

Interconnection to the Electric System

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Overview

- What is meant by interconnection?
- FERC vs. state jurisdiction for *interconnection* (siting/licensing is a separate jurisdictional determination)
- State process
 - Net metering (Public Service Board Rule 5.100)
 - Public Service Board Rule 5.500
 - PSB rules at <http://www.state.vt.us/psb/rules/rules.stm>
 - 30 V.S.A. Section 248?
- FERC/ISO-NE process

What is Meant By Interconnection?

- The physical connection of the electric generation facility to the electric system
- The process for reviewing the potential impacts to the electric system that would result from connecting a specific generation facility to the electric system at a specific location.
 - ensure that the interconnection of the generation facility will not adversely affect system stability or reliability
 - identify additional equipment, and the cost of the equipment, that would be needed for interconnection (paid for by the project developer)

Net Metering – Up to 150 kW

- The Vermont Public Service Board (PSB) is in process of revising its net metering rule (Rule 5.100) to include hydroelectric. This rule is not yet final, and will be covered in more detail later by Gregg Faber.
- “**5.109 Interconnection Requirements**
Net metering facilities shall be installed and operated in accordance with Appendix A, the Net Metering Technical Specifications (Tables 1 through 5).”

Net Metering Technical Specifications

- Generally include (but are not limited to):
 - Power factor correction
 - Harmonic distortion and voltage flicker
 - Disconnect switch
 - Fault protection
 - Step-up transformer configuration
 - Anti-islanding functions
 - Undervoltage /overvoltage
 - Underfrequency/overfrequency
 - Overcurrent
 - Synchronization

Non-Net Metered Projects

- If project above 150 kW or if choose not to net meter.
- Use PSB Rule 5.500 interconnection process if only sell power to interconnecting utility.
- Use FERC/ISO-NE interconnection process if sell power to a third party (i.e., sale subject to an open-access transmission tariff).

PSB Rule 5.500 Process

- Application fee of \$300
- Fast-track review
 - If meet all 13 fast track criteria, interconnection approved by utility. Typically no additional cost to developer.
- If project does not meet all fast-track criteria:
 - Feasibility study (feasibility of interconnection)
 - System Impact Study (impacts of interconnection)
 - Facilities Study (facilities needed to avoid impacts)
 - All studies may not be required; studies may be combined.
 - Project developer pays for all studies and facilities.
- Between utility and project developer only
 - PSB only involved if dispute arises
- After interconnection approved, utility and project developer develop Interconnection Agreement, and Technical Specifications and Operator Protocols

Type of Line

- Typically, projects of 250 kW or less should be able to interconnect with distribution lines (as opposed to transmission lines).
- Cow Power projects 275 – 500 kW have interconnected with three-phase distribution lines.
- One 200 kW Cow Power project proposes to interconnect to a single-phase distribution line.
- Highly project-specific
 - Size and type of generator
 - Characteristics of distribution line (number of phases, existing load, existing generation)
 - Location of interconnection point on the line (i.e., distance from the substation)

State Review of Interconnection

- PSB is currently in the process of clarifying its jurisdiction to review the interconnection of hydroelectric projects under the situation that:
 - 30 V.S.A. Section 248 entirely pre-empted by FERC licensing, and
 - Interconnection proceeds under PSB Rule 5.500 (a PSB process, but just between project developer and utility).
- This PSB review would be to ensure no adverse impact to electric system stability and reliability due to the interconnection of the hydroelectric facility.

FERC/ISO-NE Process

- ISO-NE administers the FERC process
 - FERC Order 2006
 - ISO-NE Schedule 23
- ISO-NE process *very* similar to PSB Rule 5.500 process
 - Rule 5.500 modeled after Schedule 23 to provide consistency