You are logged into the Technical Standards Review Group (TSRG) Quarterly meeting

The meeting will begin momentarily

Massachusetts Technical Standards Review Group

Quarterly Meeting

September 22, 2022

The Massachusetts Technical Standards Review Group

Agenda

1:00-1:10 **Opening Comments**

1:10-2:10 **Sub-Committee Updates (15 min each)**

1. IEEE 1547 Group
2. ESS Ramp Rates & Schedules Group
3. Dynamic Modeling Group
4. Area Networks Group

2:25-3:00 **Old Business – Open Items from Previous Meeting**

1. Coordinate on Expedited Process Sub-Committee
2. Effective Grounding

3:00-3:45 **New Business – New Items Not Previously Discussed**

1. Flexible Connections Presentation – Gerhard Walker
2. Open discussion for other new business items

3:45-4:00 **Close Out**

1. Call out the next scheduled quarterly meeting date
    a. Dec 1, 2022
    b. Mar 15, 2023
2. Send topics for future meetings to Mike (Michael.Porcaro@nationalgrid.com) or Mrinmayee (mkale@newleafenergy.com)
3. Final comments

TSRG
Energy Storage SubGroup Update

Mike Porcaro

The Massachusetts Technical Standards Review Group

Energy Storage Sub-Group Update

Mission Statement:

Establish clear criteria surrounding ESS schedules & ramp rates. Consider customer impacts (negative and positive) to site operation, initial interconnection costs, market participation impacts, and long term revenue impacts. Consider technical impacts (negative and positive) to the safety, reliability, and long term system operation/maintenance.

Expected Group Output:

Agreement on ESS study & operation as it relates to ESS schedules & ramp rates. Elements that are common to all EDCs will be incorporated into the TSRG Common Guidelines, and will reference EDC standards for elements that are unique.

Following the outcome of this sub-group, project performance will be monitored, possibly requiring future adjustment.

Team

First Name	Last Name	Company	Affiliation
Michael	Porcaro	National Grid	EDC
Emily	Slack	National Grid	EDC
Gerhard	Walker	Eversource	EDC
Shakir	Iqbal	Eversource	EDC
Justin	Ulrich	Unitil	EDC
John	Bonazoli	Unitil	EDC
Kavita	Ravi	Blue Wave	Industry
Mrinmayee	Kale	Borrego	Industry
Greg	Hunt	Zero Point	Industry
Amit	Barnir	Kearsarge	Industry
Matt	Parlon	Ameresco	Industry
Gerry	Bingham	DOER	DOER
Brian	Lydic	IREC	Gov/Cust

Summary of Major Accomplishments & Upcoming Activities

Completed Activities:	
12/7/2021	Kick off meeting with SMEs
3/24/2022	Sub Group status report at TSRG quarterly meeting
5/5/2022	EDCs provided examples and explanation of challenges associated with capactiry reservation for ESS and impacts to daily system control/operation and planning efforts
6/2/2022	ESS study process proposed by EDCs to the group
8/4/2022	Final coordination and agreement on ESS study process
Upcoming Activities:	
	PCC arrangement for monitoring and control
	Consideration of Expedited applications
	Ramp rate expectations

TSRG
Area Networks

Mohamed Shamog

The Massachusetts Technical Standards Review Group

Area Networks Sub-Group Update

Mission Statement:

Identify system challenges for DG interconnections to area networks (per IEEE 1547 definition), which differ from radial systems. Identify amount of service territory served by area networks from each EDC to reference overall territory impact. Explore opportunities for alternative analyses and possibilities for increasing connection capabilities.

Expected Group Output:

Agreement on the requirements and means of analysis for connection of distributed generation to area networks. Elements that are common to all EDCs will be incorporated into the TSRG Common Guidelines, and will reference EDC standards for elements that are unique.

Following the outcome of this sub-group, system and project performance will be monitored, possibly requiring future adjustment.

Team			
First Name	Last Name	Company	Affiliation
Dan	Mungovan	National Grid	EDC
Mohamed	Shamog	National Grid	EDC
Tyler	Thibault	Eversource	EDC
Shakir	Iqbal	Eversource	EDC
Fritz	Octave	Eversource	EDC
Michael	Costa	Eversource	EDC
Jeremy	Kites	Unitil	EDC
Justin	Ulrich	Unitil	EDC
John	Bonazoli	Unitil	EDC
Russ	Aney	Avid Solar	Industry
Jens	Foyer	Nexamp	Industry
Gerry	Bingham	DOER	DOER
Brian	Lydic	IREC	Gov/Cust

Milestone Summary	
Completed Activities:	
12/14/2022	Kick off meeting with SMEs
03/01/2022	Sub Group status report at TSRG quarterly meeting
06/29/2022	EDC members met with Consolidated Edison
Upcoming Milestones & Activities:	
11/01/2022	Current State Processes analyzed

Area Networks Sub-Group

- **Current State Process**
  - MA EDC held a meeting on 6/29/2022 to discuss and learn about Consolidated Edison Interconnection to Area Networks.
  - Meeting minutes have been distributed among the EDC and discussion has begun on integrating what has been learned from ConEdison discussion.
    - Developed resources and analysis techniques to support interconnections.
    - Established remote monitoring and control within their networks.
    - Have in place sophisticated protective and relaying schemes.
  - Each individual EDC will go back and review what each company will proactively do to make the system more ready for interconnection.
  - Each EDC will develop time frame, direction, and document any potential solutions identified with benefits analysis.
  - Each EDC will provide progress update at the first quarterly meeting in 2023.

Project Plan Milestones	Phase	Date / Status
Assemble subject matter experts	Engage	12/14/2021
Group member opinion on desired outcomes	Engage	12/14/2021
Current-State Processes Analyzed - Identify areas of concern	Diagnose	Nov-22
Potential Solutions Identified with benefits analysis (with input from additional sources as needed)	Design	May-23
Identify potential commonalities and necessary difference	Design	Jun-23
Incorporate to Common Guideline and EDC technical standards; assess the need for tariff updates as appropriate, involving review with broad TSRG membership	Implement	Aug-23
Monitor landscape related to this topic	Implement	Aug-23

TSRG
1547 Update

John Bonazoli

The Massachusetts Technical Standards Review Group

IEEE 1547 Sub-Group Update

Mission Statement:

Establish clear criteria of requirements and default settings for usage of grid support functions set forth in IEEE standard 1547 - Standard for Interconnection and Interoperability of Distributed Energy Resources with Associate Electric Power Systems Interfaces.

Expected Group Output:

(1) Default settings for requirements specified in IEEE 1547

(2) Investigate usage and concerns of various modes of operation for Grid Support

(3) Create requirements for communications between Facility interface and EDC central monitoring system

(4) EDC remote monitoring and control of Facility

Team			
First Name	Last Name	Company	Affiliation
John	Bonazoli	Unitil	EDC Rep/Chair
Mrinmayee	Kale	New Leaf Energy	DER Rep/ Vice-Chair
Jeannie	Amber	Eversource	EDC alt rep
Samer	Arafa	National Grid	EDC alt rep
Joseph	Debs	Eversource	EDC alt rep
David	Ferrante	Eversource	EDC alt rep
Ruvini	Kankanamalage	National Grid	EDC alt rep
Jeremy	Kites	Unitil	EDC alt rep
Paul	Krell	Unitil	EDC Rep
Brian	Lydic	irec	DER Rep
Devon	Marcaurele	Eversource	EDC alt rep
Brad	Marszalkowski	ISO-NE	ISO Rep
Mina	Moawad	Eversource	EDC alt rep
Tony	Morreale	LIG Consultants	DER Rep
Amir	Mosaddegh	Eversource	EDC Rep
Mike	Wall	NexAmp	DER Rep
Nathan	Walsh	National Grid	EDC Rep
Gina	Bellato	DOER	Cust/Gov Rep
Mauhammad	Khan	Eversource	EDC Rep

Summary of Major Accomplishments & Upcoming Activities	
Completed Activities:	
5/9/2022	Finalized Requirements document
9/12/2022	Presenation of NY Grid Support functions
9/12/2022	Presenation of impact of Grid Support functions on Risk of Islanding
Upcoming Activities:	
10/27/2022	Finalize Scope of Communications Task Force

IEEE 1547 Sub-Group Update

#	Item	Relates to	Type	Resp. Person	Resp. Affiliation	Resp. Company	Due Date	Complete Date	Notes
1	Set up Communications Teams	Create communications requirments	Action	Bonazoli	EDC	Unitil	7/30/2022	7/30/2022	
2	Presentation on NY Grid functions	Research Grid Support functions	Decision	Kankanamalage	EDC	National Grid		9/12/2022	Con-Ed presented default advanced funtions adopted by NY Joint utilities
3	Presentation on Risk Of Islanding impact of inverter advanced functions	Research Grid Support functions	Decision	Kankanamalage	EDC	National Grid		9/12/2022	Study results show no indicatino that advanced inverter control functions have significant impact on island run-on times.
4	Formulate Communications Task Force Scope	Communications	Action	Task Force	Other		10/27/2022		Need to better define the scope and effort of the Communications task force

TSRG
Dynamic Modeling

Amir Mosaddegh

The Massachusetts Technical Standards Review Group

Dynamic Modeling Sub-Group Update

Mission Statement:

- Assemble subject matter expert and group member opinion
- Current State processes Analyzed Identify areas of concerns
- Potential solutions identified with benefits analysis
- Potential commonalities and necessary difference identification
- Incorporate to common Guideline and EDC technical standards

Expected Group Output:

- Agreed upon best practice for dynamic modeling of DG connection to the EPS
- Seeking to improve efficiency of analyses
- Incorporating common elements of all EDCs to TSRG Common Guidelines
- Referencing EDE standards for elements that are unique

Team			
First Name	Last Name	Company	Affiliation
Ruvini	Kankanamalage	National Grid	EDC
Nathan	Walsh	National Grid	EDC
Shakir	Iqbal	Eversource	EDC
Amir	Mosaddegh	Eversource	EDC
Mina	Moawad	Eversource	EDC
Daniel	Dabkowski	Eversource	EDC
John	Bonazoli	Unitil	EDC
Paul	Krell	Unitil	EDC
Kavita	Ravi	Blue Wave	Industry
Mrinmayee	Kale	Borrego	Industry
Michael	Wall	Nexamp	Industry
Michael	Coddington	NREL	Industry
Devin	Van Zandt	EPRI	Industry
Gerry	Bingham	DOER	State
Brian	Lydic	IREC	State

Milestone Summary	
Completed Activities:	
04/08/2022	Kick off meeting with SMEs
05/13/2022	Nayak presented the "Renewable Power Modeling in PSCAD". Nayak stressed on the importance of the transient study and why the manufacturer inverter models are essential for studies.
06/02/2022	EDC Discussion on List of Settings to be provided by the Manufacturers
06/10/2022	Discussing the PSCAD Parameter Checklist
7/8/2022	Finalizing the PSCAD Item Checklist and PSCAD Setting Checklist
	Meetings were contingent since July 2022
Upcoming Milestones & Activities:	
Q3 2022	Finalizing the TSRG PSCAD Setting Checklist

Main Objectives To be Finalized Soon

- **Finalize the PSCAD Item Checklist**
- **Finalize the PSCAD Setting Checklist**
  - Grid Support Functions
  - Voltage/Frequency Trip and Mode of Operation Parameters

PSCAD Checklist	Notes
According to the one-line-diagram, is this the correct inverter model, manufacturer, and version?	Developers to confirm with manufacturer.
Does the PSCAD inverter model contain all necessary libraries?	Typically, libraries have the *.lib or *.obj file extension. The PSCAD model submission should include any required .dll files and .txt files (but not limited to).
Is the PSCAD model compatible with the passive equipment downstream of the point of interconnection (mainly GSU and grounding configuration) and upstream of the PCC or other active equipment (i.e., other inverters or controllers) within the one-line diagram?	Ensure that the inverter model is compatible with all passive elements (e.g., GSU and its configuration, grounding transformer configuration, grounding banks, capacitor banks, surge arresters). For passive elements, the developers provide information either in the form of a single-line file or an Excel spreadsheet.
Is there a user manual with instructions included with the PSCAD model package?	Ensure that the manuals are submitted along with the inverter models. A typical manual would include at minimum the sections for "How to Run the PSCAD model", Descriptions of modules and elements of the inverter model", "Description of protection device settings", "SPOV enablement", and "Modes of Inverter Operations/Functions".
Does the model have an SPOV function? What is the default SPOV setpoint? • What are the possible ranges of SPOV setpoints that the inverter is capable of? • Does the model package have instructions on how to enable and disable the SPOV setpoints? • Does the model package have instructions on how to change the SPOV setpoints for mitigation purposes?	TOV is different than SPOV setpoints. These mechanisms, referred to as Self Protection Over-Voltage (SPOV) mechanisms cause the inverter to cease to energize when the circuit voltage exceeds certain limits. The SPOV mechanisms thus can prevent both GFOV, and load-rejection overvoltage (LROV). Normally the voltage range is between 1.2 to 1.4 pu while the time threshold that the inverter can tolerate is about a few miliseconds. Manufacturer shoud issue a letter confirming the inverter model has the user adjustable SPOV settings with required threshold time to trip? The SPOV setting should be adjustable in the PSCAD model.
Does the model implement the required ISO_NE OV/UV/OF/UF settings or can those be set manually? (if user-configurable, then the manual should instruct how to modify	Developers to confirm with manufacturer. Either these settings can be hardcoded, or user-configurable, as long as the settings can be set to the ISO-NE requirement. The PSCAD

Table 1. Grid Support Functions

Function	Settings	Range	Default Required Settings	Can EDC Adjust the Default Required Settings	Corresponding Section in Reference Manual
Power Factor	Enable/Disable	ON/OFF	Unity power Factor (ON) - Case by Case Otherwise	Yes	
	Power Factor	(+/-) 0-1			
Frequency Droop (Freq-Watt)	Enable/Disable	ON/OFF	ON	Yes	
	Over-frequency Droop Deadband (dbof)	See Table VI in "Default IEEE 1547-2018 Setting Requirements" Document or latest version	0.036		
	Under-frequency Droop Deadband (dbuf)		0.036		
	Under-frequency and Over-frequency Droop (kuf and kof)		0.05		
	Open Loop Response Time		5		
	Enable/Disable	ON/OFF	OFF	Yes	

Table 2. Voltage/Frequency Trip and Mode of Operation Parameters

Parameter	Settings	Range	Default Required Settings	Can EDC Adjust the Default Required Settings	Corresponding Section in reference manual
High voltage shall trip curve points		See Table IV in "Default IEEE 1547-2018 Setting Requirements" Document or latest version	OV2 Setting: V: 1.2 pu Trip: 0.16s	No	
			OV1 Setting: V: 1.1 pu Trip: 2.0s	No	
Low voltage shall trip curve points		See Table IV in "Default IEEE 1547-2018 Setting Requirements" Document or latest version	UV2 Setting: V: 0.5pu Trip: 1.1s	No	
			UV1 Setting: V: 0.88pu Trip: 3.0s	No	

Old Business

The Massachusetts Technical Standards Review Group

Expedited Process Sub-Group

- Members
  - 6 industry representatives
  - 3 EDC representatives (1 from each company)
  - Others welcome to join upon request
  - TSRG membership overall to be engaged via quarterly meeting updates
- Group focus
  - Consider technical characteristics of projects that may/may not allow the Expedited process
  - Consider electrical characteristics of the system that may drive study need
  - Consider technical criteria that may qualify a project to stay on the Expedited track

Effective Grounding

- Ground banks can carry long lead time and cost challenges
- Consider alternatives
  - Equivalent ohmic impedance – allow for equivalent means of effective grounding
  - Range of acceptable impedances
- Consider timing of notification to the customer
  - Being informed earlier may provide opportunity for design change and/or equipment procurement
- Consider alternative means of protection, if any

New Business

Flexible Connections – Gerhard Walker

Open discussion

The Massachusetts Technical Standards Review Group

Closing

- **Next meetings**
  - December 14, 2022
  - Mar 15, 2023

- **Please send any topic requests for future meetings to Chair and/or Vice Chair**
  - **Michael.Porcaro@nationalgrid.com**
  - **mkale@newleafenergy.com**