



Distribution-Connected Generation Guidance

Reliability Committee Presentation

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Objective

- Provide guidance regarding the procedural and technical requirements for new Distribution-Connected Generation seeking to participate in ISO New England markets and processes
- Caveat: This presentation is not intended to provide an exhaustive description of every procedural and technical requirement for every interconnection circumstance
 - References are provided in the appendix for further guidance



What is a Distribution-Connected Generator?

- For the purpose of this presentation, a Distribution-Connected Generator is a small generator that is proposing to interconnect to Distribution Facilities
 - Distribution Facilities are:
 - Low-voltage electric power lines (typically < 69 kV); and
 - Can be either FERC jurisdictional or state jurisdictional



TARIFF REQUIREMENTS



What are FERC Jurisdictional Distribution Facilities? What are State Jurisdictional Distribution Facilities?

FERC Jurisdictional Facilities

FERC jurisdictional Distribution Facilities are Distribution Facilities that are being used for FERC jurisdictional purposes (i.e., to facilitate sales of electricity at wholesale) and are subject to the ISO Tariff.

State Jurisdictional Facilities

State jurisdictional Distribution Facilities are Distribution Facilities that are not being used for FERC jurisdictional purposes (i.e., to facilitate sales of electricity at wholesale).



A Distribution-Connected Generator developer should contact the ISO or the owner of the Distribution Facilities to determine whether the facilities are state or FERC jurisdictional. The Distribution Company and the ISO will coordinate the identification of Jurisdiction – as necessary.

What interconnection process does a new Distribution-Connected Generator follow?

- The status of the distribution facility at the time of the interconnection request is a factor in determining which interconnection process applies
- A developer proposing to interconnect a Distribution-Connected Generator to a:
 - State jurisdictional Distribution Facility needs to follow the associated state interconnection process
 - FERC jurisdictional Distribution Facility needs to follow the ISO interconnection process under Schedule 22 or 23 of the OATT, as applicable



The state interconnection process will apply if a Distributed-Connected Generator is interconnecting to a FERC jurisdictional facility and the project will:

- **Produce energy to be consumed only on the retail customer's site,**
- **Not sell its energy into the ISO markets, or**
- **Sell 100% of its output as a Qualifying Facility to the interconnecting utility**

What interconnection process applies to a generator that is being modified?

- A Distribution-Connected Generator that was interconnected under the state interconnections process and is now being modified needs to follow the state interconnection process if the Distribution Facility to which it is connected is still state jurisdictional
 - Otherwise, they would need to follow the ISO interconnection process under Schedule 22 or 23 of the OATT
- A Distribution-Connected Generator that was interconnected under the FERC interconnection process and is now being modified needs to follow the ISO interconnection process under Schedule 22 or 23 of the OATT
 - A request to participate in the ISO markets for an existing behind-the-meter generator may trigger the ISO interconnection process



To Whom do I apply?

If subject to the ISO interconnection process

Interconnections that are subject to the ISO's interconnection process are administered in accordance with Schedules 22 and 23 of the OATT

- Interconnection request forms are available electronically in the Interconnection Request Tracking Tool (IRTT), which is located on the ISO Website
 - A requestor must create an account in IRTT in order to gain access
- Interconnection requests are completed within and submitted to the ISO using the IRTT

If subject to the state interconnection process

State jurisdictional interconnection applications are available from the Distribution Company/owner of the state jurisdictional Distribution Facility

- Completed applications are to be submitted to the Distribution Company/owner of the state jurisdictional Distribution Facilities



What type of Interconnection Service may be requested under Schedules 22 and 23?

- There are two levels of Interconnection Service available under Schedules 22 and 23:
 - Network Resource Interconnection Service (energy); and
 - Capacity Network Resource Interconnection Service (energy and capacity)
- All Distribution-Connected Generators that interconnect under Schedules 22 and 23 are eligible to participate in the ISO markets
- Depending on the purpose of the interconnection, a Distribution-Connected Generator that interconnected under state interconnection procedures may be eligible to participate in the ISO markets
 - E.g., a generator interconnected behind the meter or for retail consumption does not have the interconnection rights to put power onto the grid



Best Practices – Coordination of Requests Between Distribution Company and ISO



- The Distribution Company should notify the ISO of Distribution-Connected Generators that are 5 MW or greater that are interconnecting to state jurisdictional Distribution Facilities
 - ISO will list these generators in the “Non-FERC” jurisdictional part of the Queue for transparency
- The Distribution Company should include the ISO on the interconnection study team as an Affected Party for any Distribution-Connected Generator interconnection request that is expected to have impacts on the Regional Transmission System
- Interconnection requests should be monitored by the Distribution Company, the Transmission Company and the ISO to determine when the aggregate impacts of additional Distribution-Connected Generators may be significant enough to trigger additional levels of study



Proposed Plan Approval (I.3.9)

- In addition to an interconnection request submittal, a new Distribution-Connected Generator or a modification to an existing Distribution-Connected Generator resulting in an increase or a change in its operating characteristics may need to submit a Proposed Plan Application pursuant to Section I.3.9 of the Tariff
 - This is true regardless of the jurisdiction of the interconnection process
 - If the Generator Owner is not a Market Participant, the interconnecting Transmission Owner will submit on the generator's behalf
- Distribution-Connected Generators that are 1 MW to less than 5 MW may only require a less than 5 MW Notification Form
- Distribution-Connected Generators that are less than 1 MW do not have an I.3.9 requirement

MARKET PARTICIPATION



Criteria to Determine Registration Choice

- Distribution-Connected Generators that are:
 - 5 MW or greater, in aggregate, or propose to interconnect at 115 kV or greater need to register with ISO as a modeled generator
 - 1 MW to less than 5 MW, in aggregate, and propose to interconnect below 115 kV may choose to register with ISO as either a modeled generator or a settlement-only generator, or may choose to operate as a load reducer
 - less than 1 MW, in aggregate, and propose to interconnect below 115 kV can either register with ISO as a settlement-only generator, or choose to operate as a load reducer
- An aggregate of 5 MW or greater connecting to the same feeder may be required to register as a modeled generator if participating in the ISO markets



Incorporation in the ISO Market Model

- The ISO power system model is updated and released 3 times each year, typically in January, May and September
 - A Distribution-Connected Generator that intends or is required to be a modeled generator must plan accordingly and allow for at least one year's time prior to the Commercial Operation Date in order to complete the ISO Asset Registration process
 - Such resources will not be recognized by ISO until they are included in the ISO-NE power system model update and have completed the Asset Registration process



Asset Registration – PURPA/Qualifying Facility

- A request to interconnect a Qualifying Facility (as defined by the Public Utility Regulatory Policies Act, as amended by the Energy Policy Act of 2005 and the regulations thereto), where the intent of the Qualifying Facility's owner is to sell 100% of the Qualifying Facility's output to its interconnected electric utility is subject to the applicable state tariff
- A Qualified Facility selling 100% of its output to the host utility does not register in the wholesale markets, but may operate as a load reducer
- If the host utility wishes to register the Qualifying Facility in the wholesale market, the host utility, as the representative of the unit, must meet all ISO-NE registration, modeling and operating requirements



TECHNICAL REQUIREMENTS



Interconnection Study Requirements

- Distribution-Connected Generators that are 5 MW or greater that are interconnecting under the ISO interconnection process will likely require a study pursuant to Planning Procedure 5-6 to support the Proposed Plan Application
 - Review of thermal, voltage and short-circuit impacts
 - Verification of stability model and potential stability testing



Technical Requirements for Registered Generators

- ISO New England Operating Procedure 14 (OP-14) identifies many of the requirements that help to ensure the reliable and efficient operation of market resources
 - Requirements are identified in the areas of: telemetering and revenue metering, designated entity performance, communication and control, emergency operations and dispatch considerations
- OP-14 also contains requirements that must be identified and tested during the interconnection process for new generators
 - Voltage Control (all registered Generators)
 - Maintain an Automatic Voltage Regulator
 - Governor Control (Generators > 10 MW)
 - Maintain a functioning governor meeting certain technical requirements

IEEE 1547 Standard

- This standard establishes criteria and requirements for interconnection of distributed energy resources (DER) with electric power systems (EPS) and associated interfaces
- Currently being revised to incorporate capabilities that are essential to the maintenance of Bulk Electric System Reliability
 - Low and high voltage ride-through
 - Low and high frequency ride-through
 - Voltage control
 - Frequency response
- Once the new IEEE 1547 standard is in place, the ISO believes that it is essential that Distribution-Connected Generation be interconnected consistent with the new standard
- The new IEEE 1547 Standard is expected to be approved by the end of 2017

Waivers of OP-14 Requirements

- If a waiver of an OP-14 voltage or frequency requirement is needed due to Transmission Owner/Distribution Company practices, the Interconnect Customer needs to create an “Ask ISO” ticket with project details and supporting documentation for the exemption
 - The adoption of the new IEEE 1547 Standard will remove the need for waivers from the performance requirements



Dynamic Data Management System Requirements

- Distribution-Connected Generators that are to be modeled in the ISO power system model (typically > 5MW) must submit data and models into the Dynamic Data Management System (DDMS)
 - For generators subject to the ISO interconnection process, the DDMS submission should be made after the completion of the System Impact Study and after the results meeting has been held
 - For generators subject to the state or local interconnection process, the DDMS submission should be made with the assistance of the host utility, after the generator has received Proposed Plan Application approval under Section I.3.9 of the ISO-NE Tariff
- After the required data and models have been submitted into the DDMS, they will be reviewed and tested by the ISO



CONCLUSION AND SUMMARY



Conclusion

- Several factors will determine the procedural and technical requirements for new Distribution-Connected Generation that participate in ISO New England markets and processes
- The location and status of the distribution circuit to which the resource connects will determine whether the interconnection process will be conducted by the ISO or by the local distribution utility
- The jurisdiction of the interconnection process will also be affected by whether the proposed generator will be a Qualified Facility under the Public Utility Regulatory Policies Act (PURPA)
- The size of the proposed generator will determine the nature of any Proposed Plan Application approval that would be required under Section I.3.9 of the Tariff
- The technical performance requirements for the generator will be determined by the project size and location, by ISO market participation and by factors such as the applicability of interconnection standards such as the IEEE 1547 standard



Summary Table

| Proposed Connection | Interconnection Process Jurisdiction | ISO Tariff Section 1.3.9 Requirements | ISO Market Asset Registration | Technical Performance Requirements |
|---|--|---|--|---|
| Connecting to Transmission (except, e.g., the case of a Qualifying Facility that will sell 100% of its output to the host utility) | ISO New England | Section 1.3.9 requirements apply in all circumstances | If register as a generator, required to Participate in ISO New England markets | ISO New England Interconnection Procedure Requirements, and, ISO Operating Procedure-14 Requirements if Participating in ISO Markets, and, local technical requirements |
| Connecting to FERC Jurisdictional Distribution (where no exceptions apply) | ISO New England | | | |
| Connecting to Non-FERC Jurisdictional Distribution | Local Distribution Company | | | ISO Operating Procedure -14 Requirements if Participating in ISO Markets, and, local technical requirements |
| Connecting to FERC Jurisdictional Distribution where certain exceptions apply (Or a Transmission-Connected Qualifying Facility that will sell 100% of its output to the host utility) | Local Distribution Company or Transmission Owner | | | |

APPENDIX



Helpful References

| Reference Document | Description of Document |
|--|--|
| Manual M-RPA | Registration and Performance Auditing |
| ISO Operating Procedures 14 | Technical Requirements for Generators, Demand Resources and Asset Related Demand |
| ISO Operating Procedures 18 | Metering and Telemetry Criteria |
| New Generator Checklist | Actions needed for a generator to go Commercial |
| Dynamics Data Management System (DDMS) | A user interface for owners of certain power grid equipment, such as generators, dynamic reactive power devices, HVDC facilities, and special protection systems to submit required data related to their equipment |



Helpful References - continued

| Reference Document | Description of Document |
|---|---|
| <u>Planning Procedure 5-1</u> | Procedure for Review of Governance Participant's Proposed Plans |
| <u>Planning Procedure 5-6</u> | Scope of Study for System Impact Studies Under the Generation Interconnection Procedures |
| <u>Schedule 22</u> | Large Generator Interconnection Procedures (Greater than 20 MW) |
| <u>Schedule 23</u> | Small Generator Interconnection Procedures (20 MW or smaller) |
| <u>FERC Order 2003</u> | Standardization of Generator Interconnection Agreements and Procedures |
| <u>FERC Order 2006</u> | Standardization of Small Generator Interconnection Agreements and Procedures |
| <u>FERC Order 792</u> | Small Generator Interconnection Agreements and Procedures (Pre-application reports and storage) |

Questions

