

The VELCO logo is displayed in a bold, white, sans-serif font. It is positioned in the upper left corner of the slide, set against a background image of a Vermont landscape with rolling hills and power lines.

VERMONT'S TRANSMISSION RELIABILITY RESOURCE

# Interconnecting Wind Generation in Northern Vermont

VELCO Operating Committee  
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# Overview of the Interconnection Process

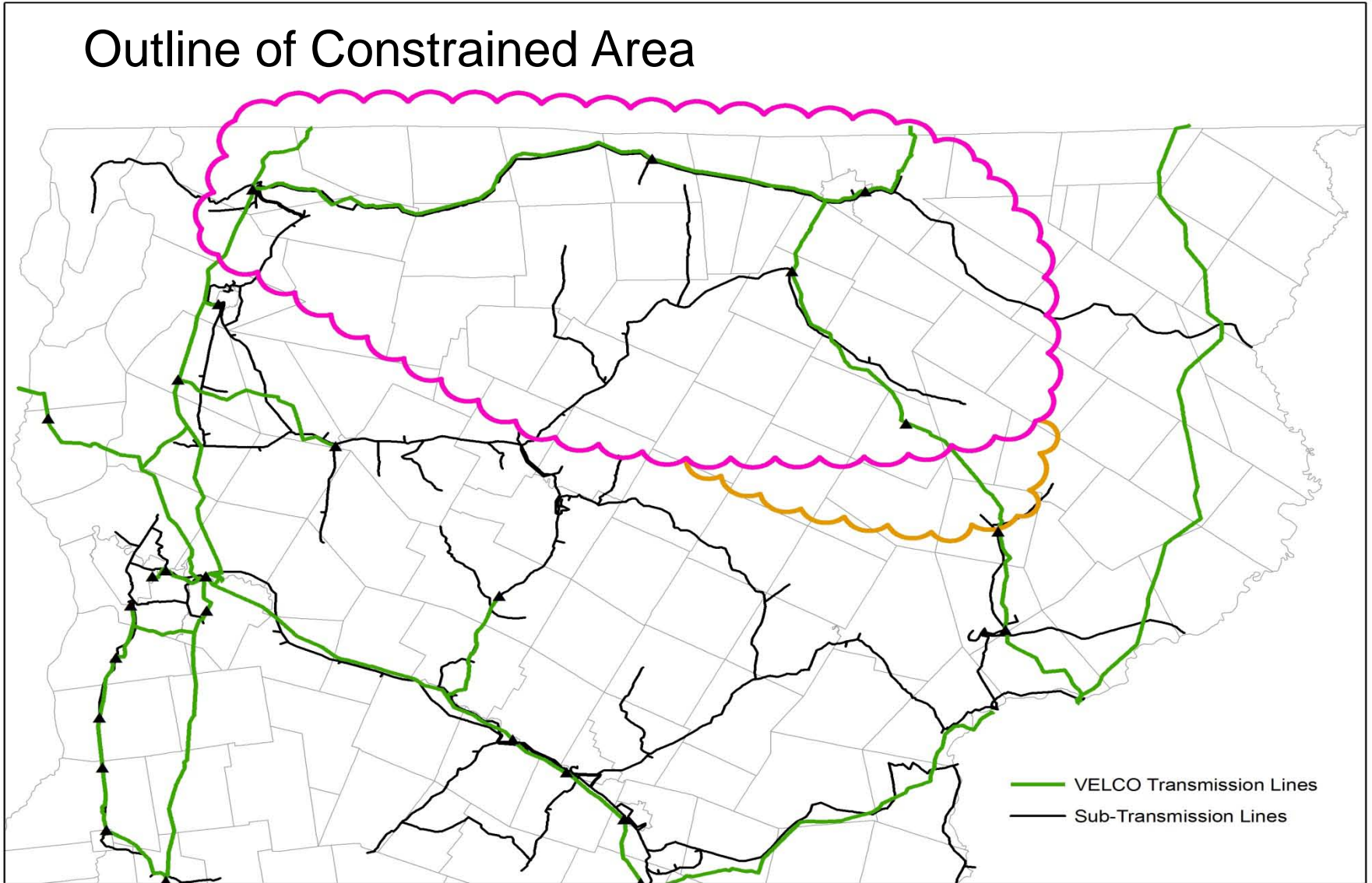
- All Generators (> 5 MW) required to follow ISO-NE's Large Generator Facility Interconnection Process to get connected to NE's transmission system
- The interconnection process ensures that the reliability and stability of the New England transmission system is not compromised by the interconnection of new generation (i.e., no significant adverse impact on system reliability)
  - Interconnection may require system upgrades and/or result in generation restrictions
- Generator submits Interconnection Request to ISO-NE specifying generator characteristics; location, and type of interconnection
- Most new generators pursue connection via Minimum Interconnection Standard ("MIS")
  - MIS does not:
    - Allow the generator to be counted as a capacity resource
    - compromise the reliability, operability or stability of the transmission system
    - guarantee the generator unrestricted operation
  - Results in lower interconnecting costs

# Overview of the Interconnection Process

- Process includes several, sequential studies:
  - **Feasibility Study:** high level assessment of grid reliability impacts and grid reinforcements required to maintain reliability
  - **System Impact Study (SIS):** detailed analysis of generator's impact on grid reliability and steps upgrades needed to mitigate impacts
  - **Facilities Study:** An optional study that identifies the design details of the specific facilities that need to be constructed to interconnect the generator
  - **Interconnection Study:** An optional study following the SIS that evaluates a project's impact on the system in relation to other system factors such as transmission line status and other generators. Additional evaluation of stability, power flow, voltage impacts and system protection issues
- Interconnection Agreement documents the grid reinforcements to be paid by applicant, the schedule for their completion and the operational requirements for the generator

# Northern Vermont Transmission System

## Outline of Constrained Area



# Northern Vermont Transmission System

- Area is served by 115 & 46 kV transmission lines; serves relatively small amount of load ~ 75 MW summer peak
  - System designed to serve this load-- “a skinny system”--
- Installation 140+ MW of new generation in last five years
  - System still reliable yet now exports power to other parts of Vermont/New England
- There is an export limit that varies based on a number of system parameters (e.g., voltage levels, reactive power requirements, etc.)
  - The system occasionally reaches this limit (aka system is constrained)
  - To preserve reliability generators in northern Vermont have been curtailed
- In constrained areas (i.e., areas where transmission system cannot export all available generation), generation will compete for market access based on bid price; equal priced units will be curtailed on a pro rata basis and other market rules

# Potential Impact of Additional Generation in Northern Vermont

- New generation will be connected under Minimum Interconnection Standard requirements unless the generator requests a more robust interconnection
- Grid reinforcements required to interconnect new generation will maintain reliability and stability of the transmission system
- It is unlikely that these reinforcements will materially increase the export capacity in northern Vermont
- If the export capacity does not increase and more generation is added then additional curtailment of all generation in northern Vermont is likely
- Potential exists for significant adverse financial impact for existing and new generators in northern Vermont
- ISO will develop operating protocols to minimize curtailments
- Long Term Solutions:
  - Site generation in more advantageous locations in Vermont
  - Reinforce the transmission/subtransmission system to facilitate increased exports
  - Align public policy goals (e.g., RPS targets) with transmission pricing policy to realize public benefits