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, 2023

The Massachusetts Technical Standards Review Group

Agenda

9:00-9:10 **Opening Comments**

9:10-9:30 **By Law Updates**

9:30-9:50 **Topics List**

9:50-10:40 **Sub-Committee Updates (10 min each)**

1. IEEE 1547 Sub-Group
2. Area Networks Sub-Group
3. Expedited Pathway Sub-Group
4. ESS Sub-Group
5. SIS Technical Analyses Sub-Group

10:40-11:10 **Aging inverter replacement –** Glenn McGillicuddy (Industria)

11:10-11:30 **Technical Standards Update**

11:30-11:40 **Interconnection Implementation Review Group (IIRG) Overview**

11:40-11:55 **Group Study Update**

11:55-12:00 **Close Out & Final Discussion**

1. Next scheduled quarterly meeting date
   a. Dec 7, 2023 1PM-4PM
   b. Mar 21, 2024 1PM-4PM
2. Send topics for future meetings to
   a. Mike Porcaro (Michael.Porcaro@nationalgrid.com)
   b. Mrinmayee Kale (mkale@newleafenergy.com)

Administrative Items

- Refer to TSRG Website for all information related to the group
  https://www.mass.gov/info-details/massachusetts-technical-standards-review-group
  - Membership
  - By-Laws
  - Reference Documents
  - Past Meeting Notes & Materials
  - Common Technical Guideline
  - Upcoming meeting info and registration link

- For any questions, suggestions, or to get on the mailing list email:
  - Chair - **Michael.Porcaro@nationalgrid.com**
  - Co-Chair - **mkale@newleafenergy.com**

By-Law Proposed Update Summary

- Shared with distribution list 8/31/23

- General edits
  - Grammatical edits, company names, web address corrections, etc

- Topic and Action Request Process
  - Present topic at quarterly meeting
  - Discuss and form sub-group as needed
    - Minimum of 5 participants in subgroup
  - Break topic down into scope for accomplishment prior to next quarterly meeting (3 months)
  - Present consensus and/or requested action at next quarterly
    - TSRG membership to vote on final submission/language to the DPU

TSRG Topics List

Main Topic Title	Sub-Topic Title	Date Opened	Status	Subgroup Formed?	Subgroup Formation Date	Topic Close Date	Notes
Standards Adoption	IEEE 1547 Adoption	9/1/2018	Discussion ongoing	Yes	9/1/2018		12/13/2022 Posted Inverter Source Requirements Document to TSRG website under "Reference Documents"
Energy Storage Systems	Schedules & Ramp Rates	8/19/2021	Discussion ongoing	Yes	8/19/2021		
System Impact Study	~~Study Costs~~	~~3/29/2023~~	~~Discussion ongoing~~	~~Yes~~	~~5/25/2023~~		
	Dynamic Modeling	3/24/2022	Complete	Yes	4/8/2022	12/14/2022	Group output: PSCAD checklist, posted to TSRG website under "Reference Documents"
Expedited Process		6/16/2022	Discussion ongoing	Yes	6/26/2023		
Area Networks	Area Network Capabilities	8/19/2021	Discussion ongoing	Yes	12/14/2022		
Flexible Interconnections	Zero export concept; Impacts to schedules; Control/curtailment at adverse times; considerations against other tariffs (ESS Tariff) Move other groups here: ESS, Area Networks	9/22/2022					Mike Porcaro; Gerry Bingham; Drew Smith; Gerhard Walker; Shakir Iqbal; Nachum Sadan; Brian Lydic; Greg Hunt; Emily Slack; Jeff Long; Clair Loe; David Ruuska; Doug Pope; Justin Woodard; John Bonazoli
Simplified Process	Revision to tariff screens/process	3/1/2022	Complete	No	NA	9/15/2023	Topic closed within TSRG, to be primarily addressed in Interconnection Implementation Review Group (IIRG). TSRG to remain updated on IIRG progress and provide technical feedback where applicable.
Construction costs		12/14/2022	Complete	No	NA	9/15/2023	Typical costs listed on EDC websites: National Grid (last updated 6/29/23, annual cycle on/around July 1) https://gridforce.my.site.com/s/article/System-Modifications-for-DG-Interconnection Eversource https://www.eversource.com/content/residential/about/doing-business-with-us/interconnections/massachusetts/distributed-energy-resources-project-costs
System planning	Ability to define expected system work in a given area, associated capacity, and timing expectations	12/14/2022	EDCs to discuss to propose what can be provided Industry to provide info needs	No	NA		In accordance with Climate Law of 2022 (https://malegislature.gov/Laws/SessionLaws/Acts/2022/Chapter179), the EDCs have prepared Electric Sector Modernization Plans, submitted to the newly established Grid Modernization Advisory Counsel on 9/1/23 and to be filed with the DPU by 1/29/24, whereafter DPU will make ruling on these plans by 8/29/24.
Significant vs moderate change		12/1/2021	Complete	No	NA	11/9/2021	EDC Posting: National Grid - https://gridforce.my.site.com/servlet/servlet.FileDownload?file=0156T00000FLhJr

TSRG
1547 Update
SubGroup 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 guidelines for Grid Support Functions

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

Team			
First Name	Last Name	Company	Affiliation
John	Bonazoli	Unitil	EDC Rep/Chair
Mrinmayee	Kale	New Leaf Energy	DER Rep/ Vice-Chair
Mauhammad	Khan	Eversource	EDC Rep
Paul	Krell	Unitil	EDC Rep
Nathan	Walsh	National Grid	EDC Rep
Mina	Moawad	Eversource	EDC alt rep
Ruvini	Kankanamalage	National Grid	EDC alt rep
Joseph	Debs	Eversource	EDC alt rep
David	Ferrante	Eversource	EDC alt rep
Devon	Marcaurele	Eversource	EDC alt rep
Jeremy	Kites	Unitil	EDC alt rep
Tony	Morreale	LIG Consultants	DER Rep
Mike	Wall	NexAmp	DER Rep
Brian	Lydic	IREC	Cust/Gov Rep
Brad	Marszalkowski	ISO-NE	ISO Rep
Aurora	Edington	DOER	Cust/Gov 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
7/30/2022	Created scope/mission of communications task force
12/12/2022	Revised deadlines for Default Setting Document
1/15/2023	Finalized membership of Communications Task Force
Upcoming Activities:	
3/1/23	Format Scope of EDC Requirements for Grid Support Functions
TBD	EDC's to study concerns of Volt/VAR
TBD	Finalize Grid support requirements and settings

TSRG
Area Networks SubGroup Update

Dan Mungovan &
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	Eversource	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
Nathan	Walsh	National Grid	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
09/2022-04/2023	Subgroup Pause
9/2023	Subgroup End
Upcoming Milestones & Activities:	

Mission Statement

#	Item	Notes
1	Identify system challenges for DG interconnections to area networks (per IEEE 1547 definition), which differ from radial systems.	**Requirements:** ➢ **Ensure a network protector:** – *Does not exceed its loading or fault-interrupting capability* – *Does not separate dynamic sources* – *Does not connect two dynamic systems together* – *Does not operate more frequently than prior to the DG interconnection* – *Is not prevented or delayed from opening for faults on the Area EPS* – *Is not delayed or prevented from closing* – *Is not prevented from reclosing* – *Settings are not required to be adjusted except by consent of the Area EPS operator* ➢ **Area networks:** – *DG interconnections within secondary grid networks shall not cause an islanding condition within the network* – *DER interconnections shall not actuate the network protector master relay during an adjacent feeder fault event* ➢ **Spot networks:** – *Connection of DG to a spot network is only permitted if the spot network bus is already energized by more than 50% of the installed network protectors* a) IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces, IEEE Standard 1547-2018. b) IEEE Recommended Practice for Interconnecting Distributed Resources with Electric Power Systems Distribution Secondary Networks, IEEE Standard 1547.6-2011. c) M. Behnke, W. Erdman, S. Horgan, D. Dawson, W. Feero, F. Soudi, D. Smith, C. Whitaker, and B. Kroposki, "Secondary Network Distribution Systems Background and Issues Related to the Interconnection of Distributed Resources," NREL United States. July 2005. Available: https://www.osti.gov/biblio/15016566/

Mission Statement

#	Item	Notes
2	Identify amount of service territory served by area networks from each EDC to reference overall territory impact.	**Eversource:** Network circuits are identified within the Hosting Capacity map Available: https://www.eversource.com/content/residential/about/doing-business-with-us/interconnections/massachusetts/hosting-capacity-map
		National Grid: Communities served by network systems are located on line. Available: https://gridforce.my.site.com/s/article/Secondary-Area-Networks-and-Secondary-Spot-Networks
		Unitil: Network circuits are identified within the Hosting Capacity map. Available: https://unitil.com/ways-to-save/solar-private-generation/interconnection-hosting-capacity-map
3	Explore opportunities for alternative analyses and possibilities for increasing connection capabilities.	M. Ropp, M. Reno, W. Bower, J. Reilly, and S. Venkata, “Secondary Networks and Protection: Implications for DER and Microgrid Interconnection,” Sandia National Laboratories, United States, 2020. Available: https://www.osti.gov/biblio/1738874
		E. Udren, D. Hart, M. Reno, and M. Ropp, "Roadmap for Advancement of Low-Voltage Secondary Distribution Network Protection," Sandia National Laboratories, United States, 2022. Available: https://www.osti.gov/biblio/1839187/ *Utilities: Pepco Holdings Inc., Oncor Energy Delivery, Consolidated Edison Company of New York*
		Z. Cheng, E. Udren, J. Holbach, D. Hart, M. Reno, and M. Ropp, “Low Voltage Network Protection Utility Workshop - Summary and Next Steps,” Sandia National Laboratories, United States, 2022. Available: https://www.osti.gov/biblio/1844061
		K. Anderson, M. Coddington, K. Burman, S. Hayter, B. Kroposki, and A Watson, “Interconnecting PV on New York City's Secondary Network Distribution System,” NREL, United States, 2009. Available: https://www.osti.gov/biblio/969713 *Utilities: Consolidated Edison Company of New York*
		L. Lisell, K. Anderson, X. Li, T. Case, S. Liburd, and L. Reilly, “Grid Ready: Strategies for Interconnecting Large-Scale PV in New York City,” NREL, United States, 2018. Available: https://www.osti.gov/biblio/1483235 *Utilities: Consolidated Edison Company of New York*

Non-MA Utilities Experience

Consolidated Edison Company of New York (ConEd)

MA-EDC only meeting objective was to discuss how ConEd is analyzing and constructing projects to interconnect distributed energy resources to the ConEd area secondary network systems. The meeting provided the MA-EDC with the following take away:

- Understanding of the infrastructure that ConEd has in place, such as:
- Established remote monitoring and control within their networks.
- Have in place sophisticated protective and relaying schemes.
- Analysis techniques that ConEd is exploring for DER Interconnection.

Utility Secondary Network Upgrade Projects

EDC's when installing new network protectors or replacing existing network protector relays, install modern microprocessor network protector relays.

- The focus of the relay upgrades is for improved protection capability and not to improve the ability to interconnect DER's to secondary network systems

Eversource piloted a program from 2010 to 2015 funded in part by a Department of Energy grant to evaluate the feasibility of installing advanced sensors within manhole structures to provide enhanced visibility of the secondary network system beyond the network protector.

- A publicly available paper summarizing the project was published with the IEEE and is available at the below location:

  https://ieeexplore.ieee.org/document/8450121

Expected Group Output

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

1. 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.
   - IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces, IEEE Standard 1547-2018.
2. Each EDC will continue to work independently on elements that are unique to their area network.

Future Path and Consideration

Elements that might provide future path and recommend by the subgroup to be raised to the main TSRG group for consideration in another subgroup

I. Energy Storage (Area Network is complicated gateway)

II. Smart inverter with limited/ zero export - Grid Mod

- Any consideration is being made to review the communication standards for DG application for potential improvement

End of TSRG Subgroup - Area Networks

TSRG Expedited Process SubGroup Update

Quincy Vale

The Massachusetts Technical Standards Review Group

Expedited Process Sub-Group

- Lead: Quincy Vale
- 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
- First meeting
  - Day: Friday, June 23, 2023
  - Time: 10 AM to 11:30 AM ET (proposing 90 minutes)

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
Pierre	Journel	Engie	Industry
Jeff	Long	Engie	Industry

Summary of Recent & Upcoming Activities

Completed Activities:	
5/26/2023	EDC provided information on Control Center duties & activities impacted by ESS
6/20/2023 7/18/2023	Discussed BTM use cases and expedited interconnection opportunities
Upcoming Activities:	
Distribution connected batteries doing frequency regulation – metering arrangements, net neutral signal every 15 minutes,	
Further discussions on dynamic grid controls (ARI, PCS/PPC, Smart Inverters)	
IIRG – handling/characterization of storage in EDC reporting; tariff revisions related to storage; policy barriers to push to IIRG	

NEXT MEETING 10/9/2023 1PM-3PM

TSRG
System Impact Study SubGroup Update

Michael Porcaro

The Massachusetts Technical Standards Review Group

System Impact Study Sub-Group Update

Mission Statement:

Review the technical analyses, tools and procedures associated with SIS. Focus on optimization, automation, and efficiency, using existing utility standards, to reduce cost and timing of SIS. Consider utility standards as they relate to evaluation processes in the study as they drive SIS tasks. Consider alternative evaluations/considerations to still maintain safety/reliability.

Expected Group Output:

Agreement on efficiencies that can be realized to reduce SIS cost and/or time, while still maintaining the safety/reliability of the grid and not challenging any requirements of the DG tariff (MDPU 1468).

Specific details of future state such as that of the ESMP, flexible interconnections, or other constructs that are not yet part of standard utility offerings for all customers are out of scope for the group.

Team

First Name	Last Name	Company
Courtney	Feeley Karp	Klavens Law Group, P.C.
Brian	Lydic	IREC
Gerry	Bingham	DOER
Claire	Loe	Blue Wave Solar
Doug	Pope	Pope Energy
Greg	Hunt	ZPE Energy
Kavita	Ravi	Blue Wave Solar
Nachum	Saadan	Grid Edge Technology
Nigam	Trivedi	Blue Wave Solar
Richard	Labrecque	Agilitas
Russ	Aney	Parallel Products
Ryan	McGlothlin	Silo Electric

First Name	Last Name	Company
Daniel	Dabkowski	Eversource
David	Laplante	National Grid
Emily	Slack	National Grid
Jennifer	Chalifoux	National Grid
Nathan	Walsh	National Grid
Samer	Arafa	National Grid
Shakir	Iqbal	Eversource
Quinn	Perry	Control Point

Milestone Summary

Completed Activities:	
5/25/2023	Kick off meeting with SMEs
6/30/2023	EDC listing of study steps for PV and ESS and associated analyses
8/1/23	Reviewed study assumptions, EDC differences, & representative solar curves
Upcoming Milestones & Activities:	
	Brainstorm of largest time items in study process – review end to end study process
	Consider common mistakes, communication gaps that can improve timing
	Change impact examples – inverter/battery/solar changes will be common within end-to-end cycle; what trips the requirement for restudy?
	Modeling

NEXT MEETING 10/9/2023 1PM-3PM

Aging Inverter Replacement

Glenn McGillicuddy
Industria Engineering, Inc

The Massachusetts Technical Standards Review Group

AGING INVERTER REPLACEMENTS (DG SITE RE-POWERING)

By: Industria Engineering Inc

To: Massachusetts Technical Standards Review Group (TSRG)

AGENDA

- Introduction
- Problem Statement
- Engineering Process
- Utility Interconnections
- Hurdles & Concerns
- Next Steps
- Discussion & Questions

INDUSTRIA ENGINEERING

INTRODUCTIONS

Industria Engineering Inc

- Small Engineering Procurement & Construction business
  - Concentrating in New England on:
    - Utility Scale & Large C&I Sectors
    - Solar; Solar + Storage (AC & DC coupled); Storage
    - Backup & Microgrid applications
    - Engineering Services
  - DC arc flash research
  - Operations, Maintenance, & System Optimization

Glenn McGillicuddy

- Owner, Vice President of Engineering
- BS Mechanical Engineering; MS Ocean Engineering
- DG / Renewables since 2008

INDUSTRIA ENGINEERING

RE-POWERING PROBLEM STATEMENT

- Inverter manufacturers are increasingly discontinuing inverter models as new models are released to market.
- Once a typical 10 year warranty has expired inverters manufacturers will no longer provide parts or have parts available
  - 3rd party vendors of inverter parts are not common especially specialty manufacturer parts
- Extended warranties are not being offered
- Inverter replacement or site decommissioning are the only options once inverters become non-repairable.

INDUSTRIA ENGINEERING

ENGINEERING PROCESS FOR RE-POWERING

- Review existing conditions:
  - PV Array DC Voltage (Min, Max, MPPT range) – 10+ year old arrays are typically 600V Class
  - Inverter AC Voltage and Configuration – Can vary from 208V to 480V & be odd voltages. Most inverters in the 10+ year old range are central inverters
- Identify likely inverter candidates
  - 600V DC class inverters are rare to non-existent
  - 1000V DC class inverters can be used with 600V DC arrays if array DC operating voltage is within limits of inverter
- Model array & inverter(s) to find best inverter fit
- Review constructability & economics of inverter replacement
- Try to limit the impacts to interconnection equipment: Transformer configuration, grounding schemes etc.
- Revise site plan and SLD for customer and utility review

INDUSTRIA ENGINEERING

UTILITY INTERCONNECTIONS

- No current standards / process for re-powering a site
  - How to change the existing ISA to reflect new equipment / production changes
  - How to enter a project in the utility portals while maintaining their legacy project positions in the feeder queue.
- Can use existing standards / process as a guideline but some additional wording maybe needed
- Re-powering changes can affect:
  - Inverter model / manufacturer changes: Anti-Islanding scheme & fault current
  - Inverter topology changes: Effective grounding & XFMR winding configurations
  - Require new equipment to be factory de-rated to maintain site nameplate power limit.
- Upgrade or grandfathered protective settings?
  - Retro-commissioning relays & witness tests
  - DG sites without redundant relaying OR sites with elements that violate new ride-through limits
- What studies will be required, study cost, and timelines?
  - Additional EPS upgrades or cost shares due to changes?
  - Area wide studies imposed on existing sites?

INDUSTRIA ENGINEERING

HURDLES & CONCERNS

- Unknown process with interconnecting utilities causing concern for system owners
- Unknown point of contact for existing customers who have ISAs to ask questions about existing sites
- Customers asking if they will be caught up in Area wide studies
- Upgrade costs (both system and utility) drive the decision to either limp the existing system along, re-power, or decommission
- Can customers do a phased replacement of inverters and continue to run to maximize uptime

INDUSTRIA ENGINEERING

NEXT STEPS
(AKA – WHY INDUSTRIA IS HERE)

- Does the Technical Standards Review Group think there is a need for input here
  - Is a Sub-Committee needed to investigate the need / advise on the process?
- Request utilities for proposed process / standards for site re-powering
  - Standards for swapping out inverters / site re-repowering & critical equipment
  - Standards for increasing / decreasing site size
  - Standards for export of power durations & time of day
- Review and advise on the proposed process
- Extra efforts should be made to keep existing DG customers online
- Process for freeing up capacity if sites are decommissioned.

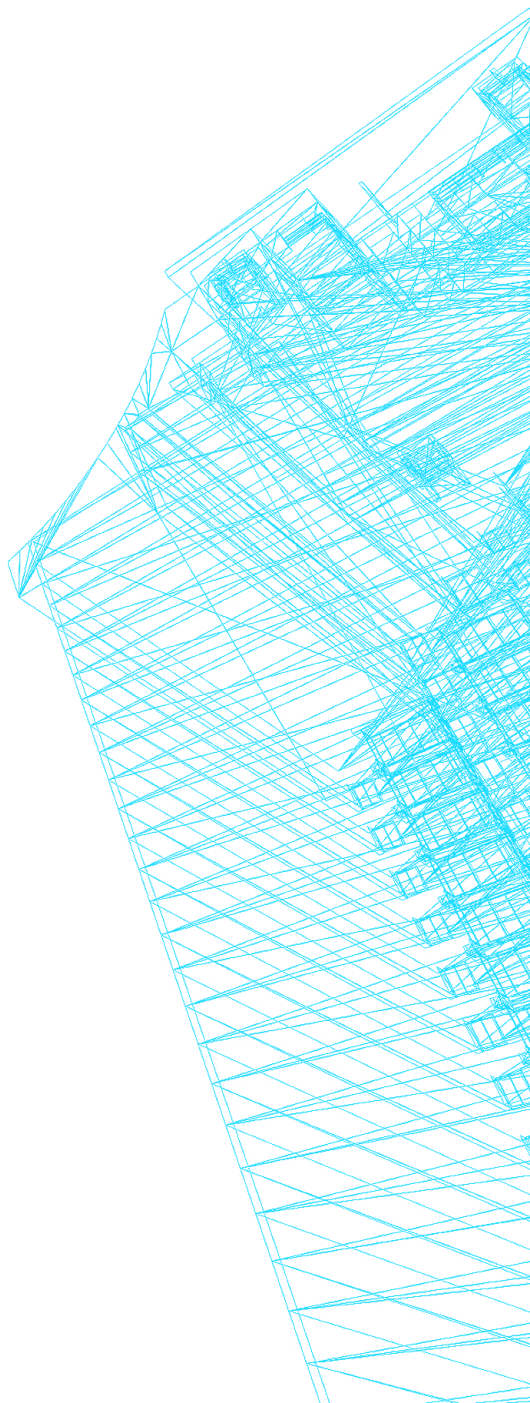
INDUSTRIA ENGINEERING

QUESTIONS?

Thank you

Glenn McGillicuddy
VP of Engineering
Industria Engineering
gmcgillicuddy@industriaeng.com

INDUSTRIA ENGINEERING



Technical Standards

The Massachusetts Technical Standards Review Group

EDC Technical Standards

- As needed, EDC technical standards may be updated
- Below is general discussion for awareness of major elements that may have been changed/amended/added within the last 12 months

Eversource (April 27, 2023)

- No new updates

National Grid (January 1, 2023)

- Errata on following slide

Unitil (May 1, 2000)

- No new updates

Information provided for discussion purposes only, and subject to change. Additional modifications to the standards may be present beyond that specifically called out here. It is the responsibility of the customer to read and understand all utility standards.

National Grid Standards

Errata issued May 2023

https://www.nationalgridus.com/media/pronet/esb750-errata-revisions.pdf

ESB No. 756 Appendix C; "Distributed Generation Connected to National Grid Distribution Facilities Per The Massachusetts Standards for Interconnecting Distributed Generation", version 9.0"

PAGE	SECTION	EFFECTIVE DATE	CHANGE
7	4.0	April 2023	*Make edits in red:* **Certified DER:** ~~A UL 1741 certified inverter~~ A Distributed Energy Resource that has been tested and certified by a Nationally Recognized Testing Laboratory, whose OSHA Scope of Recognition includes UL 1741. *Subsections A and B to remain.*
8	4.0	April 2023	*Add new definition:* NRTL – Nationally Recognized Testing Laboratory, as defined by OSHA.
9	5.1.3	April 2023	*Add sub-bullet under "Inverter-based system models and validation test data."* UL 1741 certification documentation shall be signed/stamped and dated by a NRTL whose OSHA Scope of Recognition includes UL1741. The certification shall include Manufacturer and Model number(s) and be provided with the summary of type testing results, as defined by IEEE 1547.1 Subclause 4.5.
13	5.1.7	April 2023	*Add sub-bullet under "Project with 1741-SB inverters…":* If the DER Customer elects to use 756C 7.3.2.1(5) for effective grounding, the oneline must show the zero-sequence continuity (i.e., neutral path) from the PCC to the inverters.
27	7.3.2.1	April 2023	*Make edits in red:* A wye-grounded to wye-grounded transformer with 1741-SB inverters. A letter from both the inverter(s) manufacturer and Customer stating that the Reference Point of Applicability location meets all the IEEE 1547-2018 requirements must be submitted for review. The customer shall also submit a ~~testing~~ certification document, signed and dated by a NRTL, for GFOV testing for the site-specific system grounding aspects to be installed as specified by IEEE 1547.1-2020 Section 5.17 and UL1741 Section SB 4.3.5.17.1, which complies with IEEE 1547-2018 Section 7.4.

Information provided for discussion purposes only, and subject to change. Additional modifications to the standards may be present beyond that specifically called out here. It is the responsibility of the customer to read and understand all utility standards.

ARI (Active Resource Integration) Flexible Connections

Steps toward network optimization & increased enablement for interconnection capacity

ARI is a new service being explored by National Grid designed to enable our solar developers, energy storage developers, and all customers to connect to our network **faster** and **operate safely within our grid**. ARI is the first step toward our ambitious goals to enable DERMS capability to potentially manage flexible load and generation capacity across the Massachusetts service territory.

Why?

Difficult to operate the grid with highly volatile DER; limited monitoring and control of DER

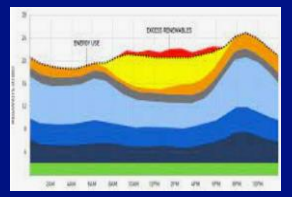
High saturation of clean energy interconnection requests have resulted in changes in load and generation system impacts that challenge grid operating constraints.

At times, high interconnection cost and/or lead times for system upgrades have been a hurdle for customers to interconnect

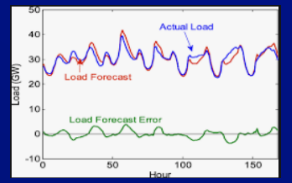
Link to ARI Program Homepage

Including program details and submission process

Key Concept Features



DG curtailment: Automated curtailment of DG based on ***real-time system conditions***



Load forecast: Use AI / ML to forecast curtailment needs in advance

Integrations: Connect with existing systems for real-time system awareness, automated DG dispatch and control center operator visibility

Value

- **Expedite time to connection**
- **Increase connection volume on existing assets through proactive management**
- **Increase energy realization toward the Commonwealth's clean energy goals**
- **Increase overall grid visibility and control**
- **Improve Customer experience for developers**

National Grid Flexible Interconnections Program

- Website with full information:
  - https://gridforce.my.site.com/s/article/ACTIVE-RESOURCE-INTEGRATION-ARI-FLEXIBLE-INTERCONNECTIONS-PILOT

- Seeking interest from solar cases and storage cases
  - **Energy Storage ARI Pilot Criteria & Eligibility Requirements**
  - **Solar ARI Criteria & Eligibility Requirements**

- To submit a request for pilot consideration a customer must:
  1. Review pilot eligibility requirements to self-assess whether the application is a possible candidate
  2. Prior to ***9/1/2024*** send an email to NationalGridARI@nationalgrid.com to submit a request for consideration. Example requests language and content listed on the website.
  3. Once received, the application will be added to the possible candidate pool for consideration by National Grid. Requests received on or after ***9/1/2024*** will not be considered.
  4. National Grid will provide responses to all requests in as timely a manner as possible, indicating denial or acceptance into the pilot.

Interconnection Implementation Review Group (IIRG)

- ***Group Mission*** - Collaborate on process/policy related DG Interconnection topics
- Refer to IIRG Website for all information related to the group
  https://ngus.force.com/s/article/Energy-Storage-Interconnection-Review-Group
  - Membership listing
  - Charter
  - Substantive topics
  - Past Meeting Notes
  - Upcoming meeting info and registration link
    - *First meeting October 12*
- Topic List & Summaries
  - Prioritization to be determined by membership after first meeting
    - Revisions to the simplified process
    - Distribution impact study timelines and costs
    - Using new technology to lower EPS upgrade costs
    - Revisions to the expedited process
    - Queue management
    - Hosting capacity maps
    - Aligning TSRG and IIRG operating procedures

Closing

- **Next meetings**
  - Dec 7, 2023
  - Mar 24, 2024

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