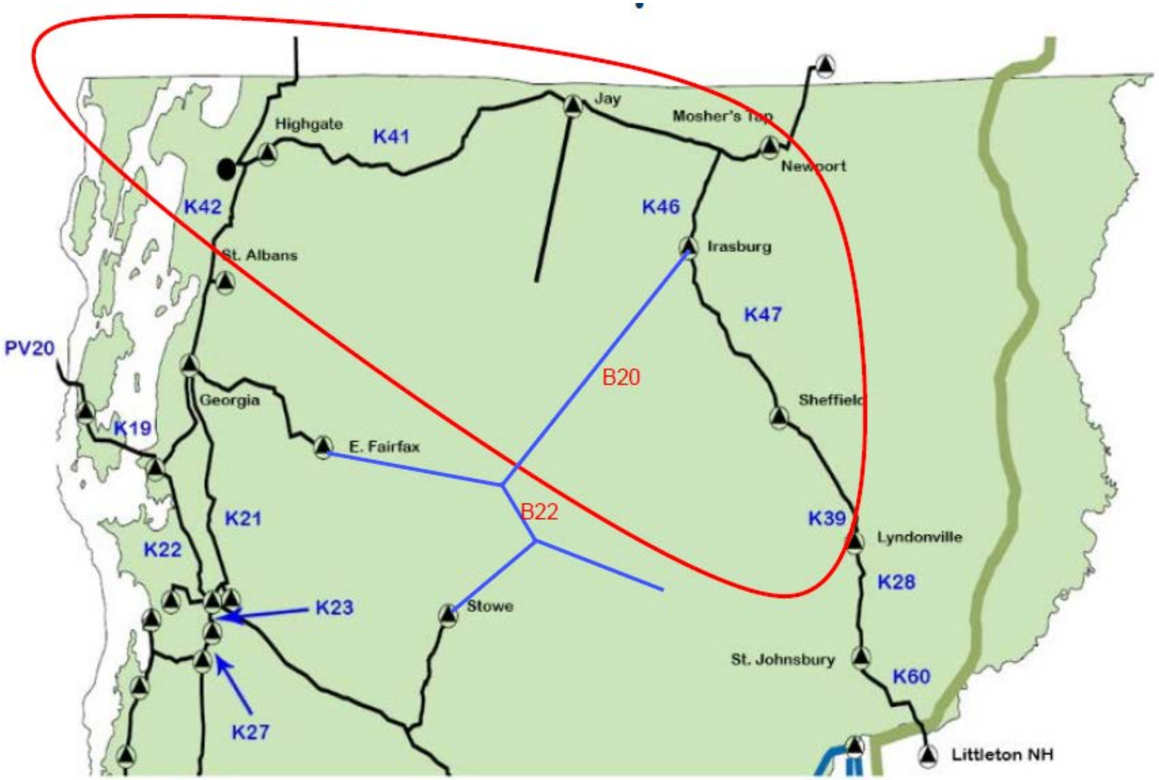
Sheffield-Highgate Export Interface

SHEI

Senate Finance Committee
February 23, 2018

vermont electric power company
VELCO

How did we get here?



- Generation has grown over the last few years
- Sheffield-Highgate Export Interface created in 2013 by ISO New England to ensure system can handle limiting transmission line outage
- Two types of interface limits: *voltage* and *thermal*
  - SHEI limit is currently based on a voltage constraint, i.e., a voltage limit
  - Thermal limit is presently slightly less restrictive than voltage limit in summer; much less restrictive in winter
- Limits are predetermined by ISO-NE off-line analyses
- Limits vary automatically in real time based on actual system conditions, such as load, generation, equipment status
- ISO-NE keeps interface flows below the limits by managing generation outputs through *Do-Not-Exceed (DNE)* signals to individual generators that participate in ISO-NE markets

Flow over SHEI equals total generation minus total load
With due regard to equipment status and negative effects of some generators

- Total load is between 20 MW and 60 MW
  - Average load is 35 MW
- Total generation is 430 MW (all at maximum potential output)
  - Including Highgate 225 MW HVdc converter—largest resource within SHEI
    - Highgate typically runs at maximum capacity almost 24 hours a day

Generation dispatchable by ISO-NE		Generation not dispatchable by ISO-NE	
Utility-scale wind	105 MW	Landfill methane	8 MW
Utility-scale hydro	35 MW	Total solar PV (small & large)	11 MW
Utility-scale thermal (rarely runs)	45 MW	Other standard offer (hydro, farm methane)	3 MW

- Higher SHEI generation from October to May
  - Spring season is more challenging due to higher hydro and lower loads
    - Growing energy efficiency and behind-the-meter/non-dispatchable generation aggravating constraints

SHEI is not a load-serving reliability problem eligible for regional pool transmission funding support

- System concerns can be prevented by backing down generation based on economics and other market rules
- Solutions not eligible for traditional regional cost sharing
- Initial transmission upgrades or non-transmission options could mitigate most *current* SHEI congestion (current generation sources loads)
  - Reactive devices; operational ambient-based ratings; B-20 line upgrade; energy storage
- Robust, long-term solutions that support 90% renewable by 2050 energy vision will be complex and could lead to costly reinforcements and other strategies
  - New transmission lines; new tools (e.g., storage, demand management, strategic electrification); hybrid solutions
- Collective problem that will require multiple stakeholders' engagement

SHEI information posted on VSPC website—public

- July 12, 2017 — SHEI study kickoff and information sharing
  https://www.vermontspc.com/grid-planning/shei-info
  https://www.vermontspc.com/library/document/download/5810/20170712_SHEI_Preso_MtgVersion.pdf
- September 1, 2017 — study update
  https://www.vermontspc.com/library/document/download/5894/SHEI%20Study%20SeptemberUpdate.pdf
- September 11, 2017 — study update makeup session
  https://www.vermontspc.com/library/document/download/5894/SHEI%20Study%20SeptemberUpdate.pdf
- October 18, 2017 — final study update
  https://www.vermontspc.com/library/document/download/5894/SHEI%20Study%20SeptemberUpdate.pdf
- Other information also available at
  https://www.vermontspc.com/grid-planning/shei-info

Sheffield-Highgate Export Interface study summary

- Hired EIG to study 17 options and 45 combinations, including…
  - Reactive power support, subtransmission and transmission upgrades, and energy storage
- Used VSPC framework to facilitate an open discussion of concerns and solutions
- Key results
  - Logical to address voltage concerns first (B20/B22, SC, AVR)
  - K42 line could be key for relieving thermal concerns
    - Implement ambient-based ratings (static or dynamic)
    - Reconductor as part of asset condition project
- Tensions
  - Short-term and quick solution versus long-term solution with implementation challenges
  - There is not a pre-established mechanism for the cost allocation of economic upgrades
  - Concern over follow on projects benefitting from the solutions
- Stakeholders will select preferred option(s)
- VELCO will provide support as needed

What’s next?

- Cost estimates are under development
- Additional analysis underway by affected distribution utilities
- Solution selection by year end
- Continuing public information through VSPC and VSPC website