Massachusetts Technical Standards Review Group

Quarterly Meeting

June 16, 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

2:10-2:25 **Break**

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

1. Coordinate on improved simplified screening process
2. Significant vs Moderate changes – incorporate into Common Guideline

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

1. Grounding Bank Sizing – Jonathan DeMay

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

1. Call out the next scheduled quarterly meeting date
    a. Sept 22
    b. Dec 1
2. Send topics for future meetings to Mike or MK
3. Final comments

TSRG
Energy Storage SubGroup Update

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
Upcoming Activities:	
	Final coordination and agreement on ESS study process
	Consideration of Group Study process with respect to ESS
	Consideration of Expedited applications

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Area Networks

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
Upcoming Milestones & Activities:	
11/01/2022	Current State Processes analyzed

Area Networks Sub-Group

- **Milestones**
  - Sub-Group schedule update
- **Current State Process**
  - Identify systems commonality & differences between EDC - Monthly EDC discussion established
  - Industry experience of Interconnection to Area Networks.

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

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1547 Update

The Massachusetts Technical Standards Review Group

IEEE 1547 SubGroup

Mission Statement:

Establish clear criteria and settings for requirements and usage of function 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) Investigate EDC remote monitoring and control of Facility

Team			
First Name	Last Name	Company	Affiliation
Michael	Porcaro	National Grid	EDC
Doug	Ayer	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

Milestone Summary	
Completed Activities:	
12/7/2021	Investigate usage and concerns of various modes of operation for Grid Support
5/9/2022	Default settings for requirements specified in IEEE 1547
Upcoming Milestones & Activities:	
June 2022	Create communications standards team (EDC's)
Q1 2024	Communications requirements issued
Q1, 2023 – Q2, 2026	Monitoring and Control requirements documented

Default IEEE 1547 – 2018 Setting Requirements

- **Purpose**
  - Create NE Utility Required Profile of settings

- **Applicability**
  - All applications submitted on or after Jan. 1, 2023
- **Section 1 – Requirements for all DER**
  - Frequency trip and ride through
  - Grid Support default functions
- **Section 2 – Requirements for UL 1741 SB certified inverter based DER**
  - Voltage trip and ride through
  - Frequency Droop
- **Section 3 – Requirements for Non-inverter based DER**
  - Voltage trip and ride through
  - Frequency Droop

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Dynamic Modeling

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
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

Grid Support Functions				
Function	**Settings**	**Range**	**Required Settings**	**Corresponding Section in Reference Manual**
Power Factor	Enable/Disable	ON/OFF	Unity power Factor (ON) - Case by Case Otherwise	
	Power Factor	(+/-) 0-1		
Frequency Droop (Freq-Watt)	Enable/Disable	ON/OFF	ON	
	Over-frequency Droop Deadband (dbof)	*See Table 24 in IEEE1547-2018*	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	

PSCAD Checklist	Notes
Is this the correct inverter model, manufacturer, model version as stated in the one-line-diagram?	Developers to confirm with manufacturer.
Does the PSCAD inverter model contain all necessary libraries?	The libraries are normally in the ***.lib** or ***.obj** file extension. If the inverters required ***.dll** files or ***.txt** files **(but may not limited to)**, these required files should be added to the PSCAD model submission.
Does the PSCAD model is compatible with the passive equipment downstream of the point of interconnection (mainly GSU and grounding configuration) until the PCC with the one-line diagram?	The developers to check with manufacturers if the inverter model is compatible with all passive elements (e.g., GSU and its configuration, grounding transformer configuration, grounding banks, capacitor banks, surge arresters). The developers to make an attempt the passive elements required information are provided either in the single-line or an excel file format.
Does the PSCAD model package contain necessary user manual with instructions?	The Developers to ask manufacturers for manuals to go along with their inverter models. A typical manual includes at minimum the sections of the "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
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. EDCs to confirm if the SPOV functionality letter can be set for the entire inverter model family.****** The SPOV functionality letter, confirming the inverter model have the user adjustable SPOV setting with trip time? Is it adjustable or not?
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 those settings)	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. - Finalizing the PSCAD Checklist
Does the model work at 60 Hz?	Developers to confirm with manufacturer.
Does the model turn off within 2 seconds after modeling a loss of source?	Manufacturer to provide the letter for their approach of anti-islanding detection (and their method), and if the model equipped with island detection module.
Does the model have anti-islanding module implemented for Risk of Islanding testing?	
Does the PSCAD inverter model have the following options? •1 Does the model have a way to scale output? •2 Does the model have the reactive power functions required by IEEE 1547-2018, including constant power factor mode, constant reactive power mode, voltage-reactive power mode, and active power-reactive power modes •3 Does the inverter model have the capability to change the real/reactive power set/reference?	We are using scaling output module (either as a separte module or a scaling transformer) to scale the output of the inverter. Please note that Point 2 is related to the mode of the inverter, but Point 3 is related to change the Pref and Qref of the inverter model. This is quite different than scaling output which scales the real P and Q output of the system. To avoid confusion, we can change point 3 as below: These items can be described in the Manual. Developers to confirm with manufacturers.
Additional items to be set in the BESS inverters?	No additional items for BESS

Old Business

The Massachusetts Technical Standards Review Group

From Last Meeting

- **Screening Process Adjustments**

- **Section added to Common Guideline**
  - Language discussed at past meetings
  - Individual EDCs to each provide any company specific nuances on their respective website and/or technical requirements

New Business

The Massachusetts Technical Standards Review Group

Ground Bank Sizing

Jonathan Demay

The Massachusetts Technical Standards Review Group

Closing

- **Next meetings in 2022**
  - September 22
  - December 1

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