

#### **Net Metering**

#### &

#### **Simplified DG**

#### **Interconnection Seminar**

May 13, 2015

**Eversource Energy** 

Western MA – Hadley, MA





## **EVERSURCE**

# nationalgrid



Mass ACA





#### **Future Eversource Energy Seminars**

June 4, 2015 August 26, 2015 September 18, 2015 November 5, 2015 December 10, 2015 Westwood

**EVERS€**UR

Hadley

Westwood

Hadley

Westwood

#### **Safety Moment**

 Overhead power lines are not insulated, and carry enough energy to cause serious injury or even death. Regard all wires as live.

- Keep yourself, your co-workers, tools, and vehicles at least 10 feet away from electric lines and equipment.
- Stay alert. Keep ladders at least 10 feet away from power lines when carrying, moving, and raising them.
- Make sure the area is clear of wires before working near trees or shrubs.
- Never attach or tie anything off to power lines or electrical equipment.
- 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)

#### **Logistics & Introductions**

**EVERS€**UR

- Facilities
  - Emergency exits
  - Restrooms
  - Designated smoking areas
- Introductions
  - DOER / Mass CEC
  - MA Utilities
  - Guests

#### **Interconnection Contacts**

- Eversource Energy Western MA DG
  - Email: wmdg@eversource.com
  - Phone: 413-787-1087
  - Cindy Janke: 413-585-1750
  - Mail: Eversource Energy Attention: WM DG 55 Russell Street Hadley, MA 01035-9455
- Eversource Energy Eastern MA DG
  - Email: dginterconnections@eversource.com

- Brett Jacobson: 781-441-8196
- Bruce Kim

#### **Net Metering in Massachusetts**

- December 2009 Net Metering Tariff, updated periodically by DPU.
- Net Metering means the process of measuring the difference between electricity delivered by a Distribution Company and the electricity generated by a Class 1, Class II, or Class III Net Metering Facility and fed back to the Distribution Company.
- Three Classes of Net Metering Facilities in Net Metering Tariff:
  - <u>Class I</u>: Any generator up to 60 kW is eligible (though compensation differs depending on type of generation).
  - <u>Class II</u>: Agricultural, Anaerobic Digestion, Solar, or Wind Net Metering Facility over 60 kW but less than or equal to 1 MW (for Municipality or Other Governmental Entity it's "per unit").
  - <u>Class III</u>: Agricultural, Anaerobic Digestion, Solar, or Wind Net Metering Facility over 1 MW but less than or equal to 2 MW (for Municipality or Other Governmental Entity it's "per unit").

#### **Net Metering in Massachusetts**

- Defines "Unit" such as a wind turbine or inverter.
- Facility is defined as one project on one parcel of land with one meter and one point of interconnection.
  - Private limited to 2 MW per parcel, Public limited to 2 MW per unit and 10 MW per entity throughout Massachusetts or on a single parcel.
  - Other non-Net Metered generation can exist on the same parcel as a Net Metering Facility.
- Established "Public" and "Private" Facilities (Class II and III only).
  - Public: Host Customer is certified as a Municipality or Other Governmental Entity by the DPU and has Class II or Class III Facility. Host Customer may allocate only to customers who are certified as a Municipality or Other Gov. Entity. Ten MW limit per entity in Massachusetts.
  - Private: All other Host Customers.
- Apply to DPU to be certified as a Public Facility.
  - Host Customer of and those being allocated to by a Public Facility.
  - Send copy of certificate(s) to utility.

#### **Net Metering Eligibility**

- 11-11E issued 7/1/13 which allows for 'an exception for optimal interconnection'.
- Utility can have more than one interconnection point and meter for technical and/or operational reasons.
- Still only allows one net-metering facility per parcel.
- Customers can petition DPU for exceptions.
- Can have a separate metered service for net metering facility along with other non-net metered services on the single parcel.
- Eligibility for Net Metering will be determined during the review process.
- Parcel boundaries needed to be set in 2010.

Note: Eversource Energy requires applicants to include lot lines and other generation on site plans.

#### **Net Metering Caps**

- Limits based on each Distribution Company's peak load; 4% cap for Private and 5% cap for Public Facilities.
  - 80% of DC-STC rating used towards cap for capacity of Solar Facilities.
  - For Eversource MA West, peak was 854MW. 4% is 34.16 MW and 5% is 42.70 MW.
  - For Eversource MA East, peak was 4,978 MW. 4% is 199.12 MW and 5% is 248.90 MW.
- Interconnected generation which contributes towards limits are posted on each Distribution Company's web site and updated monthly. (For Eversource Energy: www.eversource.com)
- Small Renewable Energy Facilities are excluded from Private cap.
  - Up to 10 kW single phase Facility on single phase service, up to 25 KW three phase Facility on three phase service.
- Private and Public Facilities can not receive net metering services from Company until they have a RESERVED cap allocation.

# Net Metering Requirements & Process

- Class II and Class III need to install their own revenue grade production meter on generation. Capacity registration is required and associated ISO-NE OP 18 metering.
- Class II and III may need a phone line to Company revenue meter.
- Eligible electric customer (Host Customer) submits Schedule Z to utility with interconnection application.
  - Can submit up to two per calendar year once facility is on line.
- Dollar credits are applied to electric account(s), customer does not receive a check\*. No annual true up.
  - (\* NOTE = Distribution Company may elect to pay Host customer of Class III Facility. Eversource Energy credits accounts.)
  - When required, apply for and receive a reserved Cap Allocation from the System of Assurance (SoA) at www.MassACA.org

#### **Net Metering Process**

- Customer is compensated for energy produced <u>after</u> receiving approval to operate <u>and</u> all other requirements have been met.
  - If you have questions regarding billing, compensation for exported energy, and/or credit allocation contact:
    - MA West = Customer Care Department at 888-783-6616
    - MA East = Customer Service at 800-592-2000.
- Net metering credits may not be applied to the Host Customer's account until the next billing cycle.
  - Customers may be on different billing cycles.
  - Credits allocated to other Eversource accounts may be applied on a different billing cycle than the Host Customer's account.
- Once online, review and implementation of a new Schedule Z will take a minimum of one billing cycle.

EVERS≘I

#### **Net Metering Credits**

Energy use is "netted" over the billing period, typically a month

- If there is net energy usage, Host Customer is billed for net purchases.
- If there is net energy sales, credit is net kWh export multiplied by components of the Host Customer's rate.

				Cı	redit the follo	owing charg	jes
Class	min	max	Туре	Default Service kWh **	Distribution kWh ***	Transmission <b>kWh</b>	Transition kWh
I	0	60 kW	Agricultural, Anaerobic Digestion, Solar, Wind	x	x	х	x
l*	0	60 kW	All Other				
Ш	>60 KW	1 MW	Agricultural, Anaerobic Digestion, Solar, Wind	x	x	х	x
III	>1 MW	2 MW	Agricultural, Anaerobic Digestion, Solar, Wind	x	Public only	x	x

- Customer still responsible for customer charges and demand charges, even if net export
- Tariff allows credits to be allocated (with limitations)

Notes: 1) Class I\* All Other (Non-Renewable) = Credited at average monthly clearing price set by ISO-NE. 2) Default Service kWh \*\* = Fixed Basic Service rate. 3) Distribution kWh \*\*\* = For Eversource WM, include following kWh components of Distribution, Revenue Decoupling Mechanism, Pension/PBOP Adj. Mechanism, Residential Assistant Adj. Clause, Solar Program Cost Adj., Basic Svc. Cost Adj. (True Up), Net Metering Surcharge, AG Consultant Expenses and Storm Recovery Adj..

Western Massachusetts Electric Company       M.D.P.U. No. 1039F         For Example Only – Your Answers May Vary         Schedule Z – Additional Information Required for Net Metering Service	For the terms "energy marketer" and "energy broker," please use the definition for "Electricity Broker," which means an entity, including but not limited to an Aggregator, which facilitates or otherwise arranges for the purchase and sale of electricity and related services to Retail Customers, but does not sell electricity. Public Aggregators shall not be considered Electricity Brokers. 220 C M R 11 02
Please fill out the form completely.       Primary Account Holder         Host Customer Nane:       John Doe       Telephone:       413-123-4567         Address of Facility:       123 Main Street, Town, MA 01000       Billing Account Number:       541234567891         Meter Number:       112233445       Application ID Number:       2A100-2000         Is the Host Customera:       Municipality       Other Governmental Entity         If so, submit certification provided by the DPU when obtained.       Complete if applicable, otherwise leave blank         A) Is the Host Customer applying for net metering service an electric company, generation company, aggregator, supplier, energy marketer, or energy broker, as those terms are used in M.G.L. c. 164, §§ 1 and 1F and 220 C.M.R. §11.00?         X       No	B) If applying for Net Metering as an Agricultural Net Metering Facility, please answer the following questions: apply to solar or solar or Yes 1) Is the Agricultural Net Metering Facility operated as part of an agricultural business? Yes No (the facility is not eligible for Net Metering as an Agricultural Net Metering Facility) 2) Has the Commissioner of the Department of Agriculture recognized the business as an agricultural business? Yes Yes No 3) Is the Agricultural Net Metering Facility located on land owned or controlled by the agricultural business mentioned in Item B.1 above? Yes No (the facility is not eligible for Net Metering as an Agricultural Net Metering Facility) 4) Is the energy from the Agricultural Net Metering Facility used to provide electricity to
Yes (you are not eligible for net metering service) NOTE: Definitions are: "Electric company" means a corporation organized under the laws of the commonwealth for the purpose of making by means of water power, steam power or otherwise and for selling, transmitting, distributing, transmitting and selling, or distributing and selling, electricity within the commonwealth, or authorized by special act so to do, even though subsequently authorized to make or sell gas; provided, however, that electric company shall not mean an alternative energy producer; provided further, that a distribution company shall not include an entity which owns or operates a plant or equipment used to produce electricity, steam and chilled water, or an affiliate engaged solely in the provision of such electricity, steam and chilled water, where the electricity produced by such entity or its affiliate is primarily for the benefit of hospitals and nonprofit educational institutions, and where such plant or equipment was in operation before January 1, 1986; and provided further, that electric company shall not mean a corporation only transmitting and selling, or only transmitting, electricity unless such corporation is affiliated with an electric company organized under the laws of the commonwealth for the purpose of distributing and selling, or distributing only, electricity within the commonwealth. G.L. c. 164, § 1.	complete       Yes         No (the facility is not eligible for Net Metering as an Agricultural Net Metering Facility)         Complete       Yes         if       applicable,         otherwise       1) Are all participants served by the same distribution company?YesNo         2) Are all participants served by the same distribution company?YesNo         3) Do all participants reside in the same municipality?YesNo         NOTE: If any of the answers to the questions in Item C are no, then the facility is ineligible for neighborhood net metering unless granted an exception by the Department of Public Utilities under 220 C.M.R. §18.09(6).         D) Please indicate how the Host Customer will report to the Company the amount of electricity generated by the net metering facility. The information is due twice each year: (1) by January 31 for the prior year's generation; (2) by September 30 for the year-to-date generation:         Provide the Company access to their ISO-NE GIS account Provide the Company access to their metering or inverter data
"Generation company" means a company engaged in the business of producing, manufacturing or generating electricity or related services or products, including but not limited to, renewable energy generation attributes for retail sale to the public. G.L. c. 164, § 1. "Aggregator" means an entity which groups together electricity Customers for retail sale purposes, except for public entities, quasi-public entities or authorities, or subsidiary organizations thereof, established under the laws of the commonwealth. G.L. c. 164, § 1. "Supplier" means any supplier of generation service to retail Customers, including power marketers, brokers and marketing affiliates of distribution companies, except that no electric company shall be considered a supplier. G.L. c. 164, § 1.	<ul> <li>Select One</li> <li>Apply all of the Net Metering Credits to the accounts of eligible Customer's account and allocate a portion to the accounts of eligible Customer's account and allocate skip Item F)</li> </ul>

	F) If the Host Customer has a Class III Net Metering Facility, please indicate below the range that best represents the number of eligible Customer accounts to which Net Metering Credits would be allocated. Alternatively, please complete Item G. This information will allow the Company to exercise its option to purchase Net Metering Credits from the Host Customer rather than allocating such credits.	Customer Name: Service Address: Billing Account Number:		
	The Company will notify the Host Customer within 30 days of the filing of Schedule Z whether it will allocate or purchase Net Metering Credits. If the Company elects to purchase Net Metering Credits, the Company will render payment by issuing a check to the Host Customer each Billing Period, unless otherwise agreed in writing by the Host Customer and Company. If the Company elects to allocate Net Metering Credits, the Host Customer must	If public entity, DPU Public Classification ID: Amount of Net Metering Credit Allocated: % Customer Name:		
Complete if applicable, otherwise leave blank	Allocate Net Metering Credits to fewer than 50 eligible Customer accounts (Skip Item G)     Allocate Net Metering Credits to 100 or fewer eligible Customer accounts (Skip Item G)     Allocate Net Metering Credits to more than 100 eligible Customer accounts (Skip Item G)	Service Address:         Billing Account Number:         If public entity, DPU Public Classification ID:         Amount of Net Metering Credit Allocated:         %         H) The Company may elect to seek to obtain capacity payments from ISO-NE for the electricity generated by Class II and III Net Metering Facilities. The Company will notify the Host Customer within 30 days of the filing of Schedule Z whether it will assert title to the right to seek those capacity payments. If the Company elects to assert title to those capacity payments, the Company will include any capacity payments received from ISO-NE in the Company's annual Net Metering Recovery Surcharge reconciliation.         I) The terms of this Schedule Z shall remain in effect unless and until the Host Customer executes a revised Schedule Z shall remain in effect unless and until the Host Customer herein or mutually agreed to in writing by the Host Customer and the Company, a revised Schedule Z shall not be submitted more than twice in any given calendar year.		
	<ul> <li>G) Please state the total percentage of Net Metering Credits to be allocated.</li> <li>% Amount of the Net Metering Credit being allocated. The total amount of Net Metering Credits being allocated shall not exceed 100 %. Any remaining percentage will be applied to the Host Customer's account.</li> <li>Please identify each eligible Customer account to which the Host Customer is allocating Net Metering (redits being the following information (attach additional page as needed):</li> </ul>			
	NOTE: If a designated Customer account closes, the allocated percentage will revert to the Host Customer's account, unless otherwise mutually agreed in writing by the Host Customer and the Company.			
	Customer Name:       (Customer Name as listed on Electric Bill)         Service Address:       (Service Address as listed on Electric Bill. This is NOT the Mailing Address)         Billing Account Number:       (Billing Account number as listed on Electric Bill)         If public entity, DPU Public Classification ID:       (Complete if applicable, otherwise leave blank)         Amount of Net Metering Credit Allocated:       (Amount being allocated to this account)	J) A signature on the application shall constitute certification that (1) the Host Customer has read the application and knows its contents; (2) the contents are true as stated, to the best knowledge and belief of the Host Customer; and (3) the Host Customer possesses full power and authority to sign the application.		
	Customer Name:	Host Customer (Signature)		
Complete if applicable, otherwise leave blank	Billing Account Number:         If public entity, DPU Public Classification ID:         Amount of Net Metering Credit Allocated:         %	Host Customer (Print) Date		
	Customer Name:         Service Address:         Billing Account Number:         If public entity, DPU Public Classification ID:	Please return Schedule Z to: Eversource Energy		
	Amount of Net Metering Credit Allocated: % Customer Name: Service Address:	Attention: MA West DG 55 Russell Street Hadley, MA 01035-9455 Email: wmdg@eversource.com		
	Billing Account Number:         If public entity, DPU Public Classification ID:         Amount of Net Metering Credit Allocated:         %	Fax: 413-585-1709		

#### **Net Metering Production Reporting**

- Net Metering Tariff requires reporting of generator's kWh output.
- Reporting required by January 31 and September 30.
- Eversource is encouraging customers to participate in the MassCEC Production Tracking System (PTS).
- Eversource currently obtains production data from PTS, not directly from Net Metered Customers.

EVERS≘l

#### **Alternatives Forms of Compensation**

- If the customer will never export power no compensation.
- If customer will export power they can sell their exported power to the market through a registered market participant.
  - Customer become or work with a registered market participant to sell power.
  - Customer must pay for all power they use.
- Customer with a Qualifying Facility (QF) certificate from FERC for the generator, can receive compensation under the local utility's Power Purchase Schedule (PPS) rate. (The PPS Short Run Energy rate is the ISO-NE locational marginal price (LMP).)

FERC QF page: http://www.ferc.gov/industries/electric/gen-info/qual-fac.asp

EVERS≘l

#### **Net Metering Summary**

- If planning to Net Meter, submit Schedule Z with interconnection application.
- Correctly fill out Schedule Z.
  - Host Customer is primary account holder on the electric account.
  - Must be signed by Host Customer.
- If allocating, verify name/address/account info of electric customer(s) or will need to submit corrected form.
- Host Customer must apply to DPU for certification as a Municipality or Other Governmental Entity and submit confirmation to Distribution Company.
  - If allocating credits to customers, those customers must also obtain certification.
- Obtain a cap allocation from Mass ACA when required.
- Production reporting is required.



## DG Tariff Overview And General Information

19

#### **Interconnection Process**

- Seminar concerns Standards for Interconnecting Distributed Generation, the current tariff approved by the DPU in 2015.
- Process of getting an interconnection agreement from your local electric distribution company to connect a distributed generation system to their distribution system.
- This process is used by the four investor owned utilities (IOU) in Massachusetts (WMECO d/b/a Eversource Energy, NSTAR d/b/a Eversource Energy, National Grid, Unitil).
- Municipally owned utilities are not required to follow this process and may follow a different process.
- The process is used to make sure interconnecting DG systems are integrated into the distribution system responsibly with respect to impacts on reliability, power quality and safety.
- Everything officially starts with the application. (But you may be required to submit a Pre-Application Report Form.)

#### **DG Tariff Overview**

- Introduction and Definitions Section 1
- Process Overview Section 3
- Operating Requirements Section 6: Interconnecting Customer must operate system safely and to ensure no adverse affects or interference to other customers
- Disconnection Section 7: Covers planned and unplanned outages
- Metering, Monitoring, and Communication Section 8: Covers requirements for metering the account the generation is interconnected with
- Dispute Resolution Process Section 9
- Confidentiality Statement Section 10
- Insurance Requirements Section 11: Many Interconnecting Customers with generation over 60 KW must maintain general liability insurance and name the appropriate utility as an additional insured
- Exhibits shows all pro forma applications, agreements, terms and conditions, and Schedule Z

EVERS≘LIR

#### **DG Tariff – Section 2**

#### If you don't read any other portion of the standard – at least read this.

- Interconnecting Customer / Customer and Company must <u>enter into an agreement</u> to interconnect generation.
- Consult with the Company before design to determine what utility facilities are present. \*\*\* If your proposed project is 500 kW or greater, you <u>must</u> submit a <u>Pre-Application Report Form (PAR)</u> prior to submitting an interconnection application. \*\*\*
  - Company can supply general circuit information for the proposed location; voltage, radial/network, three phase/single phase.
  - Keep in mind that the distribution system can change and other applications submitted between when a PAR is prepared and when you submit the interconnection application.
  - For RFP's Customer can consult utility prior to going out for bid, questions should be directed to customer for submittal to utility. Bidders should not contact utility for site specific information.
- We're here to help guide you through the interconnection process.



#### **DG Tariff – Section 4**

- Interconnection Requirements
- 4.1 Interconnecting Customer will ensure its Facility meets or exceeds requirements including:
  - Transient Voltage Conditions
  - Noise and Harmonics
  - Frequency
  - Voltage Level
  - Machine Reactive Capability
- 4.2 Protection Requirements for New or Modified Facility Interconnections with the EPS. Covered in extensive detail. Someone on Interconnecting Customer's team needs to understand and be responsible for meeting these requirements.
  - NPCC under frequency settings; 57Hz in 0.16 seconds and 58 Hz in 32 seconds for DG 30 kW and larger
- As size of DG increases and more DG is added to circuits, more studies are required, even for smaller DG.
- There is an interconnection queue and applications are processed in order received on the circuit and/or substation.

#### **DG Tariff – Section 5**

- Responsibility for Costs
- Interconnecting Customer responsible for:
  - Costs of the review by the Company and any interconnection studies conducted. (Application Fee, Supplemental Review, Impact Study, Detailed Study, Witness Test)
  - All costs associated with the installation and construction of the Facility and associated interconnection equipment on the Interconnecting Customer's side of the PCC.
  - All costs incurred by Company to design, construct, operate and maintain the System Modifications. Can include ongoing charges.
    - Costs for new services, service upgrades, service relocations, etc.
    - Equipment required by ISO-NE (telemetry, etc.)
    - Construction costs including CIAC tax liability.

EVERS≘U

#### **Third Party and Land Ownership**

- Tariff allows for third party ownership of generation
- Application must include information for both generation owner (*Interconnecting Customer*) and electric customer (*Customer*)
- Provide information on owner of property/land if not the electric customer or owner of generation.
- Utility (*Company*) will correspond with owner, customer and installer
  - Listing email addresses for all parties on application makes communication easier and faster
- Utility will enter into agreement with our electric customer (Exhibit H of tariff)
- Utility will enter into an agreement with the owner of the property/land

EVERS≘l

#### Before You Start.....

- Read the DG Tariff.
- Identify the Interconnecting Customer owner of the generation.
- Identify the Customer primary account holder listed on the electric account.
- If the name, address, landlord information is not correct on the electric account, work with our Customer Service Department to correct it.
- Identify property lines and include on your site plan.
- Identify all generation on the property. Include <u>all</u> generators on the one line and site plan. Transition switches must be labeled open or closed. *Existing <u>closed</u> transition generators without an existing ISA must be studied and included in the new ISA.*

#### 

#### Before You Start.....

- Contact your local utility prior to designing any changes to an existing generation facility.
- If you want to replace an inverter or increase the output of your facility, submit a new interconnection application.
- Be clear on application, site plan and electrical sketch as to what equipment is existing, what equipment is new and what equipment (if any) is being replaced. Make additional notes or provide additional documentation if necessary.
- If you are installing a new service or making changes to your existing service, provide the WR # on the interconnection application. That work may need to be completed before the DG application can be reviewed or completed.
  - Also, the regular meter may need to be installed and the account established before a net meter can be ordered.

#### **Application Fees**

	Simplified	Expedited	Standard (Note 1)	Simplified Spot and Area Network
	Listed Small Inverter	Listed DG	Any DG	Listed Inverter
Application Fee (covers Screens)	0 (Note 2)	\$4.50/kW, minimum \$300, maximum \$7,500	\$4.50/kW, minimum \$300, maximum \$7,500	≤\$3/kW \$100, >3kW \$300
Supplemental Review or Additional Review (if applicable)	N/A	Up to 30 engineering hours at \$150/hr (\$4,500 maximum) (Note3)	N/A	N/A
Standard Interconnection Initial Review	N/A	N/A	Included in application fee (if applicable)	N/A
Impact and Detailed Study (if required)	N/A	N/A	Actual cost (Note 4)	N/A
Facility Upgrades	N/A (Note 5)	Actual cost	Actual cost	N/A
O&M (Note 6)	N/A	TBD	TBD	N/A
Witness Test	0	Actual cost, up to \$300 + travel time (Note 7)	Actual Cost	0 (Note 8)

#### **Many Parties Involved**

### 

#### Utility

- Application analyst processes application and contracts
- Lead Engineer for reviews/studies
- Relay Engineering
- Distribution Planning
- Distribution Dispatch
- Distribution Design Engineering
- Meter Operations
- Meter Engineering
- Meter Data Services
- Relay Telecom Operations
- Inspection team
- Transmission and/or Substation Design
- Customer Service / Billing
- Energy Supply (asset registration)
- Legal
- Transmission Study
- ISO-NE notification and/or application

ISO-NE

Interconnecting Customer

Customer

- Interconnecting Customer
  - Equipment vendor
    - Lead contractor
      - Electrician
  - Electrical Engineer (PE)
    - Relay Engineer
    - Relay testing firm

Legal



#### Simplified

#### **Interconnection Information**

30



#### **Simplified Application**

- APPLIES TO:
  - Single phase listed single-phase inverter based systems 15.0 KW or less on single phase service on radial feed.
  - Three phase listed three-phase inverter based systems 25.0 KW or less on three phase service on radial feed. Single phase inverters on a three phase service DO NOT QUALIFY for Simplified Process interconnection.
  - Simplified Spot Network Process: listed inverter based system 1/15<sup>th</sup> of electric customer's <u>MINIMUM</u> load.
  - Simplified Area Network Process: listed inverter based system 15.0 kW or less and 1/15<sup>th</sup> of electric customer's <u>MINIMUM</u> load.
  - A listed inverter means:
    - Complies with current IEEE Standard 1547 and utility's technical standard. MA has adopted UL 1741.1 as the standard for inverters to comply with IEEE 1547.
    - Nationally recognized test lab results.



#### **Simplified Time Frame**

Typically little or no utility system modifications required. If meter only – usually no charges passed to customer.

If system modifications are required, they must be completed before approval to install is granted.

	Simplified Process	
Eligible Facilities	Listed Small Inverter	
Acknowledge Receipt of Application (Note 2)	(3 days)	
Review Application for Completeness	10 days	
Complete Review of All Screens	15 days (20 Days) (Note 3)	
Complete Supplemental Review (if needed)	N/A	
Complete Standard Process Initial Review	N/A	
Send Follow-on Studies Cost/Agreement	N/A	
Complete Impact Study (if needed)	N/A	
Complete Detailed Study (if needed)	N/A	
Send Executable Agreement (Note 4)	Done. The agreement is part of the application.	
Total Maximum Days (Note 5)	25 days (30 days in case of failure of Screen #5)	
Construction Schedule	By Mutual Agreement	
Witness Test	Within 10 days from receipt of Certificate of Completion or by mutual agreement.	

### Simplified Spot and Area Network Time Frame

Timelines are longer

Application fee of \$100 (=< 3.0 kW) or \$300 (> 3.0 kW).

Minimum load information needed, may need to be measured for a period of time. Interconnecting Customer responsible for costs.

External disconnect switch required.

Witness Test will be performed.

If system modifications are required, they must be completed before approval to install is granted.

	Simplified Spot and Area Network	
Eligible Facilities	Listed Inverter	
Acknowledge Receipt of Application (Note 2)	(3 days)	
Review Application for Completeness	10 days	
Complete Review of All Screens	30/90 days (Note 3)	
Complete Supplemental Review (if needed)	N/A	
Complete Standard Process Initial Review	N/A	
Send Follow-on Studies Cost/Agreement	N/A	
Complete Impact Study (if needed)	N/A	
Complete Detailed Study (if needed)	N/A	
Send Executable Agreement (Note 4)	Done (Comparable to Simplified for Radial) The agreement is part of the application.	
Total Maximum Days (Note 5)	40 days (100 days if minimum load is unknown)	
Construction Schedule	By Mutual Agreement	
Witness Test	Within 10 days of receipt of the Certificate od Completion or by	

EVERS≘UR

#### **Everything starts with application**

- A complete application includes:
  - All appropriate sections of Simplified application completely filled out and SIGNED by the Interconnecting Customer. Customer will likely need assistance from vendor/engineer.
  - Electrical Sketch
  - Site Plan / Drawing
  - Inverter cut sheet
  - UL 1741 certification (if not already on file)
  - Work Request number if there is a new service or there is a service upgrade
  - If necessary, identify ownership of property and provide proof of site control if Customer and/or Interconnecting Customer does not own the property.
  - Application fee of \$100 or \$300 for Spot and Area Networks.
  - Identify electric utility customer and owner of proposed generation
  - Schedule Z if planning to be compensated under Net Metering Tariff
- Errors or problems with application will slow down the process and "stop the clock"
- Send Electronic copy of all documents if possible Easier to distribute, saves paper and is faster.

EVERS≘UR

#### Example – Customer Installing 13 kW photovoltaic System

	Western Massachusetts Electric Company
	Simplified Process Interconnection Application and Service Agreement
	Contact Information: Date Prepared: 6/10/2013
	Legal Name and address of Interconnecting Customer
	Interconnecting Customer (print): Third Party Solar, LLC Contact Person: Maxwell Edison
	Mailing Address: 1234 6 <sup>th</sup> St, Suite 7
	City: San Francisco State: CA Zip Code: 94105
	Telephone (Daytime): 555-123-4567 (Evening):
	Facsimile Number: 555-987-6543 E-Mail Address: m.edison@thirdpartysolarllc.com
	Alternative Contact Information (e.g., system installation contractor or coordinating company, it appropriate):
	Name: Solar Installer Inc Molly Jones Official Project Contacts
	Mailing Address: 99 Electric Ave
	City: Somewhere State: MA Zip Code: 01010
	Telephone (Daytime): 413-321-9876 (Evening):
2	Facsimile Number: 413-987-1234 E-Mail Address:
	Electrical Contractor Contact Information (if appropriate):
	Name: Telephone:
	Mailing Address:
	City: State: Zip Code:
	Ownership Information (include of ownership by any electric utility). 1000 Third Barty Solar, LLC
	<u>Ownership intornation</u> (include % ownership by any electric drinky). <u>100% finite Party Solar, ELC</u>
	(without my name and address) to be reviewed by the Massachusetts DG Working Group that is
	Official Project Contact Official Project Contact
	Facility Information:
	Customer name (if Customer is not Interconnecting Customer) (Nancy McGill)
	Customer email: nancy@wmeco.com Customer telephone: 413-123-4567
	Address of Facility: 0 Example St
	City: Nowhere MA Zip Code: 01234
	Electric Service Company: West DO NOT leave blank. "Same as above" or Company
	Account Number: 54123456789 something similar is accetable
	Meter Number: 098765432

		Required Information
	Inverter Manufacturer: Ted's Inverters	
	Model Name and Number: TED 1300US	Quantity: 1
		Quantity: _1
	Nameplate Rating: 13 (kW) 13 (kVA) 240	(AC Volts) Single 🛛 or Three 🗌 Phase
NOTE: System Design Capacity is based on	System Design Capacity: 13 (kW) 13	(kVA) Required If Net Metered
(as listed on cut sheet) of all	For Solar PV provide the DC-STC rating: (14.1)	(KW) Photovoitaic
units.	Prime Mover: Photovoltaic 🛛 Reciprocating Engine 🗌	Fuel Cell 🗌 Turbine 🗌 Other
	Energy Source: Solar 🛛 Wind 🗌 Hydro 🗋 Diesel	] Natural Gas 🔲 Fuel Oil 🗌 Other
	IFFF 1547 1 (III 1741) Listed? Vec X	No
		No
	Estimated Install Date: 7/1/2013 Estimated	ted In-Service Date: 7/20/2013
		Interconnecting Customer
	Interconnecting Customer Signature:	(System Owner) Signature
	I hereby certify that, to the best of my knowledge, all of the true and I agree to the Terms and Conditions on the follow	ne information provided in this application is ving page:
	Interconnecting Customer Signature: Maxwell Edua	Title: Manager Date: 6/10/2013
	Please attach any documentation provided by the inverter 1741 listing.	manufacturer describing the inverter's UL
	Approval to Install Facility (For Company use only) (To be	e filled out by WMECO)
	Installation of the Facility is approved contingent upon the agreement to any system modifications, if required	terms and conditions of this Agreement, and
	(Are system modifications required? Yes No To	be Determined
	Company Signature: Title:	Date:
	Application ID number:	
	Company waives inspection/Witness Test? Yes No	
		DO NOT COMPLETE this information.
		This area is to be completed by WMECO when Approval to
		Install is given.

36
# **Simplified Requirements**

# Submit an electrical sketch with application:

- <u>DOES NOT</u> need to be stamped by a MA PE.
- Must show the existing/proposed service, including the revenue metering, and how/where the proposed generation will interconnect to it.
- Can be hand drawn but must be legible.
- Include: Size of main breaker, external disconnect switch (when required or installed), kW rating, Customer name, address of facility, Inverter(s) and existing and back up generation (if applicable)
- Must show actual proposed equipment. Ex: Do NOT include "MIN 60A" for a disconnect size.
- Inverter settings.
- SHOULD NOT specify equipment TBD by Company.
- If you submit a revised electrical sketch, please include a date and/or revision number on the sketch.



#### **Example Electrical Sketch**



Interconnection via a line side tap:

•<u>CANNOT</u> be made in meter trough or at lugs of meter.

•MUST be made in a junction box or an approved location. (Interconnection can be made in the panel if the panel is UL listed to be used as a junction box.)

CANNOT be made on an instrument rated service.

 If it will increase the rating of the service you must submit a Request for Service to Eversource's New Service Clearing Desk (800-880-2433).

EVERS≘U

# **Service Configuration**

Line side tap will NOT require a service upgrade (self contained meter only) if:

A load center will not be installed beyond the tap.

•Any load center installed beyond the tap will ONLY contain generation circuits and will contain NO LOADS and NO OPEN POSITIONS

- This type of design must be clearly specified on the electrical sketch
- Photos clearly showing the load center(s) must be included as part of the completion photos.
- A system which is granted Approval to Install based on the preceding conditions, but then is installed such that an upgrade is required WILL NOT be given Approval to Operate until the system is installed as designed or the upgrade is completed.

Line side tap WILL REQUIRE a Service upgrade (i.e. 100 A to 200 A or 200 A to 400 A) (self contained meter only) if:

•A load center is installed beyond the line side tap which contains load circuits or open positions in addition to generation circuits.

- The application will be considered on hold for New Service, and Approval to Operate will NOT be granted until the modifications are completed.
- All Eversource's New Service requirements must be met.



#### **Site Plan**

Submit a site plan with application:

Must show revenue meter location and location of inverter(s) and all existing generation.

•Must show AC generator disconnects (required for systems over 10.0 kW and other special cases).

Can be hand drawn but must be legible.

Does not need to be PE Stamped.

•Must be a plan form view i.e. vertical <u>NOT</u> "bird's eye", isometric, 3/4 view.

Include Customer name and address of facility.

Must show property/lot lines and other generation.

If you submit a revised site plan, please include a date and/or revision number on the plan.

#### **Example Site Plan**





# **Simplified Process**

Changes and upgrades to existing interconnections:

Contact your local utility prior to designing any changes to an existing generation facility.

If you want to replace an inverter or increase the output of your facility, submit a new interconnection application.

Be clear on the application, electrical sketch and site plan as to what equipment is existing, what equipment is new and what equipment is being replaced.

Make additional notes or provide additional documentation if necessary.

# **Compliance Documentation**

- Certificate of Completion (CoC) signed by local wiring inspector and dated no earlier than the date on the email with Approval to Install.
- Electrical or Wiring Inspector signing off a Work Request Number (WR #). Give the WR # to the local inspector who will sign off that you pulled a permit. This requirement replaces need to send in the electrical permit or building permit for Electrical Work.
- Signed Exhibit H and Landowner Agreement, when required.
- Completion photos. Photos must *CLEARLY* show the following:
  - The inverter(s). If microinverters are used, photo(s) of the ENTIRE array will suffice. The photo(s) must be clear enough to verify the number of modules and, by extension, the number of inverters.
  - The inverter nameplate(s). N/A for any microinverters installed.
  - ALL AC generator disconnects.
  - The interconnection point (i.e. breaker position, junction box etc.). If the interconnection is made in a junction box, photo(s) must show the junction box with the COVER OFF.
  - The main panel (the door must be open in the photo).
  - All other pertinent AC equipment between the service entrance and the inverters i.e. production meter(s), load centers etc.
- A Witness Test may be required:
  - A Witness Test WILL be required for ALL battery backup systems.
  - If the system is a battery backup system or uses microinverters the Interconnecting Customer / Installer must ensure that there is a means to clearly show instantaneously when the system is and is not exporting power.
  - If so, provide a Witness Test Procedure.
- System must be installed as designed in the electrical sketch and specified on the Application.

44

**EVERS** 

# **Simplified Process Tips**

Eversource suggests you submit the complete application at least six weeks before you plan to start construction.

Provide the WR # to the Electrical or Wiring Inspector.

 If you are installing a new service or making a change to your existing service, that work must be complete before your Simplified Application can be approved for installation.

 Submit all compliance documents by December 4, 2015 to allow for review and the scheduling of the installation of the revenue meter.

EVERS



# Expedited/Standard And ISO Interconnection Information

46

# State vs. FERC Interconnection Process

- MA interconnection standard applies to generators that will connect (grid tied) to state jurisdictional Distribution circuits (below 69KV).
- FERC interconnection standards apply to Transmission interconnections (69kV and higher) and FERC jurisdictional Distribution circuits. Apply to the Independent System Operator, ISO New England (ISO-NE).

**EVERS** 

# When to submit application to Utility

- Interconnecting generation to a distribution circuit that does not have a wholesale transaction <u>at the time</u> of the application (State Jurisdictional)
- Generating facility will not be used to make wholesale sales of electricity in interstate commerce
- Energy will be consumed only on retail customer's site (will not export)
- Qualifying Facility, as defined by the Public Utility Regulatory Policies Act, selling 100% of its output to interconnected electric utility (i.e. through Power Purchase Schedule)

EVERS≘U

# When to submit application to ISO-NE

- Interconnecting generation to a distribution circuit which already has a wholesale transaction (FERC Jurisdictional)
- You will be selling your power to a third party
- Increasing capacity of an existing generating facility\*
- Materially modify an existing generating facility\*
- Changing from energy only (NR) to energy and capacity unit (CNR)
- There is no minimum size
- Net Metered Facility which wants to enter the capacity market.
- \* NOTE = Generation facility with wholesale sales of electricity in interstate commerce (i.e. not compensated under Net Metering Tariff or Power Purchase Schedule).

EVERS

### Where to submit application

- Applications are either submitted to the utility or ISO-NE.
- Contact the utility for a determination.

#### **ISO New England Information:**

- ISO-NE applications
  - http://www.iso-ne.com/genrtion\_resrcs/nwgen\_inter/index.html
- Contacts for interconnections:
  - Dave Forrest 413-540-4584, dforrest@iso-ne.com
  - Cheryl Ruell 413-540-4219, cruell@iso-ne.com
- Contact for other questions:
  - ISO Customer Service 413-540-4220

**EVERS** 

# **Expedited/Standard Application**

- APPLIES TO:
  - Projects which do not qualify for Simplified Process.
  - Single phase listed single-phase inverter based systems above 15.0 KW on single phase service.
  - Three phase listed three-phase inverter based systems above 25.0 KW on three phase service.
  - Inverter based systems with service configuration mismatch (i.e. single phase inverter(s) on three phase service).
  - All non-inverter based generation (i.e. synchronous and induction generators, including closed transition backup generators) and nonlisted inverter based systems.

EVERS≘l

### **Expedited/Standard Applications**



**Expedited** – This is for Listed Facilities that pass certain pre-specified screens on a radial EPS.

**Standard** – This is for all facilities not qualifying for either the Simplified or Expedited interconnection processes on radial and spot network EPS, and for most Facilities on area network EPS.

**Standard Complex** – This is projects requiring involved studies and time frames can be set by mutual agreement.

EVERS≘l



# **Expedited Time Frame**

Typically little or no utility system modifications required. If meter only – usually no charges passed to customer.

Application fee plus any Supplemental Review charges up to \$4,500.

Relay control system must be well defined to make supplemental review easier.

Witness Test fee of up to \$300 plus travel is required.

	Expedited
Eligible Facilities	Listed DG
Acknowledge Receipt of Application (Note 2)	(3 days)
Review Application for Completeness	10 days
Complete Review of All Screens	25 days
Complete Supplemental Review (if needed) (Note 3)	20 days or Standard Process
Complete Standard Process Initial Review	N/A
Send Follow-on Studies Cost/Agreement	N/A
Complete Impact Study (if needed)	N/A
Complete Detailed Study (if needed)	N/A
Send Executable Agreement (Note 4)	10 days
Total Maximum Days (Note 5)	45 days (65 days if Supplemental Review is required)
Construction Schedule	By Mutual Agreement
Witness Test	Within 10 days from receipt of Certificate of Completion or by mutual agreement.



54

### **Standard Time Frame**

After initial review and/or Supplemental Review, customer may need to enter Standard Process

Customer can request Standard Process

Appropriate study agreement sent for signature and payment

Studies can include:

- Impact Study: Determine the impact of the new generator on potentially affected systems, including EPS, other customers and other generators
- Detailed Study: Refine required utility system modifications and cost, writing of construction work orders, engineering, all permitting
- Various timeframes for studies based on amount of modifications

During studies, may determine that project must follow Standard Complex Process.

ISO notification and possibly Transmission Study if over 1.0 MW, ISO approvals and Transmission Study required if over 5.0 MW

After studies – Interconnection Service Agreement sent for signature

An early Interconnection Service Agreement can be requested. Will not include construction schedule. Will include +/- 25% estimate. Detailed Study Agreement will still be required.

Witness Test fee is actual cost

	Standard
Eligible Facilities	Any DG
Acknowledge Receipt of Application (Note 2)	(3 days)
Review Application for Completeness	10 days
Complete Review of All Screens	N/A
Complete Supplemental Review (if needed)	N/A
Complete Standard Process Initial Review	20 days
Send Impact Study Agreement	5 days
Complete Impact Study (if needed) (Note 3)	55 days
Complete Detailed Study (if needed) (Note 3)	30 days
Send Executable Agreement (Note 4)	15 days
Total Maximum Days (Note 5)	135 days (160 days if the application starts in the Expedited process)
Construction Schedule	By Mutual Agreement
Witness Test	See Section 3.4(n)

# **Complex Time Frame**

Also knows as Standard Process Complex Projects

Similar to Standard Process.

Usually determined during the Impact Study.

If substation modifications are required, Impact Study will be 70 days in 2015, 60 in 2016 and subsequent years.

If system modifications are likely to be \$200,000 or greater not including service upgrades, the Detailed Study will take 70 days in 2015, and 60 days in 2016 and subsequent years.

If system modifications are estimated to be \$1,000,000 or greater, Impact Study and Detailed Study timeframes will be by mutual agreement.

	Standard Process Complex Projects
Eligible Facilities	Any DG (Note 2)
Acknowledge Receipt of Application (Note 3)	(3 days)
Review Application for Completeness	10 days
Complete Review of All Screens	N/A
Complete Supplemental Review (if needed)	N/A
Complete Standard Process Initial Review	20 days
Send Impact Study Agreement	5 days
Complete Impact Study (if needed)	(Note 4)
Complete Detailed Study (if needed)	(Note 5)
Send Executable Agreement (Note 6)	15 days
Total Maximum Days (Note 7)	200 or more days as determined by required System Modifications
Construction Schedule	By Mutual Agreement
Witness Test	See Section 3.4(n)

EVERS≘UR

# **Everything starts with application**

- A complete application includes:
  - All appropriate sections of 6-page application completely filled out and SIGNED by the Interconnecting Customer. Customer will likely need assistance from vendor/engineer.
  - Application fee \$4.50/KW (\$300 minimum and \$7,500 maximum). This fee covers the initial review and is non-refundable. Fee based on aggregate maximum AC kW output as listed on generation technical cut sheet.
  - Stamped electric one-line diagram, showing relay controls (3 copies, 1 paper copy if submitted electronically) (Stamped by Massachusetts Electrical PE). (If a three-line diagram is needed, we will request it later in the process.)
  - **Site plan** (3 copies, 1 paper copy if submitted electronically)
  - Three copies of any supplemental information i.e. inverter cut sheet, UL 1741 certification, TCC curves of fuses or breakers used etc. (if electronic – single copy acceptable)
  - Identify electric utility customer and owner of proposed generation
  - Schedule Z if planning to be compensated under Net Metering Tariff
- Errors or problems with application will slow down the process and "stop the clock"
- Send Electronic copy of all documents if possible Easier to distribute, saves paper and is faster.

EVERS≘UR

# Example – Customer Installing 2 MW PV System

Western Massachusetts Electric Company

M.D.P.U. No. 1039F



(without my name and address) to be reviewed by the Massachusetts DG Working Group that is exploring ways to further expedite future interconnections." Yes  $\square$  No  $\square$ 

<u>Group Study Agreement</u>: "I agree to allow my contact information to be shared with other parties interested in a potential group study in the same geographic area." Yes  $\Box$  No  $\boxtimes$ 



Type of Generating Unit:    Synchronous    Induction    Inverter						
Manufacturer: Ted's Inverters Model: TI PV500 (4 Units)						
Nameplate Rating: 2000 (kW) (kVAr) 208 (AC Volts) Single in or Three Phase						
Prime Mover: Fuel Cell 🗌 Reciprocating Engine 🗍 Gas Turbine 🗌 Steam Turbine 🗌 Microturbine 🗌 Photovoltaic 🖾 Other						
Energy Source: Solar Vind Hydro Diesel Natural Gas Fuel Oil Metered	t					
For Solar PV provide the DC-STC rating: 2123.4 (kW)						
IEEE 1547.1 (UL 1741) Listed? Yes XNo						
Need an air quality permit from DEP? Yes No X Not Sure If "yes", have you applied for it? Yes No						
Planning to Export Power? Yes       X       No       A Cogeneration Facility? Yes       No						
Anticipated Export Power Purchaser:						
Export Form? Simultaneous Purchase/Sale Net Purchase/Sale Net Metering X						
Other (Specify)						
Est. Install Date: 8/1/14 Est. In-Service Date: 10/1/14 Agreement Needed By: 7/1/14						
Application Process  L hereby certify that, to the best of my knowledge all of the information provided in this application is true:						
Interconnecting Customer Signature: Mail Day, Title Director Date 8/29/2013						
The information provided in this application is complete:						
Company Signature: Title: Date:						
"Company" is Eversource. Leave this section BLANK						

Information on componer	nts of the generating facili	ty that are currently List	ed:		Complete	applicable area.	
Equipment Type	Manufacturer	Model	National Standard		Leave	others blank.	
1. Inverter	Ted's Inverters	TI PV500	UL 1741				
2. Relay	Ted's Relays	T1000					
3. Switchgear	Ted's Power Equipment	TS2000		_		×	
4 5.				- Generator Characteristic Data (for	r all inverter-ba	sed machines	
6.				Max Design Fault Contribution Curr	rent? 1600 A	Instantaneous X	or RMS?
				Harmonics Characteristics: <u>&lt;3%</u>	THD		
Trackel Manufacture of Comments				Start-up power requirements:			
Concentration Unit Douver For	ater Bating: 0.00			-			
Generator Unit Power Factor Rating: 0.99			- Generator Characteristic Data (for	r all rotating ma	<u>chines)</u>		
Max Aujustable Leading		Max Aujustable La		- Rotating Frequency: (rpm	n) (n	Neutral Grounding Resistor (If Appl	licable).
					~ ~		
				Additional Information for Synchr	onous Generati	ng Units	
				Supebropous Posstance, Vd.		Transient Desetance, V'de	
		"Generati	na Unit" is	Subtransient Reactance, X"d:	(PU)	Neg Seguence Desotonce, X :	(PU)
		an inver	tor wind	Zero Sequence Reactance, X u.	(PU)	kVA Base	
		anniver	ter, wind	Field Voltage:	(Volts)	Field Current:	(Amps)
		turbine, g	en-set etc.		(+ 010)		(rmpo)
				Additional information for Induction Generating Units			
				Rotor Resistance, Rr:		Stator Resistance, Rs:	
				Rotor Reactance, Xr:		Stator Reactance, Xs:	
				Magnetizing Reactance, Xm:		Short Circuit Reactance, Xd":	
				Exciting Current:		Temperature Rise:	
				Frame Size:			
				Total Rotating Inertia, H:		Per Unit on kVA Base:	
				Reactive Power Required In Vars (N	o Load):	-	
				Reactive Power Required In Vars (Fo	ull Load):		
				Additional information for Induction	on Generating L	inus that are started by motoring	

Interconnection Equ	ipment Technical Detai	<u>l</u>	Date:	
Will a transformer be Yes ⊠ No □	used between the genera	tor and the point of interconnection	on?	Please note: WM
Will the transformer b	e provided by Interconn	ecting Customer? Yes 🖂 N	0	Eversource's 3 Ph.
<u>Transformer Data (</u>	if applicable, for Inter	connecting Customer-Owned	Transformer):	13.8 and 23 kV
Nameplate Rating: Transformer Impeda If Three Phase: Transformer Primary Transformer Seconda	nce: 4.9 /: 13,800 (Volts) ary: 208 (Volts)	(kVA) Single (%) on a 2000 kVA Delta Wye X V X Delta Wye	Or Three X Phase Base Vye Grounded Other Wye Grounded Other	circuits are Multi- grounded wye
Transformer Fuse <u>D</u> (Attach copy of fuse	Data (if applicable, for manufacturer's Minimu	Interconnecting Customer-Out m Melt & Total Clearing Time-	n <u>ed Fuse)</u> : Curvent Curves)	
Manufacturer: Ted	's Fuses	Type: TS800 Size:	800A Speed	Devidend
Interconnecting Circ	cuit Breaker (if applic	able):		information,
Manufacturer:	Ту	pe: Load Rating:	(Amps) Interrupting	but commonly
Rating:	(Amps) T	rip Speed: (Cycles)		omitted
Interconnection Prot (If microprocessor-co	t <u>ective Relays (if applic</u> ntrolled)	<u>cable):</u>	·	<u>onnicod</u>
List of Functions and	Adjustable Setpoints fo	r the protective equipment or sof	tware:	
Set	point Function	Minimum	Maximum	
1				
2			······	
3				
5.				
6.		· · · · · · · · · · · · · · · · · · ·		
(If discrete component	ts)			
(Enclose copy of any	proposed Time-Overcur	rent Coordination Curves)		
Manufacturer:	Туре:	Style/Catalog No.:	Proposed Setting:	
Manufacturer:	Туре:	Style/Catalog No.:	Proposed Setting:	
Manufacturer:	Туре:	Style/Catalog No.:	Proposed Setting:	
Manufacturer:	Туре:	Style/Catalog No.:	Proposed Setting:	
Manufacturer:	Туре:	Style/Catalog No.:	Proposed Setting:	
Manufacturer:	Type:	Style/Catalog No.:	Proposed Setting:	

# **Expedited/Standard Requirements**

# Submit a one line with application:

- <u>DOES</u> need to be stamped by a MA PE.
- Must show the existing/proposed service, including the revenue metering, and how/where the proposed generation will interconnect to it.
- Include: Size of main breaker, external disconnect switch, kW rating, Customer name, address of facility, Inverter(s) and existing generation (if applicable).
- CT's and PT's for relays with ratios, relay settings.
- Inverter settings.
- Interconnecting Customer owned transformer size, configuration, impedance.
- SHOULD NOT specify equipment TBD by Company

#### **Technical Issues – One Line**

- Well documented electric service
- including 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



**EVERS⊖**UR

Interconnection via a line side tap:

•<u>CANNOT</u> be made in meter trough or at lugs of meter.

•MUST be made in a junction box or an approved location. (Interconnection can be made in the panel if the panel is UL listed to be used as a junction box.)

CANNOT be made on an instrument rated service.

 If it will increase the rating of the service you must submit a Request for Service to Eversource's New Service Clearing Desk (800-880-2433).

EVERS≘U

# **Service Configuration**

Line side tap will NOT require a service upgrade (self contained meter only) if:

A load center will not be installed beyond the tap.

•Any load center installed beyond the tap will ONLY contain generation circuits and will contain NO LOADS and NO OPEN POSITIONS

- This type of design must be clearly specified on the electrical sketch
- Photos clearly showing the load center(s) must be included as part of the completion photos.
- A system which is granted Approval to Install based on the preceding conditions, but then is installed such that an upgrade is required WILL NOT be given Approval to Operate until the system is installed as designed or the upgrade is completed.

Line side tap WILL REQUIRE a Service upgrade (i.e. 100 A to 200 A or 200 A to 400 A) (self contained meter only) if:

•A load center is installed beyond the line side tap which contains load circuits or open positions in addition to generation circuits.

- The application will be considered on hold for New Service, and Approval to Operate will NOT be granted until the modifications are completed.
- All Eversource's New Service requirements must be met.

## **Protection Requirements**

- Protection Requirements:
  - Single phase generation on a three phase service (balanced or unbalanced) <u>MUST</u> have three phase protection.
  - Three Line (AC Schematic)
    - Including all AC Current and Voltage circuits
    - Required before Impact Study
  - Control Schematic (DC Elementary Diagram)
    - Including protection functions
    - Tripping schemes
    - Required before Witness Test

EVERS



#### **Site Plan**

Submit a site plan with application:

Must show revenue meter location and location of inverter(s) and/or generators.

- Must show AC generator disconnects.
- Must show production meter if Net Metered.
- Does not need to be PE Stamped.
- •Must be a plan form view i.e. vertical <u>NOT</u> "bird's eye", isometric, 3/4 view.
- Title block with Customer name, address, date, drawing number and revision number
- Must show property/lot lines

# **Supplemental Review**

- If one or more Screens are not passed or if additional time is needed to determine system modifications or technical review, the Company will provide a Supplemental Review Agreement.
- Interconnecting Customer signs agreement and pays fee for additional engineering time (max fee is \$4,500).
- The Supplemental Review may be able to determine what impacts the generation system will have and what (if any) modifications are required. If so - an interconnection agreement will be sent to customer detailing:
  - System modification requirements, reasoning, and costs for these modifications
  - Specifics on protection requirements as necessary
- If Supplemental Review cannot determine requirements, Impact Study Agreement (or equal) will be sent to the customer. (Project shifts to the Standard Process.)

## **Impact Study**

- If one or more Screens are not passed, the Company will provide an Impact Study Agreement.
- Interconnecting Customer signs agreement and sends payment.
- The Impact Study determines what impacts the generation system will have and what (if any) distribution system modifications are required for safe and reliable interconnection. It includes a protection review.
- If distribution system modifications are required, a Detailed Study Agreement will likely be required.
- Impact Study Report is provided to Interconnecting Customer with:
  - System modification requirements, reasoning, and + / 25% cost estimate for these modifications (electric utility work only)
  - Specifics on protection requirements as necessary

#### **Detailed Study**

- If system modifications are required, Company sends a Detailed Study Agreement to Interconnecting Customer.
- Interconnecting Customer signs agreement, submits payment and work is scheduled.
- When complete, an Interconnection Service Agreement will be sent for signature and will include:
  - System modification requirements + / 10% estimated cost for these modifications (electric utility work only) (only if regular ISA)
  - Construction schedule
- Detailed Study includes any permitting such as for pole sets, tree trimming, environmental work to be done the electric utility.
- ISO notification for applications over 1.0 MW will be done in conjunction with Detailed Study.

# **ISO-NE Notification**

- Proposed Plan Applications (PPA):
  - <u>0 0.999 MW cumulative increase</u>\* no form required
  - <u>1.000 4.999 MW cumulative increase</u>\* notification form required to go to Reliability Committee.
    - Submitted after Impact Study is completed.
    - Transmission Owner submits PPA if generator is not a NEPOOL participate.
    - If generator is NEPOOL participant, Transmission Owner must review PPA first.
  - <u>> 4.999 MW cumulative increase</u>\* PPA and studies required to go to Stability and Transmission Task Forces and Reliability Committee
    - After Impact Study completed, determine if any Substation / Transmission upgrades required.
    - Transmission Owner and Task Forces need to agree if transmission study will/will not be required.
    - Transmission Owner submits PPA if generator is not a NEPOOL participate.
    - If generator is NEPOOL participant, Transmission Owner must review PPA first.
    - A stability model will likely be required.
- Refer to Planning Procedure 5-1

\* NOTE = new generation or cumulative increase from last approved PPA

EVERS≘U

# **Compliance Documentation**

- Certificate of Completion (CoC) signed by local wiring inspector and dated no earlier than the date on the Interconnection Service Agreement.
- Electrical or Wiring Inspector signing off a Work Request Number (WR #). Give the WR # to the local inspector who will sign off that you pulled a permit. This requirement replaces need to send in the electrical permit or building permit for Electrical Work.
- Witness Test Procedure.
- If inverters used, printout of applied inverter settings. If relays were installed, certified test results from a testing company.
- As built one line, three line and wiring diagrams.
- System must be installed as designed in the One Line (and three line when required) and specified on the Application.
- Revenue meter change will be scheduled after receipt of all compliance documents.
- Witness Test is required and will be scheduled after compliance documents are reviewed by the utility's engineering departments.
# **Allow Additional Time For:**

- New construction
- Service upgrade or relocation
- Change in Interconnecting Customer or Customer
- If email address(s) not available for communication
- If you make a change to your project (inverter, proposed system size or other equipment), you will need to submit a new application
- Can submit up to two options (three total options) with original application
- Possible distribution system modifications to accommodate the proposed generation
- ISO notification and approval

## **Tops to Remember**

- Contact local utility to inquire about the service configuration of your specific location.
- <u>Apply early</u> each project and location is unique.
- The interconnection standard contains a wealth of information get to know it.
- The time frames in the Tariff are business days.
- Interconnection expenses should be budgeted into your project.
- The number and complexity of interconnection applications has picked up remarkably in the last several years.
- Generation larger than customer's load takes longer to review.
- Stand alone (no or minimal load) interconnection applications take longer to review.
- Interconnection timeframes do not apply to Electric Power System construction when required.

**EVERS€**UR

## **Technical Requirements**

- Modifications to protection systems as required (e.g. replace or install fusing, install switch, modify breaker/recloser set-points, transfer trip, etc.).
- Larger generators require review by NEPOOL reliability committee and registration with ISO-NE. ISO time frames are <u>NOT</u> included in the Tariff time frames.
- Class II and III Net Metered facilities (over 60 kW) may require a dedicated analog phone line to the meter.
- Inverter based generation over 500 kW requires utility grade relays.
- Stand alone generation facilities 500 kW and greater will be primary metered with a DSCADA equipped recloser.
- For generators 500 kW and larger, Eversource WM will write a Special Operating Guideline for utility field personnel, dispatch and the customer.
- Set up future testing for relay protection, meter calibration, insurance tracking, etc.

EVERS≘UR

## **Technical Issues – Rules of Thumb**

- High fault current may impact your interconnection costs.
- Some things of note on various things that must happen between the time an application is received and a system can go on line:
  - During initial analysis and various studies, there is usually an exchange of information which takes time.
  - ISO-NE Reliability Council review if over 1.0 MW
  - If distribution system modifications are required, specialty equipment may need to be ordered (lead times for reclosers, meters, substation equipment can be 4 to 6 months) after interconnection agreement is fully executed.
  - System modifications must be scheduled and can take time. Must be coordinated with Interconnecting Customer, other utilities (such as phone company for pole sets and phone line installation).
  - Asset registration if 60 KW or larger and will export power.

## **Technical Issues – Rules of Thumb**

- If aggregate generation on a feeder is over 15% of peak line section and/or or feeder load, there may be special reviews required.
- Feeder voltage may impact the size of generator that can be safely interconnected at the distribution level. (e.g. 4.8 kV, 13.8 kV, 23 kV).
- If the generator will sell on the market and has to apply through ISO-NE, the process may take longer than the standard time frames.
- Generators over 10 kW are most likely going to be three-phase.

# Technical Issues – Metering, Disconnection, Data Acquisition

- Generator must be installed behind a utility revenue meter
- Can not interconnect in meter socket/meter trough
- Cold sequence metering required for instrument rated services and all 277/480 V services.
- Approved disconnect means must be provided to isolate metering instrument transformers
- Metering with remote data access required for all generation 60 kW and larger that will export power onto utility EPS
- Installation 500 kW and larger will also require a recloser with remote control and data access to be installed to
  - Monitor voltage, current
  - Act as a utility controlled protection system
  - Provide for remote disconnect

## **Summary**

- When submitting application, include site plan and PE stamped one line
- Compliance Documentation is needed:
  - Witness Test procedure
  - Certified relay test results
  - PE Stamped as-built wiring diagrams
  - Certificate of Completion
  - Work request sign off by inspector.
  - Proof of insurance
- Bidirectional revenue meter will be set after Eversource has the appropriate Compliance Documentation.
- Eversource WM is doing Witness Tests of some Simplified projects and all Expedited/Standard projects. We inspect all battery backup systems.
- Submit required documentation by December 4<sup>th</sup> to insure that we can install the bi-directional meter and schedule a Witness Test by the end of December

# **Tips to Avoid Process Delays**

- Include cut sheet for inverter with application
- Specify generator secondary / service voltage
- Indicate number of generators being used
- Specify DC-STC rating of PV on application
- Include correct electric utility account and meter number
- Address of facility must match service address on electric utility account
- Name on application must match name of primary account holder on electric utility account
- Include accurate contact addresses, phone numbers and email addresses
- Identify if generator is single or three-phase
- Application must be signed by Interconnecting Customer
- Include Qualifying Facility documentation, if not compensated under Net Metering Tariff
- Identify ownership of property, provide proof of site control if necessary
- Identifying third party ownership of generator
- Provide sketch for new construction, service upgrades or relocations and commercial customer systems to identify meter sequence and point of connection
- CoC signed and dated after given approval to install, include electrical permit and photos

**EVERSUR** 

### Behind the Scenes at Utility.....

- Review and replacement of metering, modifications to billing.
- Verifying wiring inspector signed off on Work Request Number.
- Modifications to protection systems as required (e.g. replace or install fusing, install switch, modify breaker/recloser set-points, transfer trip, etc.).
- Larger generators require review by NEPOOL reliability committee and registration with ISO-NE.
- Adding generation asset to geographic information systems, maps, system onelines, dispatch systems, etc.
- Publish internal special operating guidelines for utility field personnel on larger generators.
- Set up future testing for relay protection, meter calibration, insurance tracking, etc.

EVERS€U