Distributed Energy Resources Interconnection Seminar Standard / Expedited Process

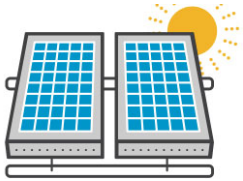
December , 2024

Thank you for joining us.

The presentation will begin at 9:00am.

Please mute your phones to avoid any feedback.

Thank you.



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In roduc ions & Ag nda

Pow rcl r
Expedited/ Standard Interconnection Process
DG Interconnection Documentation Requirements
Engin ring D sign o Pr -Construction
Distribution Group Studies
Effective Grounding Requirements
RTAC Requirements
Transmission Group ASO Studies
FERC Ord r 2023 In o
Qu s ions

EXPEDITED Interconnection Contacts

Eversource E er Easter MA DG

Smart

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POWER CLER E PE E APPL CA ONS

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

Proposed generation equipment must meet IEEE 1547.1 standards.

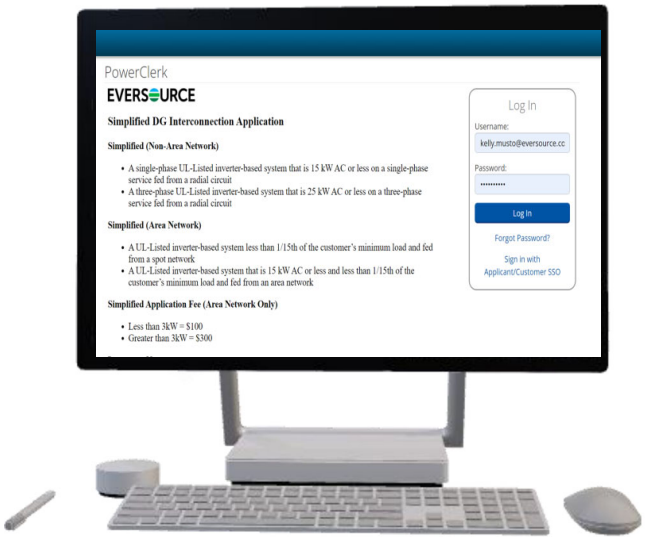
Expedited/Standard application fee = $4.50 per kW (minimum fee of $300; maximum of $7,500)

You will be prompted to submit a pre-app if you are installing a generation facility of 250 kW AC or greater. Pre-App fees are $250 for projects up to 500 kW and $750 for projects over 500kW.

APPLICATION FEES CAN NOW BE PAID ONLINE

Contractors/Installers
Please login to Eversource.com and register for the access

Customers
Request read/write access from your installer



Eversource | PowerClerk Log In

One Line Diagram (SLD)

- Requires Stamp
- Existing metering and proposed meter/interconnection
- Point of ommon oupling with Interconnecting Device, please note existing pole number
- Size of main breaker
- External disconnect switch needs to be lockable in the open position and accessible by the utility 24/7 at all times of the year
- Generator connection point, breaker and size
- kW rating needs to match application (name plate)
- Interconnecting ustomer transformer configuration (if applicable) and impedance must match application.
- Cold Sequence tering Required (Customer quipment – Disconnect Switch – ter)
- Recloser Required for 500 kW C (Recloser – rimary ter – Customer quipment)
- Title block with ustomer name, address, date, drawing number and revision number
- Inverter settings in table form
- Definitive relay settings in table form, relay(s), PT's and T's

Me

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Site Plan

- Must show property/lot lines, street names
- Interconnecting Pole Numbers
- Must show revenue meter location, location of inverter(s) and/or generators and disconnect
- 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

Spec Sheet a e equ e fo I ve te a Batte e - If ve te ba e a how that t UL 1741-SB

http ://www.eve ou ce.com/co te t/ oc / efault- ou ce/bu l e -co t acto / efault- eee1547-2018-ett g - equ eme t - ue .p f? fv =160fb831_2

Effective Grounding Overvie

*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

Effective Grounding

I e ective grounding is required, the customer's site must meet the e ective grounding requirement o X0/X1 at the PCC below 3 when disconnected rom the Eversource system. Eversource will review a customer's site e ective g ou g by mo el g the te ASPEN a evaluat g the X0/X1 at the PCC.

Fo cu tome w th epa ate PCC fo the PV a BESS y tem s, they w ll ee to ach eve effect ve g ou g the follow g th ee ce a o 1) PV o ly, 2) BESS o ly, 3) PV a BESS.

Effect ve g ou g hall be equ e fo all DER te co ect o whe e a y of the follow g t ue:

- The fault cu e t at the po t of commo coupl g (PCC) cau e to c ea e by at lea t 10 pe ce t of the ex t g value.
- A ea whe e fault cu e t may al ea y be eeme exce ve.
- DER te co ect o equal to o la ge tha 1MW.
- A ywhe e the e may ex t a pote t al la g co ce ega g ge e at o to loa at o.

DER that equ e effect g g ou g hall u e o e of the follow g metho :

- A GSU w th a eact vely g ou e eut al o the h gh (ut l ty) wye-co ecte e a a elta co f gu at o o the low (ge e ato) e.
- A GSU w th a g ou e -wye / g ou e -wye co f gu at o a a g ou g t a fo me o e the e of the GSU.
- A elta h gh (ut l ty) e GSU co f gu at o a a g ou g t a fo me o the h gh (ut l ty) e.

DER that o NOT equ e effect g g ou g hall u e:

- A GSU w th elta w g o the h gh (ut l ty) e of the GSU co ju ct o w th a cu tome p ov e 59N (3V0) cheme fe by PT o the h gh (ut l ty) e of the GSU.

Plea e ee Sect o 2.8 the l fo mat o a Tech cal Requ eme t fo mo e fo mat o .

P&C Common Comments on SLD

EVERSOURCE ENERGY

- O e-l e a am s mu t have the IEEE1547 p otect ve ett , a the R e-Th u capab l ty of the ve te clu e . See Table I-V f om ISO New E la outl the IEEE1547 ta a .
- The volta e p ckup value ee to be l te volt (p ma y a /o eco a y) a t o to p.u. value .
- The PCC co ect w tch houl ot be a fu e co ect. If a fu e we e to blow, a ope pha e co t o woul ex t, a the te may expo t u bala ce e e at o a expe e ce po ble fe o e o a ce.
- Fo ve te -ba e te ove 500kW, the te mu t have o e a t o al ut l ty a e elay w th 27, 59, **59N**, 81U a 81O elay fu ct o al ty.
- 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 ≤ 61.8	Mandatory Operation	Identical
58.8 ≤ f ≤ 61.2	Continuous Operation	Identical
57.0 ≤ 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 ≤ 1.20	Momentary Cessation	Identical
0.88 ≤ V ≤ 1.10	Continuous Operation	Identical
0.5 ≤ V < 0.88	Mandatory Operation	Identical
V < 0.50	Momentary Cessation	Identical

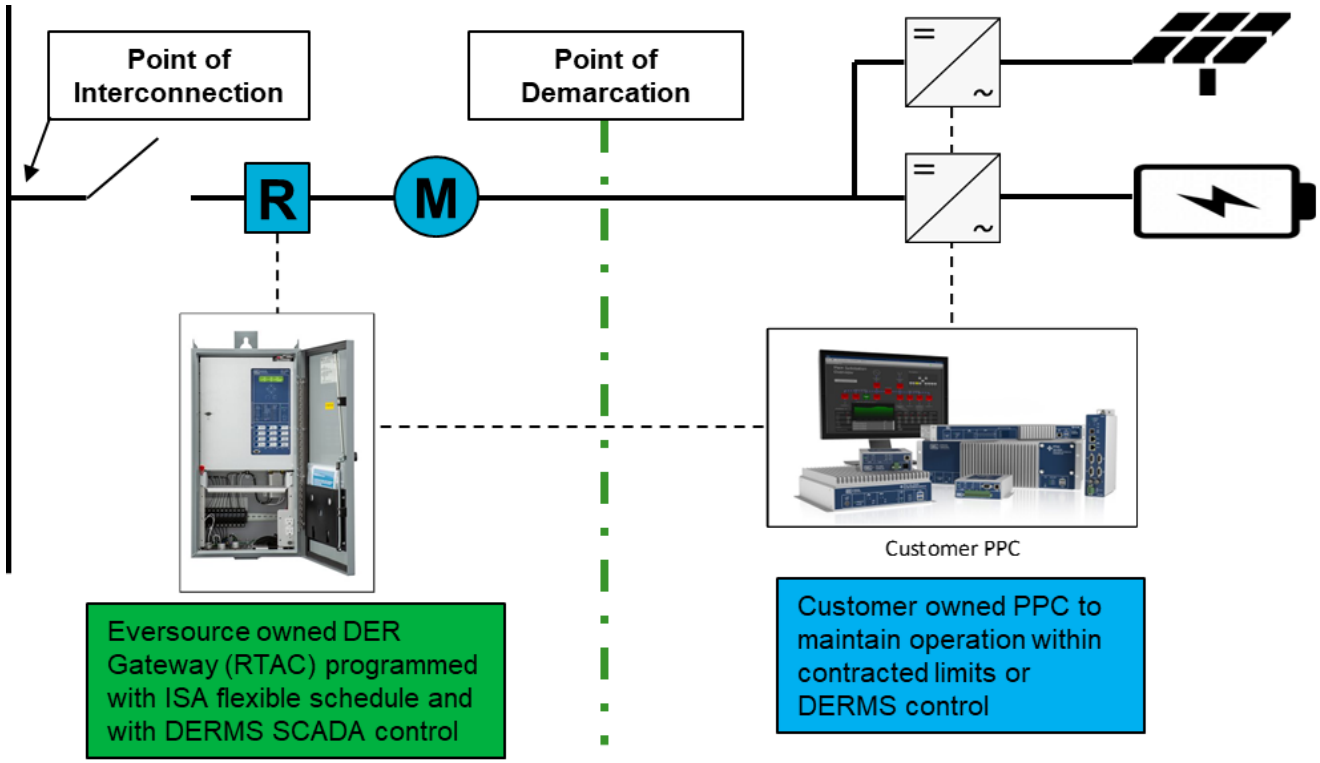
RTAC Overview

*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

DER SCADA Mo g & C l Requ eme

- New standard D EM 19.065 DER CADA Monitoring and Control
- Applicable to all DER facilities >500 kW
- Based on DER Gateway to Power Plant Controller (PPC)
- upports future flexible dispatch limiting interconnection schedules
- upports future real-time operating envelope dispatch with DERM S
- Eversource supplied DER Gateway (RTAC 3350)
- Customer provides PPC
  - May use RTAC 3350 or similar controller for PPC
- Technical upport available from chweitzer Engineering Laboratories (EL)

DER Gatewa t high level vervie



Transmission udies verview

- Volume of DER appl cat ons seek ng to nterconnect has resulted n the need to ensure that DER projects do not cause adverse impacts* to the network.

- Eversource n coord nat on w th ISO-NE w ll now assess each DER appl cat on and perform a ASO Impact Screen to determine if the facility may result in adverse impact to the system and the correct path of study.

- Level 0/1 studies
  - At a m n mum, generally cons st of a transfer l m t assessment to ensure no degradat on of ISO-NE Interface L m ts. If adverse impacts found, a Level 3 ASO study will be required.
  - Some Level 0/1's may require more detailed analysis

- Level 3 studies
  - Conduct thermal and voltage steady state, short circuit, stability analysis
  - PSCAD analys s w ll be requ red as per ISO-NE PP5-6 requirements
  - Technical data will be requested from projects and is required to start studies

*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

Capital Investment Project (CIP)- Distribution Group Studies

- Eversour e s er orm ng d str but on grou stud es n Massa husetts to e ently ro ess and analyze d str buted generat on (DG) a l at ons that allow om p mentary grou solut ons to be shared by DG ustomers. he grou study looks at the olle t ve m pa t on the system to understand what system mod at ons would be requ red to su ort these DG roje ts when nter onne ted.

- Customer's that are connecting to stations associated with the grou w ll be requ red to ay a ost er kW AC to nter onne t.

Distribution Group Studies Process and CIP Schedule

Group	Final SIS Date +/- 25% Cost Estimate	Customer Notification (10 business days after completion)	CIP Proposal Deadline (40 business days after completion)	CIP Fee (Dollars/kW)
Marion-Fairhaven	Completed on 3/29/2022	Completed on 3/28/2022	Approved 12/31/2022	$370/kW
Plymouth	Completed on 4/19/2022	Completed on 4/19/2022	Approved 6/4/2024	$224/kW
Cape	Completed on 4/25/2022	Completed on 4/25/2022	Approved 6/4/2024	$357/kW
Freetown	Completed on 4/1/2022	Completed on 4/1/2022	Submitted 4/29/2022	$490/kW
Dartmouth Westport	Completed on 4/8/2022	Completed on 4/8/2022	Approved 6/4/2024	$387/kW
New Bedford	Completed on 5/11/2022	Completed on 5/11/2022	Eversource will not be filing a CIP Proposal for the New Bedford Group Study	N/A
Plainfield Blandford	Completed on 4/4/2022	Completed on 4/4/2022	Approved 6/4/2024	$498/kW

Capital Investment Project (CIP)- Distribution Group Studies- Continued

- To iden i i i e i connec ing o ion oci ed wi h he group ud , ple e u ilize our ho c p ci m ap. We h ve included he li o ion or e ch group in he ble o our righ . Thi in orm a ion i l o po ed on our web i e.

Group Name	Substation Name
Plymouth	Brook St 727
	Manomet 721
	Tremont 713
	Valley 715
	Wareham 714
	West Pond 737
	Kingston 735
Freetown	Assonet 647
Marion-Fairhaven	Arsene St 654
	Crystal Springs 646
	Rochester 745
	Wing Lane 624
Cape	Falmouth 933
	Harwich 968
	Hatchville 936
	Hyannis Jnc 961
	Sandwich 916
	Oak St 920
	Mashpee 946
	Otis 915
Dartmouth-Westport	Cross Rd 651
	Fisher Rd 657
Blandford	Blandford 19J

Summary of Resources A ailable

Mass Distri t n ration, Int rconn ctions & N t M et ring
https://www.e ersource.com/content/ema-c/about/about-us/doing-business-with-us/builders-contractors/interconnections/massachusetts

ASO Impact Scr ning Flow Diagram
https://www.e ersource.com/content/docs/default-source/builders-contractors/aso-impact-screen-diagram.pdf?sf rsn=551cdd62_2

T chnical Data R q st List for L v l 3 ASO Transmission St i s
https://www.e ersource.com/content/docs/default-source/builders-contractors/aso-technical-data-request.pdf?sf rsn=2d53d562_0

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

D i lin s
https://www.e ersource.com/content/docs/default-source/builders-contractors/distributed-generation-guidelines-interconnection.pdf?sf rsn=5432d062_2

SMART i lin s
https://www.e ersource.com/ content/ema-c/about/about- us/doing-business-with- us/builders- contractors/interconnections/ massachusetts/smart-solar-program-installers

Distri tion ro p St i s
https://www.e ersource.com/content/residential/about/doing-business-with-us/interconnections/massachusetts/distribution-group-studies

Host Capacity Map
https://e ersource.maps.arcgis.com/apps/webapp iewer/index.html?id=7b13d31f908243e49406f198b359aa71

Distri t En rgy R so rc (DER) Proj cts Costs
www.e ersource.com/content/residential/about/doing-business-with-us/interconnections/massachusetts/distributed-energy-resources-project-costs

THANK YOU!!