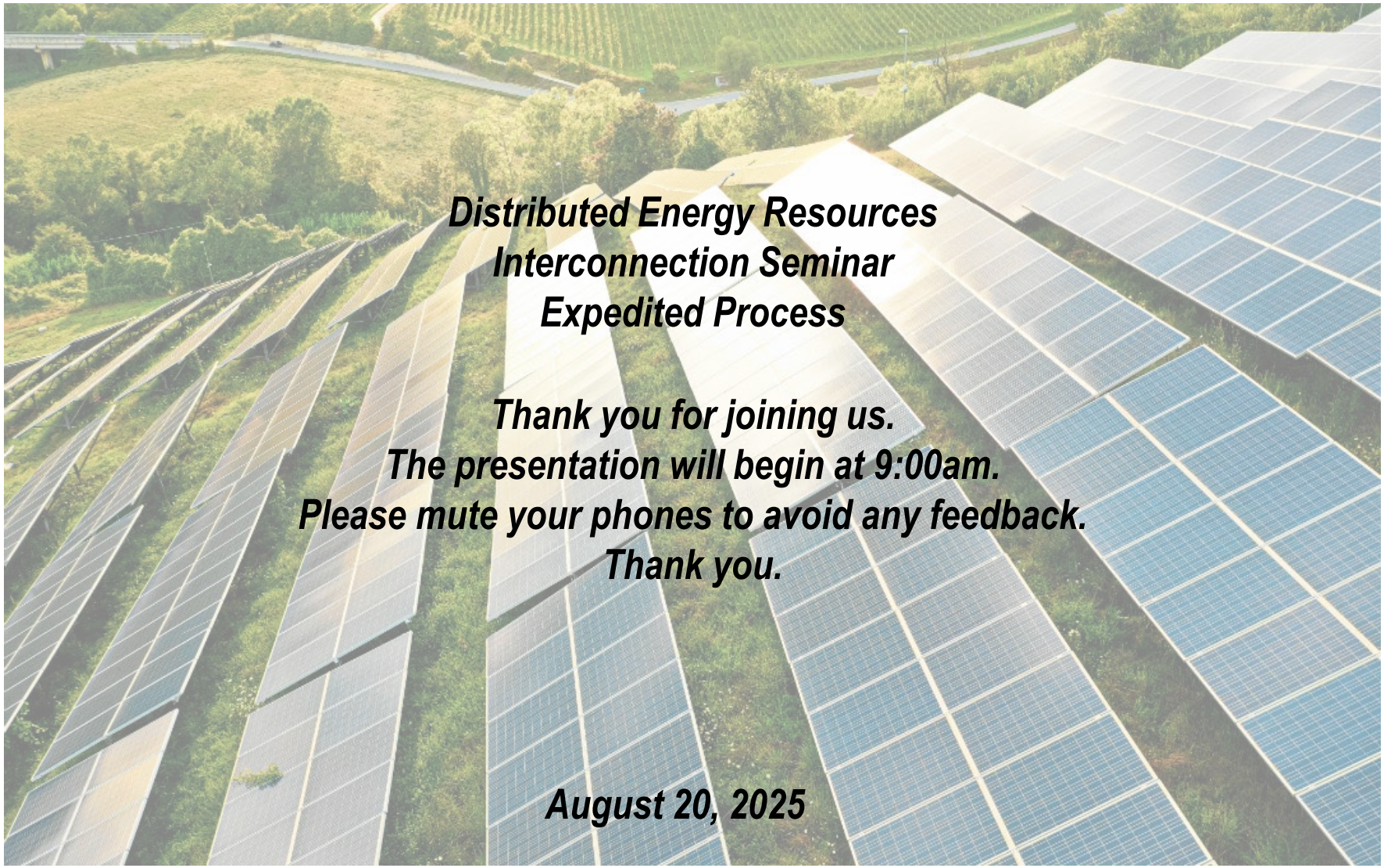


Distributed Energy Resources
Interconnection Seminar
Expedited Process

Thank you for joining us.
The presentation will begin at 9:00am.
Please mute your phones to avoid any feedback.
Thank you.

August 20, 2025

Co-Hosts

EVERSOURCE ENERGY

EVERSOURCE

MASSACHUSETTS CLEAN ENERGY CENTER

Mass ACA

DOER

Massachusetts Department of Energy Resources

nationalgrid

Unitil

Safety

Safety is the most important thing to consider in designing, connecting and operating a successful DG project.

Live Wires	Regard ALL wires as live. Overhead power lines are not insulated and carry enough energy to cause serious injury or even death.
Keep Away	Keep yourself, your co-workers, tools, ladders and vehicles at least 10 feet away from electric lines and equipment.
Safe Area	Make sure the area is clear of wires before working near trees or shrubs.
Never Attach or Tie	Never attach or tie anything off to power lines or electrical equipment.
Call	If you need to dig, first call Dig Safe at **1-888-dig-safe (1-888-344-7233)** to get underground utilities marked. **(www.digsafe.com)**

Interconnection Contacts

Eversource Energy – Western MA DG

Simplified Projects

- Anne Morrison
- Jeena Hatton
- Christina King
- Project inquiries need to be submitted via the portal
- General questions email: wmdg@eversource.com
- **Expedited Projects**
- Matthew Secovich: matthew.secovich@eversource.com
- Renata Gamache Renata.gamche@eversource.com

Project inquiries need to be submitted via the portal

SMART

- Email: SMART@eversource.com
- Toll Free Number: 844-726-7573

Meter Configuration & Meter Technical Questions

- MEDGAP: medgap1@eversource.com

Eversource Energy Seminars

February 5	**EMA Simplified**
March 12	WMA Expedited / Standard
May 7	EMA Expedited / Standard
June 11	WMA Simplified
August 20	WMA Expedited / Standard
September 17	EMA Simplified
November 5	WMA Simplified
December 10	EMA Expedited / Standard

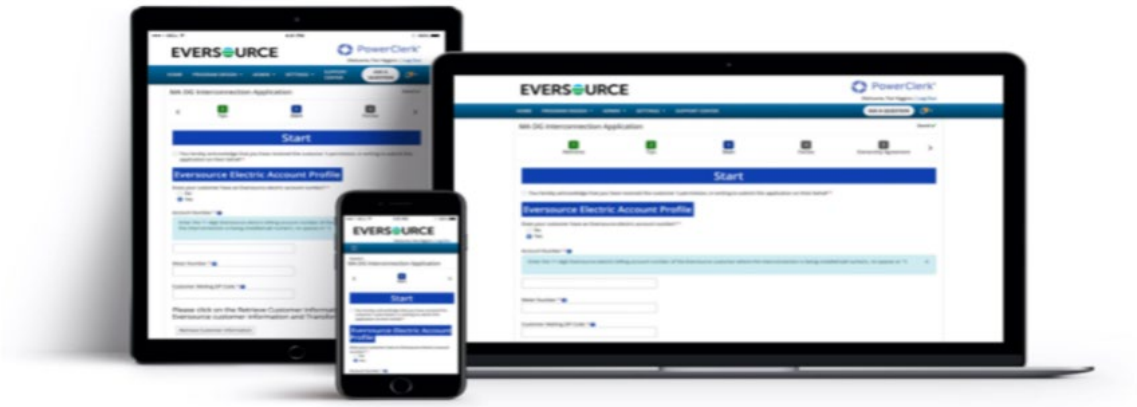
Power Clerk DG Application

- https://www.eversource.com/content/wma/about/about-us/doing-business-with-us/builders-contractors/interconnections/massachusetts/application-to-interconnect

POWERCLERK

You will use our PowerClerk portal to submit and track your applications. This online tool brings you:

- The ability to easily upload and review documents associated with your projects
- Automatic communications to help you keep track of your projects
- A mobile-friendly user interface that can be used on most devices including your laptop or tablet



You will need an Eversource.com user ID to use PowerClerk. If you don't have an ID, you'll be prompted to sign up.

Continuation Of Power Clerk DG Application

Expedited/Standard Application

Choose this application if you intend to install a:

- System that is greater than **15 kW AC single phase** or greater than **25 kW AC three phase**
- System configuration that does not correspond with the service configuration (such as using single phase inverters on a three-phase service)
- Non-inverter-based generator, co-generator, wind, hydro or other facility
- System on a radial distribution circuit

In addition, your proposed generation equipment must meet IEEE 1547.1 standards.

Expedited/Standard application fee = $4.50 per kW (minimum fee of $300; maximum of $7,500)

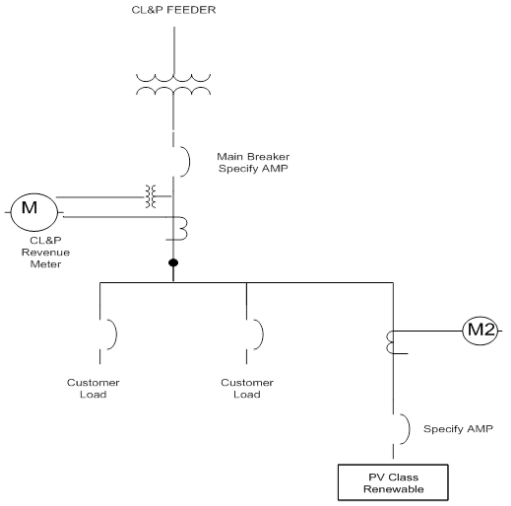
Pre-Application

You no longer need to submit a separate pre-application as it's now part of PowerClerk. You will be prompted to submit a pre-app if you are installing a generation facility of 250 kW AC or greater. View our **hosting capacity map**.

Log into Expedited PowerClerk →

Expedited Requirements

- **One Line**

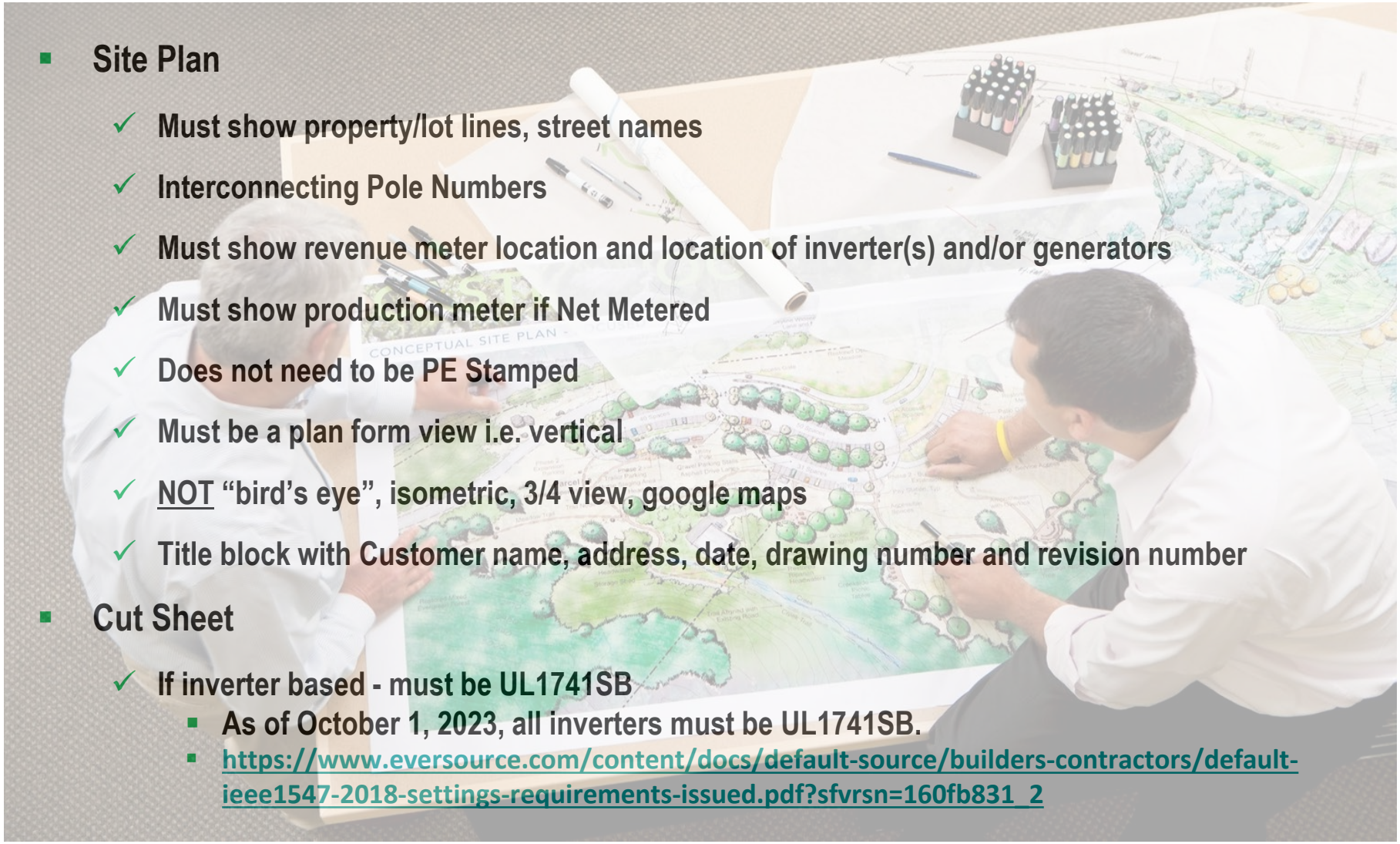


  - ✓ Required to be stamped by a MA **Electrical** PE.
  - ✓ Well documented electric service
  - ✓ Point of Common Coupling with Interconnecting Device
  - ✓ Size of main breaker
  - ✓ External disconnect switch
  - ✓ Generator breaker & size
  - ✓ Generator connection point
  - ✓ kW rating matches application (name plate)
  - ✓ Interconnecting Customer transformer configuration (if applicable) and impedance must match application.
  - ✓ Location of revenue meter, instrument transformers and protection – Metering Sequence
  - ✓ Title block with Customer name, address, date, drawing number and revision number
  - ✓ Inverter settings in table form
  - ✓ Definitive relay settings in table form, relay(s), PT's and CT's

- **Battery Storage Sheet (BESS)**

  - ✓ Required for any projects with storage

Expedited Requirements



- **Site Plan**
  - ✓ Must show property/lot lines, street names
  - ✓ Interconnecting Pole Numbers
  - ✓ Must show revenue meter location and location of inverter(s) and/or generators
  - ✓ Must show production meter if Net Metered
  - ✓ Does not need to be PE Stamped
  - ✓ Must be a plan form view i.e. vertical
  - ✓ NOT "bird's eye", isometric, 3/4 view, google maps
  - ✓ Title block with Customer name, address, date, drawing number and revision number
- **Cut Sheet**
  - ✓ If inverter based - must be UL1741SB
    - As of October 1, 2023, all inverters must be UL1741SB.
    - https://www.eversource.com/content/docs/default-source/builders-contractors/default-ieee1547-2018-settings-requirements-issued.pdf?sfvrsn=160fb831_2

Expedited Standard Process
(single phase >15kw and three phase >25kw)-All Technologies

INITIATION PHASE

- 250kW and greater Pre-app takes place before submitting application.
- Completed application
- Site plans
- One-line diagram
- Cut sheets
- Energy Storage Narrative
- Application fee
- Application reviewed for completion

ENGINEERING REVIEW

- Depending on project type and size various levels of engineering groups are involved
- System Planning Engineering determines if Impact Study is required or not

IMPACT STUDY

- Impact Study Agreement or supplemental agreement or both and Payment
- Impact Study Completed with a +/-25% Interconnection Cost Estimate
- ISA Executed
- Group Study (if applicable. See link below)

NO IMPACT STUDY

- A determination is made if any local upgrades are needed to the existing service or system.
- ISA Executed

DETAILED ENGINEERING

- Scheduled to begin after Customer pays 100% payment after ISA
- Final Sketch complete, Final Costs compiled, Easements by Property Owner Paperwork compiled, Town Hearings Scheduled, etc…

CONSTRUCTION PHASE

- ES construction
- Install meter and meter communications
- Relay settings confirmed
- Close out documents
- Schedule witness test

FINAL PHASE

- Test Energization
- Witness Test
- PTO
- Verify set up bill

Group Study website link: https://www.eversource.com/content/ct-c/about/about-us/doing-business-with-us/builders-contractors/interconnections/massachusetts-application-to-connect/distribution-group-studies

Questions?

Solar MA Renewable Target Program (SMART)

PROGRAM UPDATE

Katelyn Pidala
Associate Analyst, Customer Solar Programs

Outline

- SMART 3.0
- SMART Program Update (Western MA)
- Snapshot of SMART applications and claims
- Information on Renewable Credits Portal

SMART 3.0

1. Projects that are eligible to participate in SMART 3.0 are currently expected to be able to submit SMART program applications to the statewide Solar Program Administrator after October 15th.
2. Approved projects will be eligible to receive incentive payments and Alternative On-Bill Credits once Eversource receives necessary approvals from the Massachusetts Department of Public Utilities, likely in early 2026; projects may still operate as Net Metering Facilities or Qualified Facilities until this time.
3. Projects that intend to apply to SMART 3.0 should note anticipated SMART participation in their interconnection applications to ensure necessary metering is installed and eventual SMART enrollment is not delayed.
4. For more information, visit the Mass.gov DOER webpage: https://www.mass.gov/info-details/smart-30-program-details

SMART Program Update (WMA)

- 2025 SMART application fees:
  - Smaller than 25 KW: $142
  - Between 25 and 250 KW: $200
  - Between 250 and 500 KW: $971
  - Between 500 and 1,000 KW: $1,811
  - Larger than 1,000 KW: $3,518
    - **Zero Incentive Rates (SMART 2.0):**
      - Due to higher electricity rates and the declining incentive structure of the SMART program, some applications may receive an incentive payment rate of $0.00. In these instances, the Department advises solar installers work with their customers to evaluate the benefits of participating directly in the RPS market.

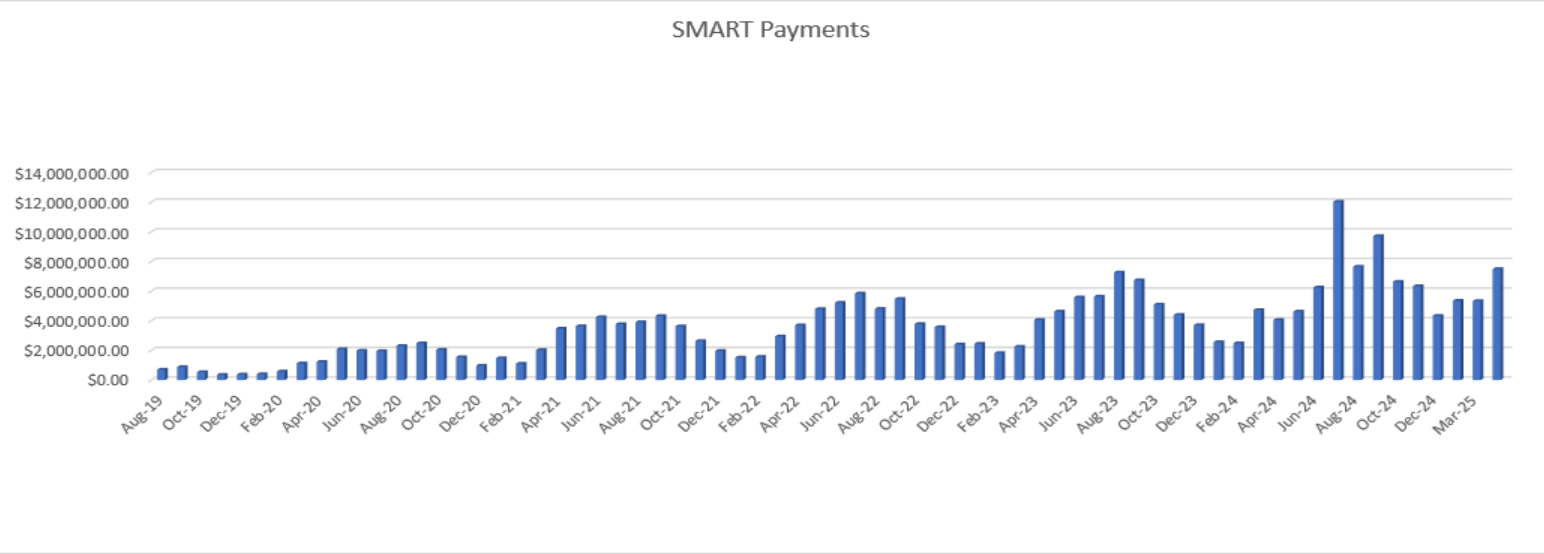
SMART Program Snapshot (WMA)

Number of large SMART applications and incentive claims by status and type with (MW) (as of 8/14/2025):

SMART Application or Claim Status	Total No. of Large Projects (> 25 kW-AC)	Behind the Meter (BTM)			Stand Alone (SA)		
		Net metering (NM)	Qualifying Facility (QF)	AOBC	NM	QF	AOBC
1. Applications submitted	3 (1.6)	0	0	0	1 (0.2)	2 (1.4)	0
2. Applications approved (PSOQ)	25 (36.4)	4 (2.1)	1 (2.1)	1 (0.03)	1 (0.3)	7 (9.6)	11 (22.4)
3. Claims submitted and under review	4 (5.2)	1 (0.05	1 (0.9)	0	0	1 (0.2)	1 (4.1)
4. Claims pending Eversource approval	1 (0.2)	1 (0.2)	0	0	0	0	0
5. Claims approved (FSOQ)	92 (133)	18 (4.3)	12 (2.3)	9 (1)	6 (7.4)	12 (13.2)	35 (104.8)

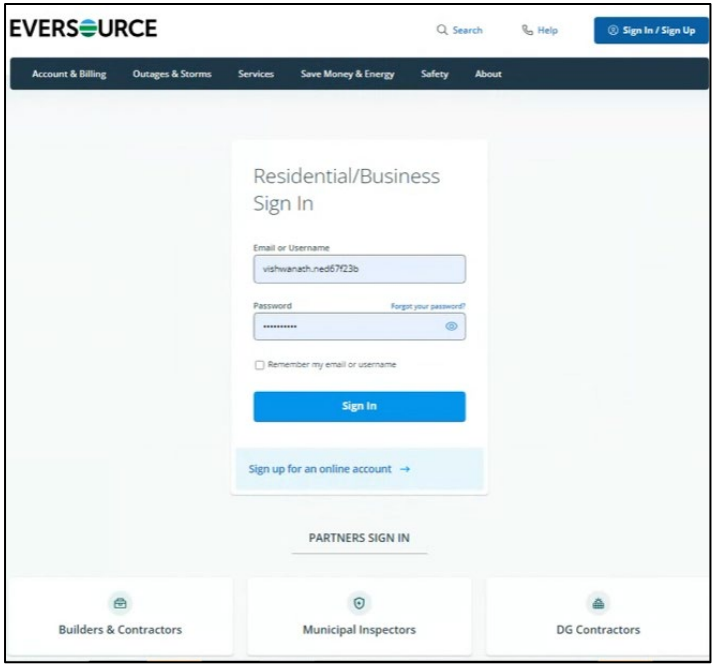
Overall Numbers

- Claim Approved Accounts WMA (>25 kW AC): 92 **(133 MW)**
- Total WMA Payments Last 12 Months (all sizes): **$12.9M (251,601 MWH)**
- Total Program Payments (since inception): **$247M**



Renewable Credits Portal Update

- Nearly 1200 users have signed up and submitted ~1500 AOBC forms and ~500 Schedule Z forms
- Portal is available at eversource-ext.gridx.com/
- Log in using your eversource.com log in information. First time users must sign up for an online account.
- Access the User Guide on eversource.com for step-by-step instructions
- For help, contact smart@eversource.com



- Renewable Credit Portal user guide: https://eversource.com/content/docs/default-source/save-money-energy/renewable-credits-portal-user-guide.pdf

Ask Questions and Get Clarification

CLEAResult

(SMART Program Administrator):

MA.SMART@CLEAResult.com, 888-989-7752

Eversource SMART Team:

SMART@eversource.com, 844-726-7573

WMA Expedited DG Interconnection Studies

Spencer Hutchins,
Engineer, Trans. Interconnections

Overview

- DER applications in WMA continue to increase and bring more saturation to existing stations. Eversource continues to work closely with ISO-NE on DER projects to assess and verify the correct path forward for each project.
  - Eversource substations are now seeing approximately 300MW of DER connected generation in just WMA alone.

- Eversource in coordination with ISO-NE assess each DER application and perform an Impact Screen to determine if the facility may result in adverse impact to the system and the correct path of study.

- Eversource continues to work to improve and streamline the process of receiving applications, reviewing project information and improving information transparency to DER interconnection customers relative to studies.

Agenda:

- Process & Resources for understanding the ASO Impact Screen
- Level 0 & Level 3 Studies
- Timing and Communication
- Summary of Resources Available

*See definition of Significant Adverse Impact in ISO-NE's *Transmission Planning Technical Guide*: https://www.iso-ne.com/static-assets/documents/2017/03/transmission_planning_techincal_guide_rev6.pdf

Process Overview

Developers can self-screen projects for likely anticipated path of study. Final determination can vary from below in some circumstances; important to review all points of the document.

If your project is between 1MW & 5MW **AND** the interconnecting substation generation total is below 5MW:
Level 0 with no analysis

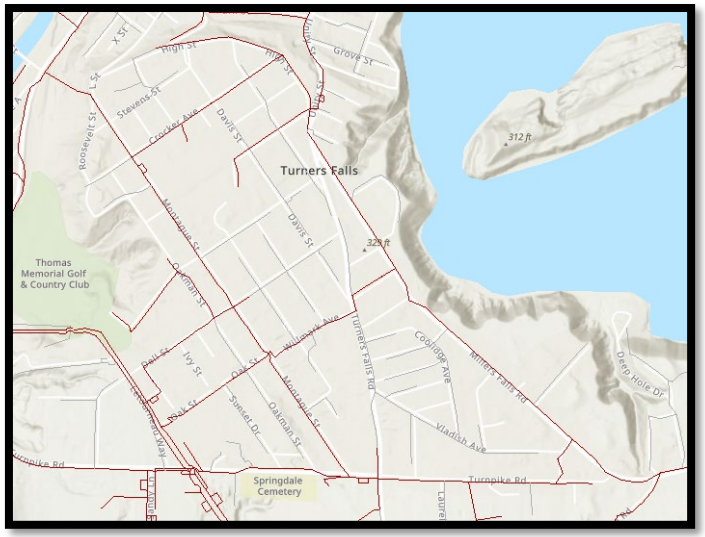
If your project is between 1MW & 5MW **AND** the substation total is between 5MW & 20MW:
Level 0 with Transfer Limit Analysis (testing for no adverse impact)

If your project is 5MW or above **OR** if the substation total is above 20MW:
Level III Study

Electrically-close stations can be summed in certain instances to invoke a Level III study even in the case that it appears the station has less than 20MW interconnected. ISO-NE makes this final determination.

https://www.eversource.com/content/docs/default-source/builders-contractors/aso-impact-screen-diagram.pdf?sfvrsn=551cdd62_2

Hosting Capacity Maps



DG Hosting WMA Final: 21C8	
Location Hosting Capacity(MW)	0.20
Section ID	8475956
Operating Voltage (kV)	13.8
Circuit Name	21C8
Bulk Circuit Name	21C8
Distribution Substation Name	N/A
Distribution Substation Voltage(kV)	N/A
Distribution Substation Rating (MVA)	
Bulk Substation Name	21C MONTAGUE
Bulk Substation Voltage(kV)	115/13.8
Bulk Substation Rating (MVA)	40.00
Bulk Sub Hosting Capacity(MW)	0.00
Circuit DER Online(kW)	9496.00
Circuit DER In Queue(kW)	68.00
Ferc Jurisdiction	Y
Current ASO Studies	None ; Lvl 3 In Study:4
Circuit Feeds Secondary Network Customers	N
Circuit Rating (Amp)	300.00
3V0 Status	
Date Last Updated	07/18/2023, 06:20 AM

Hosting Capacity Maps publicly available – provides insight into level of saturation and queued generation pending. Maps are general guides and subject to change.

https://www.eversource.com/content/ema-c/about/about-us/doing-business-with-us/builders-contractors/interconnections/massachusetts/hosting-capacity-map

DER Projects & Market Participation

Reminder:

- On August 28th, 2022, FERC approved ISO-NE's proposal to have all distribution connected projects follow the state interconnection process regardless of if the project is interconnecting on a market facing feeder.
- DER projects that receive PPA approval can participate in ISO-NE markets without the need for an ISO-NE queue position or a 3 party FERC IA.

What did not change?

- Projects are still subject to the same requirements for ISO-NE PPA approval and screening for potential adverse impact to the transmission system.

https://www.iso-ne.com/static-assets/documents/2022/08/er22-2226-

Overview of T Studies

- **Level 0 Studies**
  - At a minimum, generally consist of a transfer limit analysis to ensure no degradation of ISO-NE Interface Limits. If adverse impacts found, a Level 3 study will be required.
  - Some Level 0 projects may require more detailed analysis while others may require less analysis.
- **Level 3 Studies**
  - Conduct thermal and voltage steady state, short circuit, stability analysis
  - PSCAD analysis will be required as per ISO-NE PP5-6 requirements
  - Technical data will be requested from projects and is required to start studies.
  - Highly saturated substations generally now all fall into a group study.

https://www.eversource.com/content/docs/default-source/builders-contractors/aso-impact-screen-diagram.pdf?sfvrsn=551cdd62_2

Technical Data Required - Level 3 ASO

- Conductor types and distance
  - Between Project and inverters/GSUs
  - Project's tie line to the point of interconnection (POI)
- Generator step-up (GSU) transformer size (MVA), impedance (%Z), and X/R ratio
- GSU transformer number of taps and per unit size of each (typical is +/-2 steps, each at 2.5% or, 0.95, 0.975, 1.0,1.025, 1.05 per unit)
- Stamped project one line (must include inverters)
- Project inverter modeling information (>1MW and <5MW)
  - Eversource to use DER_A inverter stability models
  - Developers to provide parameters
- Project inverter modeling information (>=5MW)
  - Datasheet and manual
  - Reactive capability curve and/or data tables necessary to create the capability curve when the project output is a maximum (Pmax)
  - Stability model in PSS/E standard library format. **Note ISO-NE does not accept user developed models.**
- All projects' inverter modeling information
  - Protective voltage and frequency trip set points
    - Ride through capabilities need to meet ISO-NE SRD requirements.
  - PSCAD models for a potential frequency response study

Link below provides a comprehensive list of all Technical Data required for Level 3 ASO Study

https://www.eversource.com/content/docs/default-source/builders-contractors/aso-technical-data-request.pdf?sfvrsn=2d53d562_0

Summary of Resource Available

Mass Distributed Generation, Interconnections & Net Metering
https://www.eversource.com/content/ema-c/about/about-us/doing-business-with-us/builders-contractors/interconnections/massachusetts

ASO Impact Screening Flow Diagram
https://www.eversource.com/content/docs/default-source/builders-contractors/aso-impact-screen-diagram.pdf?sfvrsn=551cdd62_2

Technical Data Request List for Level 3 ASO Transmission Studies
https://www.eversource.com/content/docs/default-source/builders-contractors/aso-technical-data-request.pdf?sfvrsn=2d53d562_0

Hosting Capacity Maps
https://www.eversource.com/content/ema-c/about/about-us/doing-business-with-us/builders-contractors/interconnections/massachusetts/hosting-capacity-map

DG Guidelines
https://www.eversource.com/content/docs/default-source/builders-contractors/distributed-generation-guidelines-interconnection.pdf?sfvrsn=5432d062_2

Questions?

MA SMART Program
Metering Review

Manager, Meter Services
Supervisors, Meter & Service

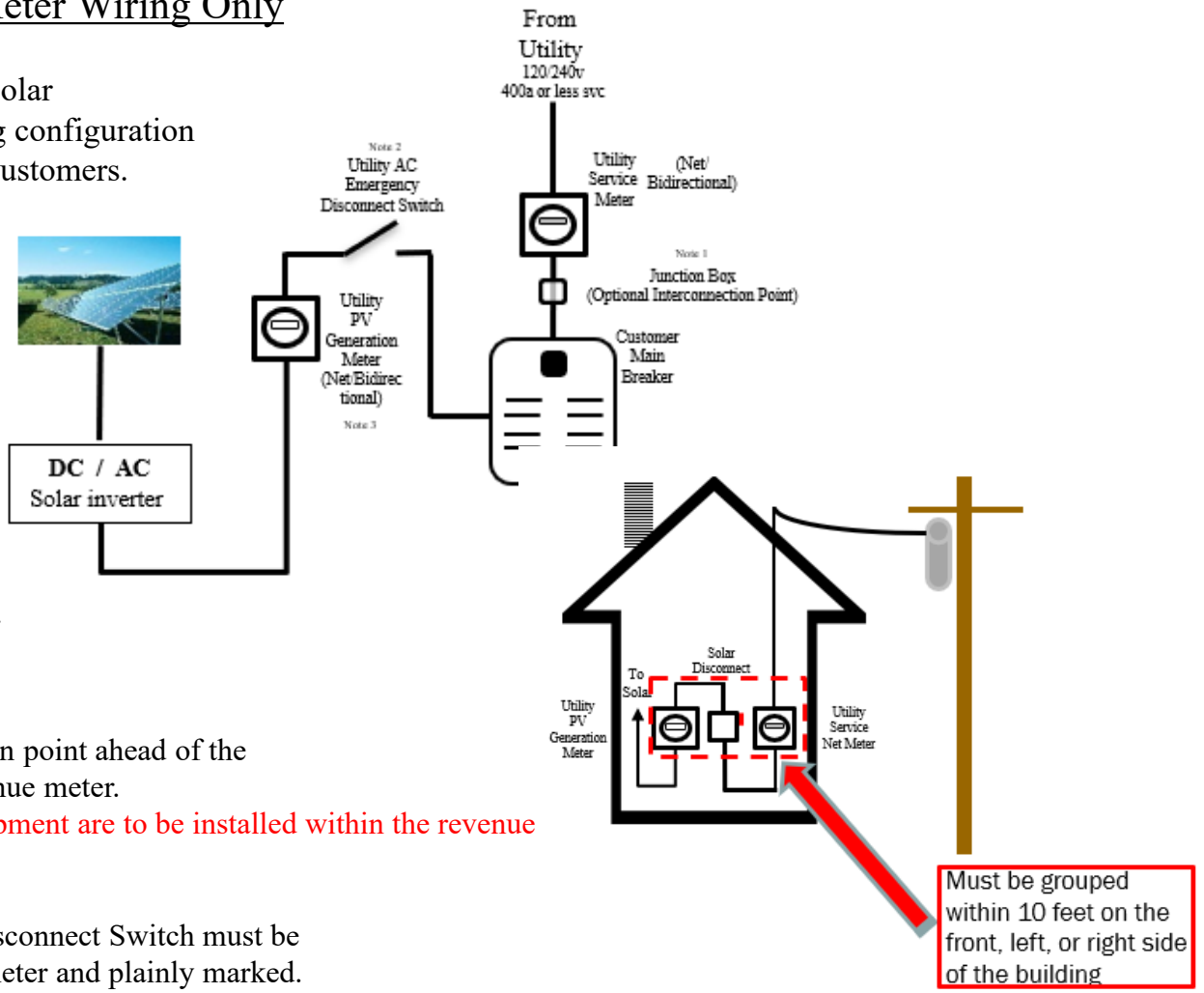
MA SMART Program Topics

- Meter Socket wiring
- Emergency disconnect position
- Information on meter socket use
- IT (instrumented transformer) Rates Services
    - What the contractor provides
    - What Eversource provides
    - Labeling

Meter Wiring

Solar and Production Socket Meter Wiring Only

Scenario – Behind the Meter (BTM) Solar
Description: typical solar meter wiring configuration for residential and small commercial customers.



Solar Prod Meter
(Utility PV Generation Meter)
< 60KW = Scalar meter
(Monthly consumption)
> 60KW = Interval Recording meter

Note 1: Optional acceptable interconnection point ahead of the main breaker, but behind the revenue meter.
No connections, splices or measuring equipment are to be installed within the revenue meter socket.

Note 2: Customer provided Emergency Disconnect Switch must be Located next to the Eversource Revenue meter and plainly marked.

Note 3: Utility PV Generation and the Utility Storage meters must be wired with Utility feed to the top of the Meter socket; Solar panels to the bottom of the meter socket

Meter Wiring

Solar Meter Wiring Only

Scenario – Behind the Meter (BTM) Solar
Description: typical solar meter wiring configuration for residential and small commercial customers.

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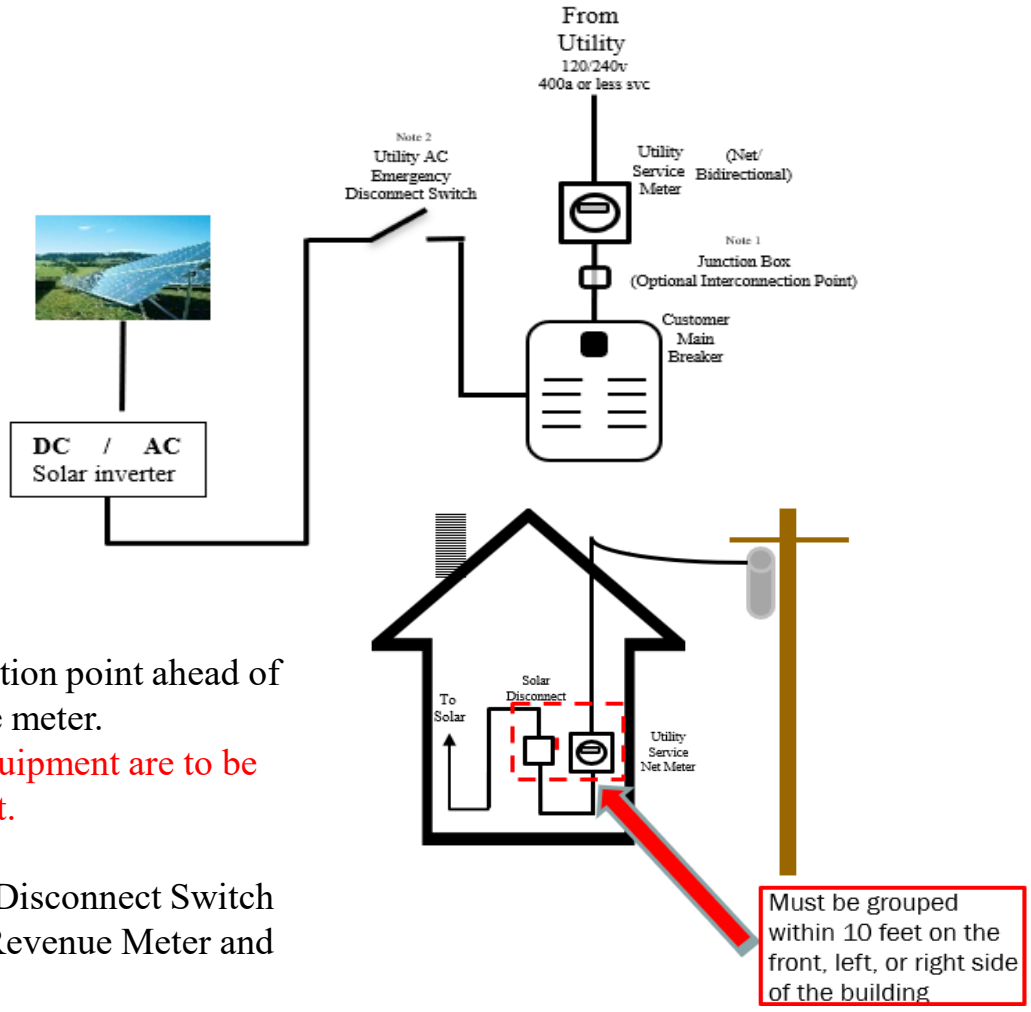
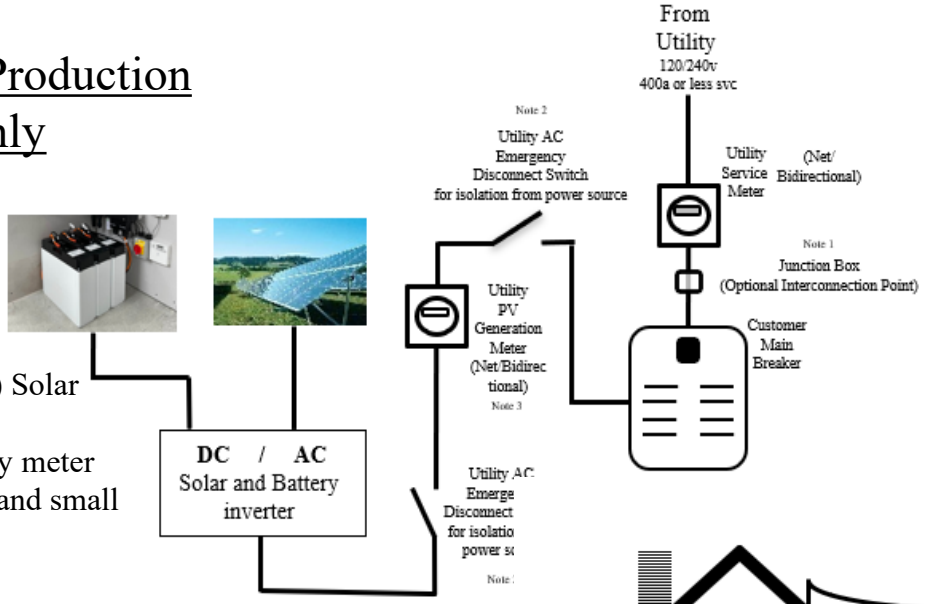


Note 1: Optional acceptable interconnection point ahead of the main breaker, but behind the revenue meter.
No connections, splices or measuring equipment are to be installed within the revenue meter socket.

Note 2: Customer provided Emergency Disconnect Switch must be located next to the Eversource Revenue Meter and plainly marked.

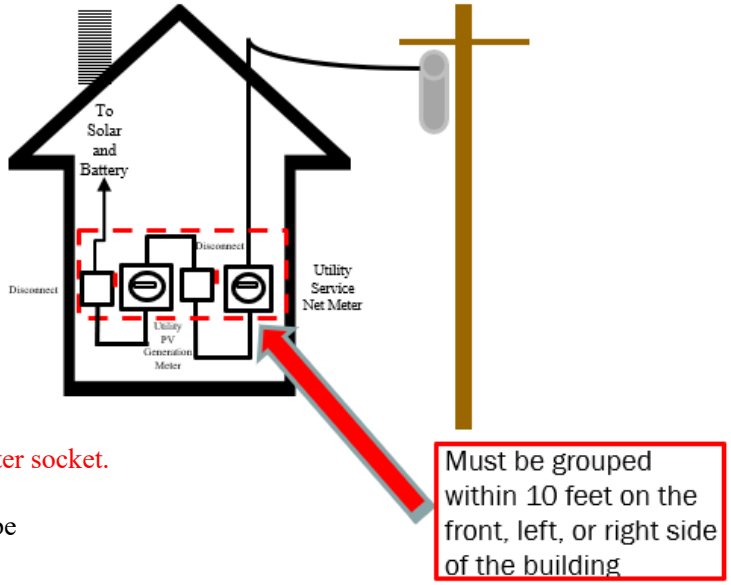
Meter Wiring

Solar with Battery and Production Socket Meter Wiring Only



Scenario – Behind the Meter (BTM) Solar and Battery

Description: typical solar and battery meter wiring configuration for residential and small commercial customers.



Solar Prod Meter
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(Monthly consumption)
> 60KW = Interval Recording meter

Note 1: Optional acceptable interconnection point ahead of the main breaker, but behind the revenue meter.
No connections, splices or measuring equipment are to be installed within the revenue meter socket.

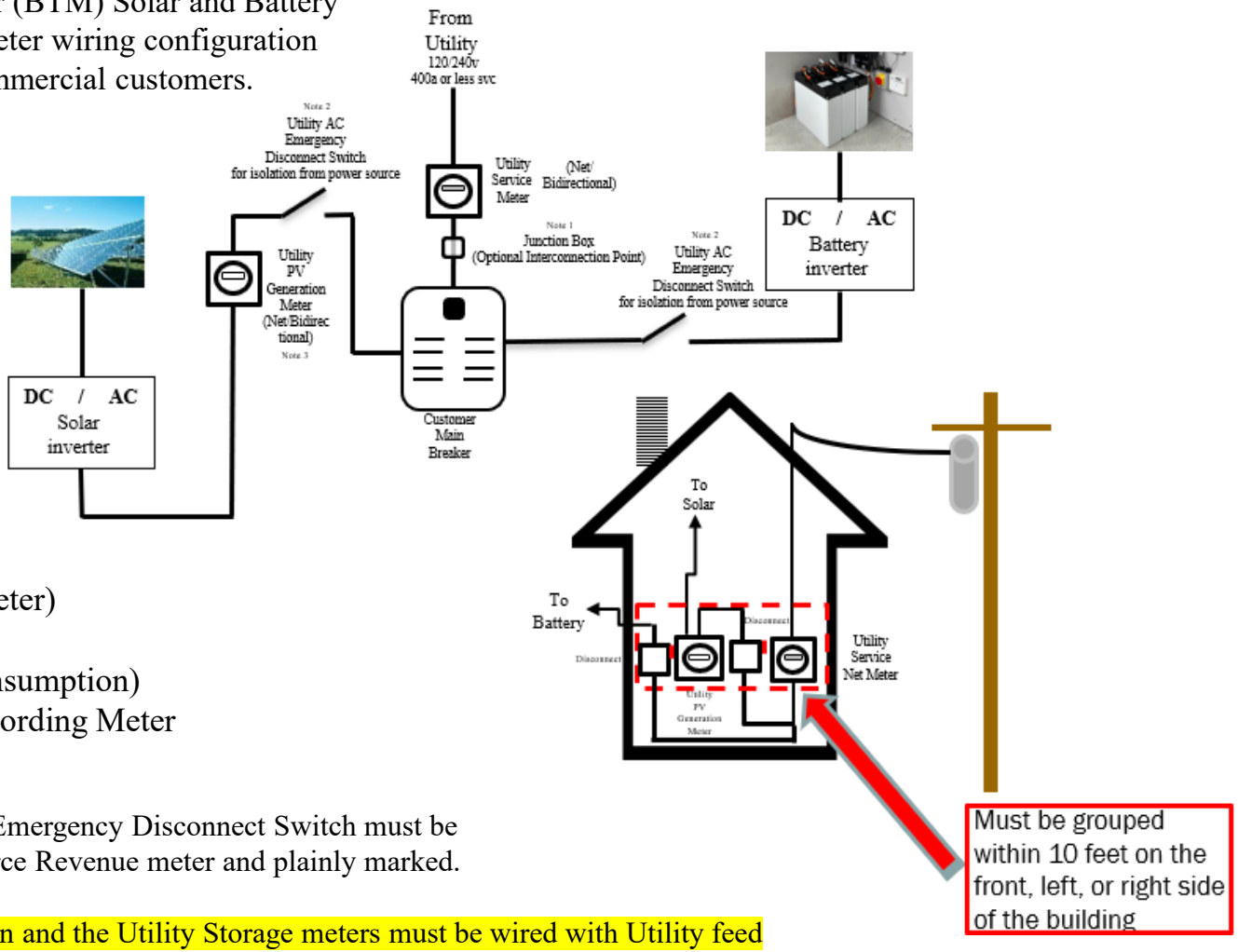
Note 2: Customer provided Emergency Disconnect Switches and Production Meter must be located next to the Eversource Revenue Meter and plainly marked.

Note 3: Utility PV Generation and the Utility Storage meters must be wired with Utility feed to the top of the Meter socket; Solar panels to the bottom of the meter socket

Meter Wiring

Solar Production Socket and Battery Meter Wiring Only

Scenario – Behind the Meter (BTM) Solar and Battery
Description: typical solar meter wiring configuration for residential and small commercial customers.



Solar Prod Meter
(Utility PV Generation Meter)
< 60KW = Scalar meter
(Monthly consumption)
> 60KW = Interval Recording Meter

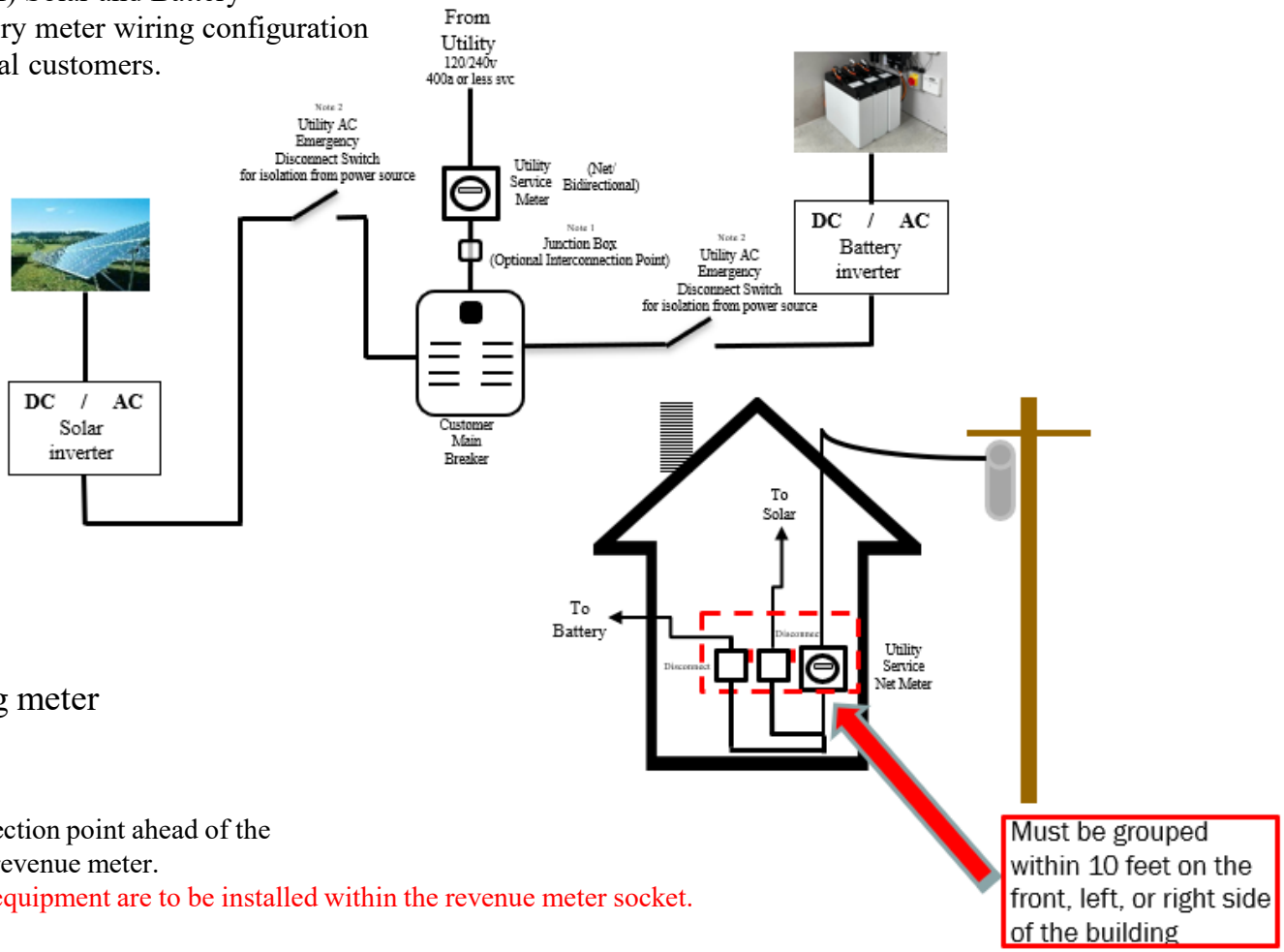
Note 1: Customer provided Emergency Disconnect Switch must be Located next to the Eversource Revenue meter and plainly marked.

Note 2: Utility PV Generation and the Utility Storage meters must be wired with Utility feed to the top of the Meter socket; Solar panels to the bottom of the meter socket

Meter Wiring

Solar and Battery Meter Wiring Only

Scenario – Behind the Meter (BTM) Solar and Battery
Description: typical solar and battery meter wiring configuration for residential and small commercial customers.



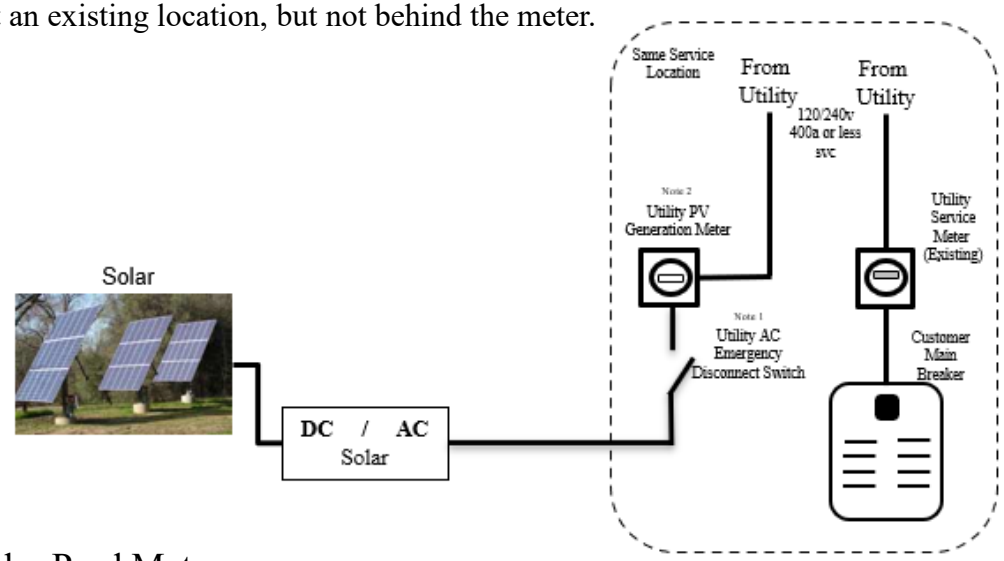
Solar Prod Meter
(Utility PV Generation Meter)
< 60KW = Scalar meter
(Monthly consumption)
> 60KW = Interval Recording meter

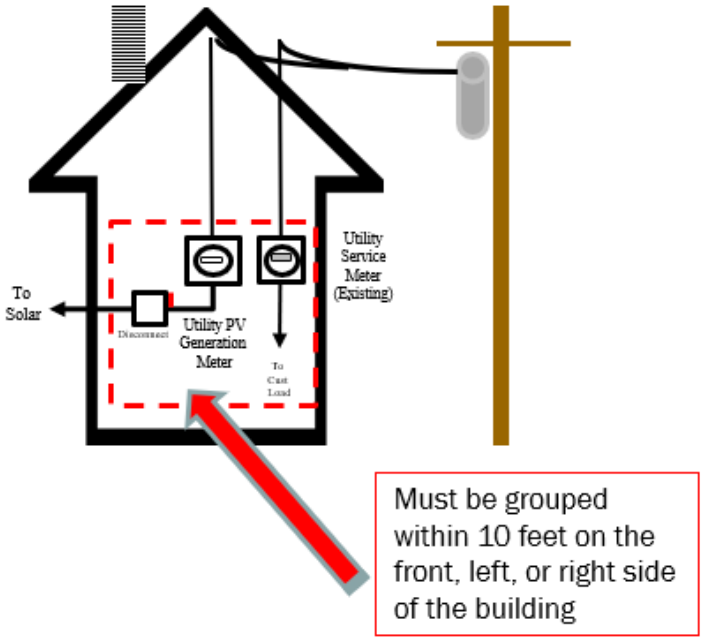
Note 1: Optional acceptable interconnection point ahead of the main breaker, but behind the revenue meter.
No connections, splices or measuring equipment are to be installed within the revenue meter socket.

Note 2: Customer provided Emergency Disconnect Switches and Production Meter must be located next to the Eversource Revenue Meter and plainly marked.

Meter Wiring

Scenario – Standalone Meter at Existing Service location
Description: typical meter wiring configuration for residential and small commercial customers where the solar is installed at an existing location, but not behind the meter.





Solar Prod Meter
(Utility PV Generation Meter)
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(Monthly consumption)
> 60KW = Interval Recording Meter

Note 1: Customer provided Emergency Disconnect Switch must be Located next to the Eversource Revenue meter and plainly marked.

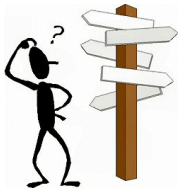
Note 2: Utility PV Generation and the Utility Storage meters must be wired with Utility feed to the top of the Meter socket; Solar panels to the bottom of the meter socket

Meter Wiring

Scenario – Standalone Meter at Existing Service location
Description: typical meter wiring configuration for residential and small commercial customers where the solar is installed at an existing location, but not behind the meter.

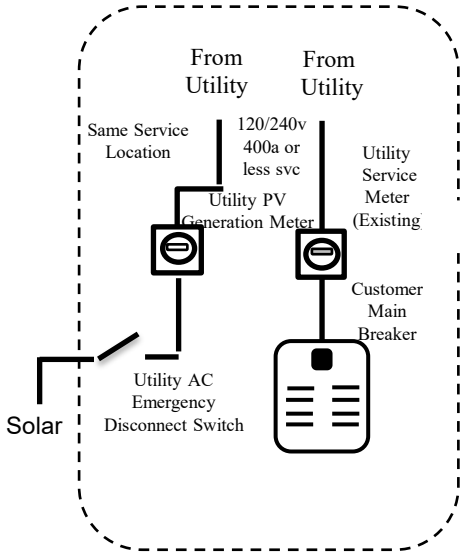
WHY ??

Yes the meter WILL SPIN BACKWARDS When generating



Load

~~Excess~~ Generation



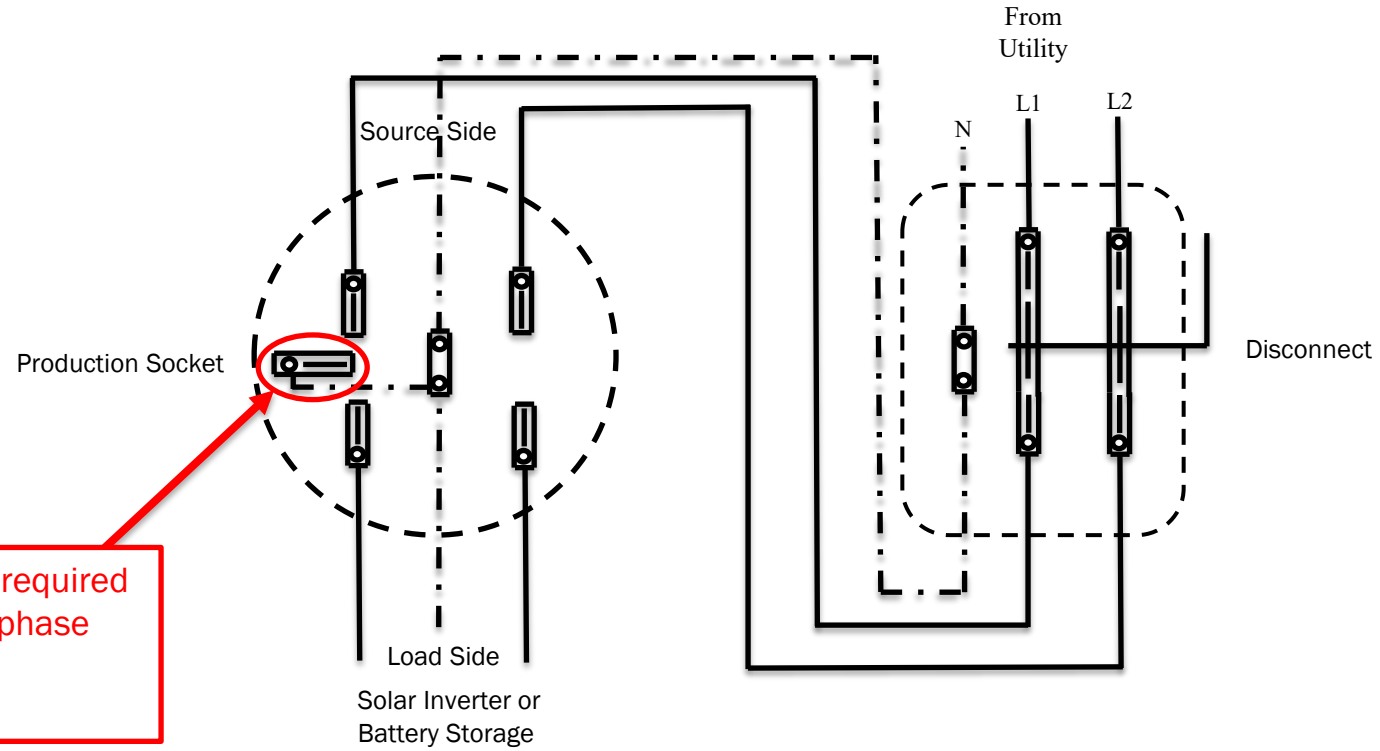
Load

Excess Generation

Trying to maintain consistency in the direction of load and generation for both the Revenue and Production Meters

Production Socket Wiring

Utility PV Generation and the Utility Storage meters must be wired with Utility feed to the top of the Meter socket; Solar panels and Battery storage to the bottom of the meter socket

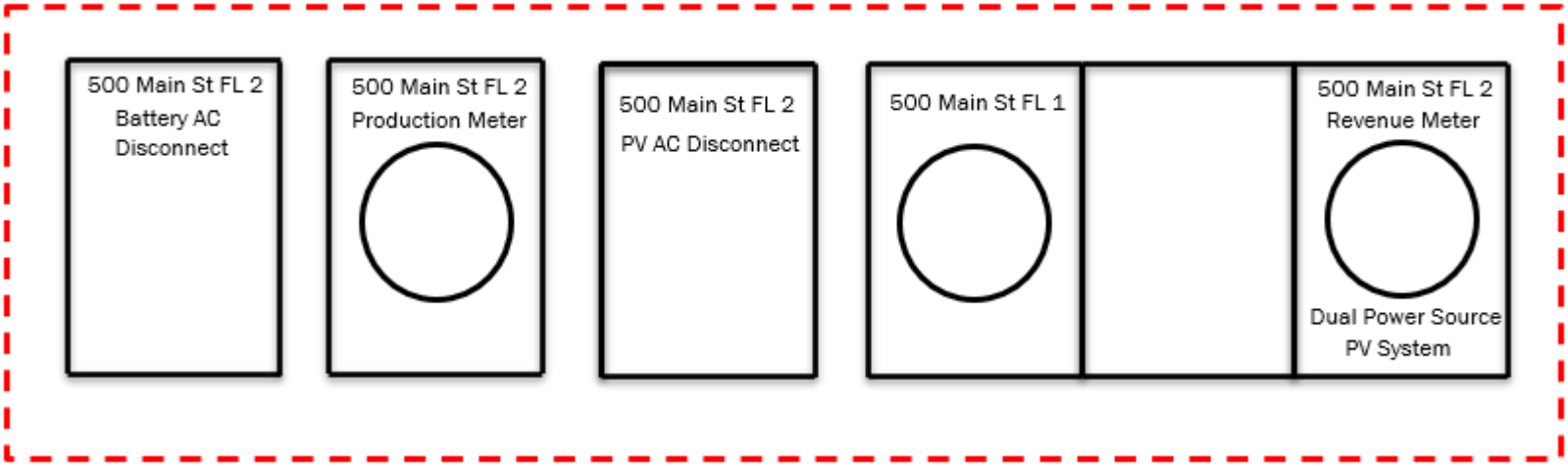


This 5th jaw is required for any single-phase service that is 120/208

Note: If you are installing battery storage behind a production socket you will need a second disconnect on the load side of the production socket

Meter Socket and Disconnect Labeling

- The Revenue Meter Socket needs to be labeled as **Revenue Meter** with the address (Number, Street name & Unit number) that has the solar system.
- The Production Meter Socket needs to be labeled **Production meter** with the address (Number, Street name & Unit number) that has the solar system.
- The Disconnect on the Source Side of the Production Socket needs to be labeled **PV Disconnect** (Number, Street name & Unit number) The Disconnect on the Load Side of the Production Socket if needed must be labeled with the address (Number, Street name & Unit number) . Also needs to be **labeled Battery Disconnect**
- If the battery system is not on the load side of the Production Socket, a Disconnect is still required and that will have to be labeled with the address (Number, Street name & Unit number). Also, to be **labeled Battery Disconnect**.



Note: All the Revenue Meters, Disconnects and Production Meters are grouped together on the exterior either on the front, or sides of the buildings.

Information about metering socket use

- Consult the WMA I&R book for approved meter sockets.
- Link to WMA I&R book:
  - https://www.eversource.com/content/docs/default-source/wma---pdfs/info-requirements-wma.pdf
- Using a meter socket listed in the I&R book will AVOID DELAYS
- All Stand-alone scenarios are considered as new services and MUST follow all I&R requirements.
- A new service request must be submitted for any revenue meter upgrades that are needed to proceed with solar installation. The new service request needs to be completed first before the DG request can moved forward.
- No meter socket can be used as raceway or a splice box. The only wires allowed in a meter socket are the line side, load side and a bonding wire. No grounding wire is allowed. (Grounding wire is a wire the goes out of the meter socket directly to a ground rod)

Instrument Transformer (IT) Rated Services

What does the Installation Contractor Provide?

- ✓ Diagrams – 1-line and 3-line diagrams
- ✓ Approved IT cabinet
- ✓ Approved Meter Socket w/Test Switch
- ✓ Emergency disconnect

Provide all diagrams and equipment spec sheets to Eversource for review.

What does the Eversource Provide?

- ✓ Necessary Current Transformers
- ✓ Any necessary Voltage Transformers
- ✓ Meter

All service voltages at or above 277/480v will require voltage transformers.

Secondary CTs will be either 600:5 bar types or 2000:5 window types.

Any services above 3000 A will be primary metered.

Eversource will install all CTs and VTs and wire the secondary side to the test switch.

IT Rated Services:

What type of equipment do I use?

- Consult the WMA I&R book for approved meter sockets AND IT rated transformer enclosures.
- All IT metering must be Cold Sequenced.
- Label Label Label.
  Clearly mark the Emergency Breaker, all IT cabinets and Meter sockets. The more we know when we go out to wiring the equipment, the fewer delays you will encounter.

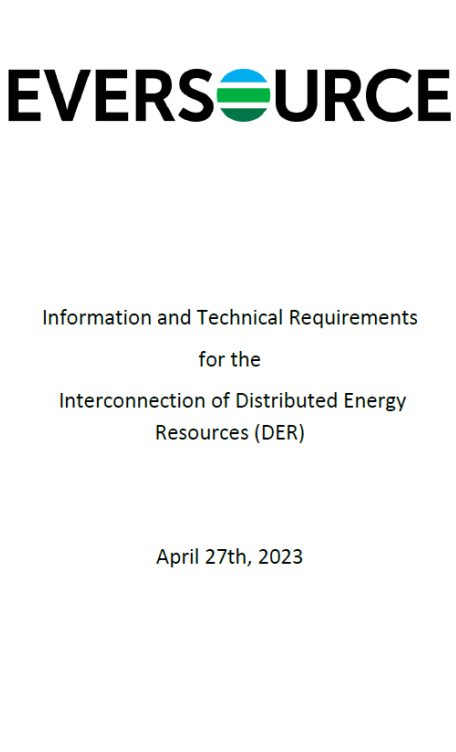
Questions?

Western Massachusetts Expedited Interconnection Seminar

Joe Sarcia

Manager – Protection and Control

Information and Technical Requirements for the Interconnection of Distribution Energy Resources (DER)


EVERSOURCE

Information and Technical Requirements

for the

Interconnection of Distributed Energy Resources (DER)

April 27th, 2023

Effective Grounding

If effective grounding is required, the customer's site must meet the effective grounding requirement of X0/X1 at the PCC below 3 when disconnected from the Eversource system. Eversource will review a customer's site effective grounding by modeling the site in ASPEN and evaluating the X0/X1 at the PCC.

For customers with separate PCCs for their PV and BESS systems, they will need to achieve effective grounding in the following three scenarios 1) PV only, 2) BESS only, 3) PV and BESS.

Effective grounding shall be required for all DER interconnections where any of the following is true:

- The fault current at the point of common coupling (PCC) is caused to increase by at least 10 percent of the existing value.
- Areas where fault current may already be deemed excessive.
- DER interconnections equal to or larger than 1MW.
- Anywhere there may exist a potential islanding concern regarding generation to load ratio.

DER that require effecting grounding shall use one of the following methods:

- A GSU with a reactively grounded neutral on the high (utility) wye-connected side and a delta configuration on the low (generator) side.
- A GSU with a grounded-wye / grounded-wye configuration and a grounding transformer on either side of the GSU.
- A delta high (utility) side GSU configuration and a grounding transformer on the high (utility) side.

DER that do NOT require effecting grounding shall use:

- A GSU with delta windings on the high (utility) side of the GSU in conjunction with a customer provided 59N (3V0) scheme fed by PTs on the high (utility) side of the GSU.

Please see Section 2.8 in the Information and Technical Requirements for more information.

P&C Common Comments on SLD

- One-line diagrams must have the IEEE1547 protective settings, and the Ride-Thru capability of the inverter included. See Tables I-V from ISO New England outlining the IEEE1547 standard.
- The voltage pickup values need to be listed in volts (primary and/or secondary) in addition to p.u. values.
- The PCC disconnect switch should not be a fused disconnect. If a fuse were to blow, an open phase condition would exist, and the site may export unbalanced generation and experience possible ferroresonance.
- For inverter-based sites over 500kW, the site must have one additional utility grade relay with 27, 59, **59N**, 81U and 81O relay functionality.
- The customer's dedicated utility grade relay/protection shall be located at the PCC.

Table I: DER response (shall trip) to abnormal frequencies-Category I, Category II and Category III

Shall Trip Function	Required Settings		Comparison to default IEEE td. 1547-2018 for Category I II, III		
	Frequency (Hz)	Clearing Time(s)*	Frequency	Clearing Time (s)	Within Ranges of Allowable settings?
OF2	62.0	0.16	Identical	Identical	Yes
OF1	61.2	300.0	Identical	Identical	Yes
UF1	58.5	300.0	Identical	Identical	Yes
UF2	56.5	0.16	Identical	Identical	Yes

Table II: Frequency ride-through requirements for DER of abnormal operating performance-Category I, Category II, and Category III

Frequency Range (Hz)	Operating Mode	Comparison to IEEE Std. 1547-2018 for Category I, II, III
$f > 62.0$	No ride-through requirements apply to this range	Identical
$61.2 < f \leq 61.8$	Mandatory Operation	Identical
$58.8 \leq f \leq 61.2$	Continuous Operation	Identical
$57.0 \leq f < 58.8$	Mandatory Operation	Identical
$f < 57.0$	No ride-through requirements apply to this range	Identical

Table IV: Certified inverter response (shall trip) to abnormal voltages -Category III

Shall Trip Function	Required Settings		Comparison to default IEEE Std. 1547-2018 (as amended by IEEE-1547a-2020) for Category III		
	Voltage (p.u. of nominal voltage)	Clearing Time(s)*	Voltage	Clearing Time (s)	Within ranges of allowable settings?
OV2	1.20	0.16	Identical	Identical	Yes
OV1	1.10	2.0	Identical	Much shorter (default is 13 s)	Yes
UV1	0.88	3.0	Identical	Much shorter (default is 21 s)	Yes
UV2	0.50	1.1	Identical	Shorter (default is 2 s)	Yes

Table V: Voltage ride-through requirements for certified inverter abnormal operating performance-Category III

Voltage Range (p.u.)	Operating Mode/ Response	Comparison to IEEE Std. 1547-2018 for Category III
$V > 1.20$	Cease to Energize	Identical
$1.10 < V \leq 1.20$	Momentary Cessation	Identical
$0.88 \leq V \leq 1.10$	Continuous Operation	Identical
$0.5 \leq V < 0.88$	Mandatory Operation	Identical
$V < 0.50$	Momentary Cessation	Identical

Any Questions?