Expedited/Standard Interconnection Seminar

August 24, 2016

Eversource Energy

WM DG – Hadley, MA

Eversource Website

- Please refer to www.eversource.com for interconnection and net metering information.
- There are different sections for Eastern Massachusetts (EM DG) and Western Massachusetts (WM DG).
  - Eversource Energy – EM DG
    - Email: emdg@eversource.com
  - Eversource Energy – WM DG
    - Email: wmdg@eversource.com

Expedited/Standard

And ISO

Interconnection Information

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).

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).

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:
  - Cheryl Ruell 413-540-4219, cruell@iso-ne.com
- Contact for other questions:
  - ISO Customer Support 413-540-4220

When to submit application to Utility

- Interconnecting generation to a distribution circuit that does not have a wholesale transaction **at the time** of the application (**State Jurisdictional**)
- Generating facility will not be used to make wholesale sales of electricity in interstate commerce (i.e. not selling energy and/or capacity)
- 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)

DG Tariff Overview

And General Information

Interconnection Process

- Seminar concerns Standards for Interconnection of 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 first.)

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

DG Tariff – Section 2

- Basic Understanding
- Interconnecting Customer / Customer / Landowner and Company must enter into an agreement 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 *must* submit a *Pre-Application Report Form (PAR)* 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.

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.
  - Phase loss relay required for three phase generation facility using single phase inverters.
- 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.**

Third Party and Land Ownership

- Tariff allows for third party ownership of generation and property/land
- Application must include information for both generation owner (***Interconnecting Customer***) and electric customer (***Customer***)
- Provide information on owner of property/land (***Landowner***) 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 Customer (Exhibit H of tariff)
- Utility will enter into an agreement with the Landowner (Exhibit I of tariff).

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.
- Identify the Landowner.
- 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 **all** generators on the one line and site plan. Transition switches must be labeled open or closed. ***Existing closed 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 one line 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 will likely 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.

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

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)

Application Fee is based on aggregate maximum kW AC size of project.

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 non-listed inverter based systems.

Expedited/Standard Applications

Larger generators can impact the electric power system and must be reviewed individually.

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 for projects requiring involved studies and significant system modifications and time frames can be set by mutual agreement.

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.

Example – Customer Installing 2 MW PV System

Western Massachusetts Electric Company d/b/a Eversource Energy **M.D.P.U. No. 1039G**

STANDARDS FOR INTERCONNECTION OF DISTRIBUTED GENERATION

Generating Facility Expedited/Standard Process
Interconnection Application

Contact Information: Date Prepared: 8/25/2015

Legal Name and address of Interconnecting Customer

Interconnecting Customer (print): Solar Owner, LLC Contact Person: Molly Jones

Mailing Address: 123 Fourth Street

City: Washington State: NJ Zip Code: 08888

Telephone (Daytime): 123-456-7890 (Evening): _____

Facsimile Number: 987-654-3210 E-Mail Address: mjsolar@exsolar.com

Customer name (if Customer is not Interconnecting Customer): Town of Nowhere

Customer email: jschmidt@nowhere.ma.us Customer telephone: 413-444-5555

Customer Mailing Address: Town of Nowhere, Attention: John Schmidt, 77 Main Street

City: Nowhere State: MA Zip Code: 01234

Landowner name (if neither Interconnecting Customer nor Customer): John Doe

Landowner email: jd@landowner.com Landowner telephone: 413-123-4567

Landowner Mailing Address: 413 Main Road

City: Somewhere State: MA Zip Code: 01888

Alternative Contact Information
(e.g., system installation contractor or coordinating company, if appropriate):

Name: Maxwell Edison – Example Power Engineers Inc.

Mailing Address: 667 Fleet Street

City: St. Louis State: MO Zip Code: 65432

Telephone (Daytime): 999-888-7777 (Evening): _____

Facsimile Number: _____ E-Mail Address: medison@expower.com

Ownership (include % ownership by any electric utility): 100% Interconnecting Customer

Site Control? (Y/N) Y

Will Facility be constructed on a single parcel of land? (Y/N) Y

Authorized/Proposed generation capacity already exists (check all that apply):

☐ On Current Account ☐ On Same Legal Parcel of Land ☐ In Same Building/Structure

If any apply, include existing generation capacity on design diagrams, and provide Application Number(s): _____

Confidentiality Statement: "I agree to allow information regarding the processing of my application (without my name and address) to be reviewed by the Massachusetts DG Working Group that is exploring ways to further expedite future interconnections." Yes X No _____

Group Study Agreement: "I understand and agree if my project becomes part of a Group Study, the Company is authorized to share my contact information and project details with other parties that are also involved in the Group Study."

Generating Facility Information

Please provide all Pre-Application Reports (either mandatory or optional) as attachments. This is mandatory for systems greater than or equal to 500 kW. PAR-999

Address of Facility: 779 Main Street

City: Nowhere State: MA Zip Code: 01234

Electric Distribution Company: Eversource Energy – WM DG

Account Number: New Service

Meter Number: New Service

System Design Capacity: Nominal 1,900 (kW) _____ (kVA)

Maximum 2,000(kW) _____ (kVA)

For Solar PV provide the DC-STC rating: 2134.5 (kW_{DC})

Type of Generating Unit: Synchronous _____ Induction _____ Inverter X

Manufacturer: Bruce's Inverters Model: BI PV500 (4 units)

Prime Mover: ☐ Fuel Cell ☐ Reciprocating Engine ☐ Gas Turbine ☐ Steam Turbine
☐ Microturbine ☒ Photovoltaic Other _____

Energy Source: ☒ Solar ☐ Wind ☐ Hydro ☐ Diesel ☐ Natural Gas ☐ Fuel Oil
Other _____ (Please Specify)

For Solar PV provide the DC-STC rating: 2134.5 (kW)

IEEE 1547.1 (UL 1741) Listed? Yes X No _____

1) Generating Unit Type 1
Manufacturer: _____ Model Name and Number: _____
Quantity: _____

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 X

Anticipated Export Power Purchaser: _____

Export Form? Simultaneous Purchase/Sale ____ Net Purchase/Sale ____ Net Metering X

Other (Specify) _____

If net metering, please refer to Schedule Z of the Standards for Interconnection of Distributed Generation. Please note that if under the public cap, all off-takers must be a Municipality or Other Governmental Entity (as defined in 220 C.M.R. 18.02) and therefore be certified by the DPU.

Est. Install Date: 11/1/2016 Est. In-Service Date: 1/2/2017 Agreement Needed By: 9/1/2016

Application Process

I am opting to forego the Expedited Process. Please review this application under the Standard Process. Yes____ No X

I hereby certify that, to the best of my knowledge, all of the information provided in this application is true:
Interconnecting Customer Signature: _____ Title: _____ Date: _____

The information provided in this application is complete:
Company Signature: _____ Title: _____ Date: _____

Generating Facility Technical Detail

Information on components of the generating facility that are currently Listed

	Equipment Type	Manufacturer	Model	National Standard
1.	Inverter	Bruce's Inverters	BI PV500	UL 1741
2.	Relay	Bruce's Relay	BI1000	
3.	Switchgear	Bruce Power Equip.	BPE2020	
4.				
5.				
6.				

Total Number of Generating Units in Facility? 4

Generator Unit Power Factor Rating: 1.0

Max Adjustable Leading Power Factor? _____ Max Adjustable Lagging Power Factor? _____

Generator Characteristic Data (for all inverter-based machines)

Max Design Fault Contribution Current? 1600A Instantaneous _____ or RMS? _____

Harmonics Characteristics: < 3%

Start-up power requirements: _____

Generator Characteristic Data (for all rotating machines)

Rotating Frequency: _____ (rpm) Neutral Grounding Resistor (If Applicable): _____

Additional Information for Synchronous Generating Units

Synchronous Reactance, Xd: _____ (PU) Transient Reactance, X'd: _____ (PU)

Subtransient Reactance, X'd: _____ (PU) Neg Sequence Reactance, X2: _____ (PU)

Zero Sequence Reactance, Xo: _____ (PU) kVA Base: _____

Field Voltage: _____ (Volts) Field Current: _____
(Amps)

Interconnection Protective Relays (if applicable):
(If microprocessor-controlled)

List of Functions and Adjustable Setpoints for the protective equipment or software:

	Setpoint Function	Minimum	Maximum
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____

(If discrete components)

(Enclose copy of any proposed Time-Overcurrent Coordination Curves)

Manufacturer: _____ Type: _____ Style/Catalog No.: _____ Proposed Setting: _____

Manufacturer: _____ Type: _____ Style/Catalog No.: _____ Proposed Setting: _____

Manufacturer: _____ Type: _____ Style/Catalog No.: _____ Proposed Setting: _____

Manufacturer: _____ Type: _____ Style/Catalog No.: _____ Proposed Setting: _____

Manufacturer: _____ Type: _____ Style/Catalog No.: _____ Proposed Setting: _____

Manufacturer: _____ Type: _____ Style/Catalog No.: _____ Proposed Setting: _____

Current Transformer Data (if applicable):

(Enclose copy of Manufacturer's Excitation & Ratio Correction Curves)

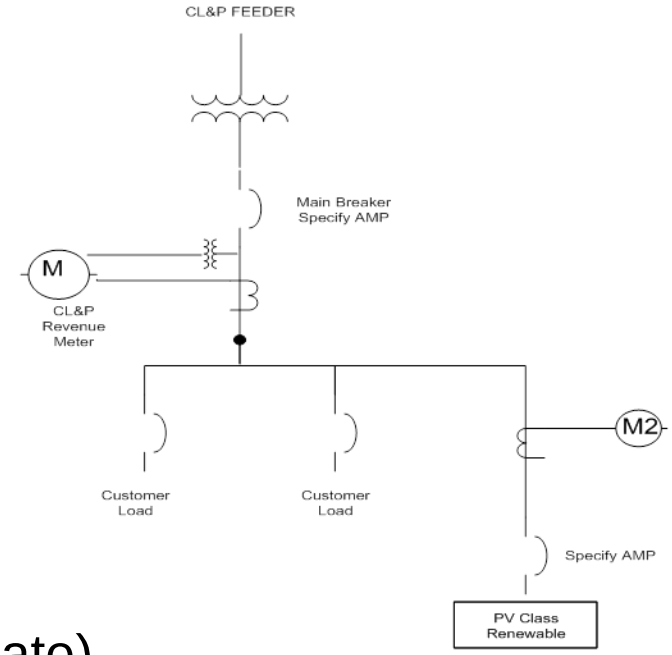
Manufacturer: _____ Type: _____ Accuracy Class: _____ Proposed Ratio Connection: ___

Expedited/Standard Requirements

Submit a one line with application:

- DOES 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

Service Configuration

Interconnection via a line side tap:

- CANNOT 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.
  - Metering must be cold sequenced.
- 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).

Service Configuration

- Self Contained Meter Only

Line side tap will NOT require a service upgrade (rating of tap is less than existing service rating) and 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) 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.
- Rating of tap exceeds existing service.

Protection Requirements

- Protection Requirements:
  - Single phase generation on a three phase service (balanced or unbalanced) **MUST** 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

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 NOT “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.
- 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

Impact Study

- If distribution system modifications are required, a Detailed Study Agreement will likely be required.
- If applicant requests it, an early Interconnection Service Agreement will be sent for signature and will include:
  - System modification requirements + / - 25% estimated cost for these modifications (electric utility work only)
  - If you are part of a group, all members will receive the early ISA
- **As of 5/31/16, DG Tariff provision for group Impact Studies ended.**

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. **A group Detailed Study will not start until all members submit payments.**
- 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):
  - *0 - 0.999 MW cumulative increase** - no form required
  - *1.000 - 4.999 MW cumulative increase** - 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.
  - *> 4.999 MW cumulative increase** - 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

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

Tips to Remember

- Contact local utility to inquire about the service configuration of your specific location.
- **Apply early** – 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.

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 NOT included in the Tariff time frames.
- Class II and III Net Metered facilities (over 60 kW) will require communication such as a dedicated analog phone line to the revenue meter.
- Inverter based generation over 500 kW, synchronous induction generators and some smaller inverter based generation require utility grade relays.
- Stand alone generation facilities 500 kW and greater and smaller facilities needing transfer trip will be primary metered with a DSCADA equipped recloser.

Technical Requirements

- Eversource WM will write a Special Operating Guideline for utility field personnel, dispatch and the customer as needed for generation facilities.
- Set up future testing for relay protection, meter calibration, insurance tracking, etc.

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 1.0 MW or larger
  - If distribution system modifications are required, specialty equipment may need to be ordered (lead times for reclosers, meters, substation equipment is 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.
- Lockable AC disconnect switch with visible break is required.

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 of 500 kW and larger (and some smaller facilities) 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 2th 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 one line 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

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 one-lines, 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.