Simplified

Interconnection Seminar

May 11, 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

DG Tariff Overview

And General Information

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 Simplified application.

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
- Exhibits – shows all pro forma applications, agreements, terms and conditions, and Schedule Z

DG Tariff – Section 2

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

- 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. *** *A Pre-Application Report Form (PAR) is optional for projects under 500 kW*. ***

  - 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, Witness Test (in extenuating circumstances))
  - 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
- 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 names, phone numbers and 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 (***Landowner***) of the property/land.

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 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 will likely need to be completed before the DG application can be reviewed or completed.
  - Also, for Simplified applications, the service work and regular meter will need to be installed and the account established before a net meter can be ordered.
- When System Modifications are required for a Simplified Application, the construction must be completed before approval to install is granted.

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.

Simplified

Interconnection Information

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.
  - 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 Spot and Area Network Application

- APPLIES TO:
  - Simplified Spot Network Process: listed inverter based system 1/15th of electric customer's **MINIMUM** load.
  - Simplified Area Network Process: listed inverter based system 15.0 kW or less and 1/15th of electric customer's **MINIMUM** load.
  - A study should be expected to determine minimum load.
  - If your project does not meet these requirements, you will need to submit a Standard Application.
  - 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 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 unless you are replacing the inverter with the same exact make, model and size inverter. Contact the Company to verify this.
- 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.

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. Signature must be a wet signature. Docusign is not accepted.
  - 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
  - If necessary, identify ownership of property and provide proof of site control if Customer and/or Interconnecting Customer does not own the property.
- 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.

Contact Information: Date Prepared: _____

Legal Name and address of Interconnecting Customer

Interconnecting Customer (print): _____Contact Person: _____

Mailing Address: _____

City: _____State: _____ Zip Code: _____

Telephone (Daytime): _____ (Evening): _____

Facsimile Number: _____ E-Mail Address: _____

Customer name (if Customer is not Interconnecting Customer) _____

Customer email: _____ Customer telephone: _____

Customer Mailing Address: _____

City: _____State: _____ Zip Code: _____

Landowner name (if neither Interconnecting Customer nor Customer)

_____

Landowner email: _____Landowner telephone: _____

Landowner Mailing Address:

_____

City: _____State: _____ Zip Code: _____

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

Name: _____

Mailing Address: _____

City: _____State: _____ Zip Code: _____

Telephone (Daytime): _____ (Evening): _____

Facsimile Number: _____ E-Mail Address: _____

Electrical Contractor Contact Information (if appropriate):

Name: _____ Telephone: _____

Mailing Address: _____

City: _____State: _____ Zip Code: _____

Ownership Information (include % ownership by any electric utility): _____

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 _____ No _____

Facility Information:

Address of Facility: _____

City: _____State: _____ Zip Code: _____

Electric Distribution Company: _____

Account Number: _____

Meter Number: _____

Inverter Manufacturer: _____
Model Name and Number: _____ Quantity: _____

Single __ or Three __ Phase

AC Rating:	Nominal:	_____ (kW) _____ (kVA) _____ (AC Volts)
	Maximum:	_____ (kW) _____ (kVA) _____ (AC Volts)
System Design Capacity:	Nominal	_____ (kW) _____ (kVA)
	Maximum	_____ (kW) _____ (kVA)

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

Prime Mover: ☐Photovoltaic ☐Reciprocating Engine ☐Fuel Cell ☐Turbine
Other _____

Energy Source: ☐Solar ☐ Wind ☐ Hydro ☐ Diesel ☐ Natural Gas ☐Fuel Oil
Other _____

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

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): _____

Estimated Install Date: _____ Estimated In-Service Date: _____

Interconnecting Customer Signature:

I hereby certify that, to the best of my knowledge, all of the information provided in this application is true and I agree to the Terms and Conditions for Simplified Process Interconnections attached hereto and included in Exhibit A of the Company's Standards for Interconnection of Distributed Generation in effect from time to time:

Interconnecting Customer Signature: _____ Title: _____ Date: _____

Please attach any documentation provided by the inverter manufacturer describing the inverter's UL 1741 listing.

Approval to Install Facility (For Company use only)

Installation of the Facility is approved contingent upon the terms and conditions of this Agreement, and agreement to any system modifications, if required
(Are system modifications required? Yes____ No____ To be Determined ____):

Company Signature: _____ Title: _____ Date: _____

Application ID number: _____

Company waives inspection/Witness Test? Yes____ No____

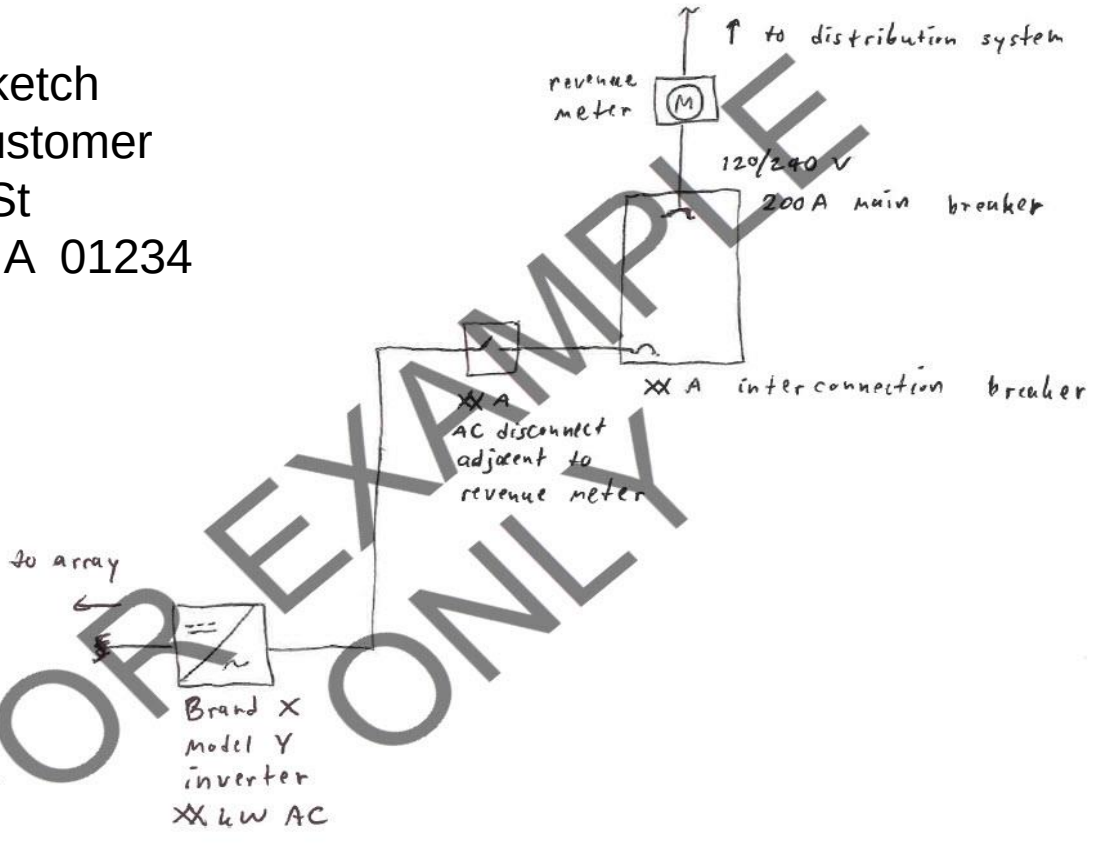
Simplified Requirements

Submit an electrical sketch with application:

- DOES NOT 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, kW rating, Customer name, address of facility, Inverter(s) and existing and back up generation (if applicable).
- Clearly label any transfer switches “open transition” or “closed transition”.
- 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

Electrical Sketch
Example Customer
0 Example St
Nowhere, MA 01234



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.
- 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).
- All new construction and changes to existing services must meet our New Service and Meter Department requirements.

Service Configuration

Line side tap will NOT require a service upgrade (self contained meter only) if rating of tap is less than existing service size and:

- 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.
- Tap exceeds rating of existing service.

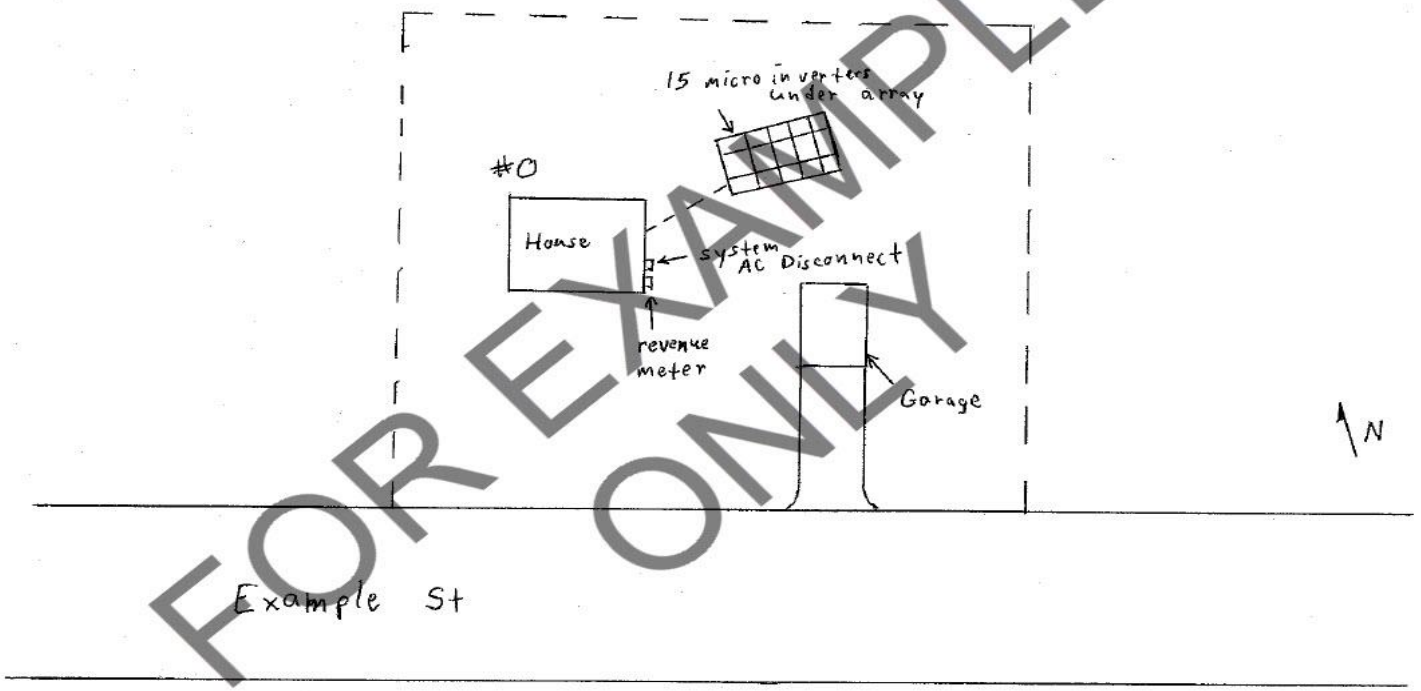
Site Plan

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.
- Can be hand drawn but must be legible.
- Does not need to be PE Stamped.
- Must be a plan form view i.e. vertical NOT “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

Site Plan
Example Customer
0 Example St
Nowhere, MA 01234



Technical Issues – Metering, Disconnection

- 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
- AC Disconnect switch must be located within 10 feet and visible sight of revenue meter.
- Disconnect switches are required for all generation facilities.
- EM DG and WM DG are working to align our technical requirements.

Supplemental Review

- If additional time is required to review your application for technical reasons, the application will be designated Simplified + 5 Days
- 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 Expedited/Standard Process.)

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 (Exhibit I), 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.

Simplified Process Tips

- Submit application to correct Eversource office well in advance of when 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 2, 2016 to allow for review and the scheduling of the installation of the revenue meter.

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