 was within the scope. There was no change recommended for the PAR. They will be cosponsoring if approved by the EMC committee

7) Babak Enayati gives an update as T&D Liaison with a focus on P2800 (the performance RP)
   - Discussed the possibility of sponsoring 2800. 1 They took unofficial vote. Those who attended the meeting were in favor of having a liaison in this effort. Need to work with IEEE SA to find a way to reach out to the voting member. Got feeling that the group inclined towards liaison
   - They are willing to have the liaison in the effort but we didn't think it is within the scope.

8) Pouyan Pourbeik gives an update as PSDP Liaison with a focus on P2800 (the performance RP)
9) Jens Boemer informs about required next steps:
   a. Creation of a new WG named "Wind and Solar Plant Interconnection Test and Verification Working Group (WSPI-TV)" and seeks volunteers to contribute to P2800.1. A joint TF will be set up with jointly sponsoring committees to steer this project.
   b. Either assignment of our existing Wind and Solar Plant Interconnection Working Group (WSPI) (PE/ED&PG/WSPPID/WSPI) or the creation of a new WG named "Wind and Solar Plant Interconnection Performance Requirements Working Group (WSPI-PR)" and seeks volunteers to contribute to P2800. A joint TF will be set up with jointly sponsoring committees to steer this project.

<u>For discussion:</u>

- Difference between individual and entity project?
- Realistic timeline for each standard? Roadmap?
- Coordination between P2800 and P2800.1? - Chair presented the draft coordination proposal
- Meeting schedule/form (in-person and/or virtual?)

- There may be a need for IEEE/PES/T&D to create a dedicated working group under the transmission subcommittee to liaison with these new projects.
- There may be a need to seek funding for working group leadership as this is expected to be a significant effort.
- There is a need to reach out to various entities in order to guarantee sufficient industry participation, especially for the entity project. Targets may include:

  <u>Utility, Transmission</u>

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- RTOs/ISOs

Regulatory and Governmental Bodies
- NERC

Producer – Components, Software, Systems
- DER equipment & system manufacturers
- Software developers

Users, Industrial/ Developers/IPPs
- Project developers
- System integrators

Service Provider/ Consulting
- NRTLs/Certifiers

Academic/Research
- National laboratories
- Research laboratories
- Universities
- IEEE PES T&D, EDPG, EMC, PSDP, PSRC

- Suggestion to change "inverter-based" to "inverter-coupled" to avoid confusion with non-technical perspectives.
- Suggestion that the T&D Committee may not include system performance scope any longer and Babak tends to agree. Therefore, PSDP may be the more appropriate main sponsor. But PSDP does not seem to have PnPs for standard development in place.

5. Liaison Reports

5.1. PES

5.1.1. IEEE PES T&D Distributed Resources Integration Working Group (DRIWG)

Babak Enayati gives an update.

- MA ride through adoption process – recently adopted the new 1547. Applies to any DER including rooftop.
- Adverse impact of ride through on distribution protection - MA was able to handle it via ISO NE proposed standard.
- Vol regulation during ride through- 1547 leaves it open but most inverters are able to provide it. SCE gave a lab testing report. Had a good discussion.
- Under T&D, there are 3 task forces now covering energy storage, micro grid, and advance DER. Their scope is around the adoption of the new1547 standard

5.1.2. IEEE PES EMC Renewable Energy Machines and Systems Subcommittee (REMSSC)

Kay Chen and Wes Baker give an update.

5.1.3. IEEE PES EDPG Wind and Solar Power Plant Interconnection and Design Subcommittee

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Tom Key gives an update.

5.2. SCC21

5.2.1. Update on IEEE 1547.x Standards

5.2.1.1. Update on published IEEE Std 1547-2018

IEEE Std 1547-2018 was published in April and an errata has been published in June of 2018. The errata will stay separate from the standard until the next revision of the standard.

SCC21 has processes for educational outreach on IEEE Std 1547-2018:

- SCC21 process to share SCC21-approved presentations for tutorial and conferences.
- SCC21 process and criteria for providing discounted copies of SCC21-sponsored standards to qualified parties.

5.2.1.2. Update on P1547.1 – Testing standard for IEEE 1547

IEEE P1547.1 is targeting ballot draft by October meetings in California. Near-ballot ready draft submission to Chair by August 31, 2018. For some subgroups this may be a heavy lift (risk!). Should expect contentious discussions at the in-person meetings on topics that were led by small subgroups.

5.2.1.3. Update on P1547.2 – Application Guide for IEEE 1547

IEEE P1547.2 held second meeting on June 14. Monthly web meetings really need to be set up soon.

5.2.1.4. Update on P1547.9 – Application Guide for ESS

IEEE P1547.9 – Leadership team is set up, kick-off at February 2019 meeting, outline strawman in development, high and growing interest (20-30 interested individuals). P1547.9 is the first joint effort between SCC21 and ESSB.
Need for an overview presentation on the applicability of IEEE Std 1547-2018 to energy storage to inform the wider industry. May need to clarify/promote that fact that IEEE 1547 does apply to distributed ESS as some folks seem to question that fact. P1547.9 will specify exactly what/how/where 1547 applies to ES-DER.

5.2.2. Update on SCC21 Energy Storage Design Standards

- Revisions in Comment Resolution phase
  - IEEE P1013 Recommended Practice for Sizing Lead-Acid Batteries for Stand-Alone Photovoltaic (PV) Systems
  - IEEE P1562 Guide for Array and Battery Sizing in Stand-Alone Photovoltaic (PV) Systems

- Revisions in Ballot Pool formation phase
  - IEEE P937 Recommended Practice for Installation and Maintenance of Lead-Acid Batteries for Photovoltaic (PV) Systems (Lead: Chris Searles)
  - IEEE P1561 Guide for Optimizing the Performance and Life of Lead-Acid Batteries in

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Remote Hybrid Power Systems (Lead: Curtis Ashton)

- IEEE P1661 IEEE Guide for Test and Evaluation of Lead-Acid Batteries Used in Photovoltaic (PV) Hybrid Power Systems (Lead: Charlie Vartanian)

Ballot Pool formation lasts for 30 days, with extension of another 30 days possible.

5.3. NERC

5.3.1. BPS-Connected Inverter-Based Resources Performance Task Force (IRPTF)

5.3.2. System Planning Impacts from Distributed Energy Resources Group/Task Force (SPIDER) Proposal

5.4. FERC

5.4.1. NOPR Reactive Power Requirements for Non-Synchronous Generation (RM16-1)

5.4.2. NOPR Primary Frequency Response (RM16-6)

5.4.3. NOPR Ruling on Ride-Through of Small Generators (RM-16-8)

6. Other updates

6.1. Website

We have a new website at http://sites.ieee.org/pes-edpgcom-wsppidsc/working-groups-and-task-forces/wind-and-solar-plant-interconnection-working-group/ . Meeting agendas and minutes can be found here along with other useful information.

6.2. Member Roster

We are maintaining the member roster in an Excel format that is maintained by the Chair and Secretary.

7. Next meeting(s)

7.1. 2019 IEEE PES Joint Technical Committee Meeting, Jan 13-17, Orange County, CA

No meeting scheduled.

7.2. 2019 IEEE PES General Meeting, Aug 4-8, Atlanta, GA

For discussion:

- Does the Wednesday morning slot work fine or should we move back to Tuesday afternoon?
- Proposed panel session topics
  - BPS-connected inverter-based performance requirements – international best practices
  - T&D interface impacts of wind and solar resources – voltage regulation and reactive power coordination
- Proposed tutorials

7.3. Others?

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Are there any other venues we should meet at?
8. AOB NONE
9. Adjourn

Voting
2800 – Unanimous
One for standard, 3 for recommended practice
One – reserve the right to change

2800.1
Unanimous approval
No changes to PAR'

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