

2021 Long-Range Transmission Plan Update



Vermont System Planning
Committee
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Agenda

- Long-Range Transmission Plan Summary
- Utility Scale Storage Hosting Capacity
- Burlington Net Zero Energy Plan
- Generation Retirement
- Time Series Power Flow

Long-Range Transmission Plan Summary

- Load growth due to EVs and heat pumps (no growth within ten years in the 2015 and 2018 plans)
 - High growth will require load management to avoid transmission
- No load related transmission deficiencies in first 10 years
- Diversity necessary to support continued solar PV growth
 - Storage
 - Grid upgrades
 - Curtailment
 - Grid support from inverters
 - Load management
 - Statewide coordinated planning
- Vermont will continue to depend on transmission
- Collaboration and innovation needed to achieve renewable goals

Utility Scale Storage Hosting Capacity

- Storage located at each of VELCO substations
- Simulates broad effects of storage
 - Consideration of charging and discharging
 - Consideration of proximity to load/generation pockets

Note: This analysis examined batteries charging/discharging at the most likely time frames (i.e. high gen, or high load). There was no analysis completed to examine impacts away from a daily peak in load or generation.

Resulting Takeaways

- Location matters for large scale storage
 - Poor siting could exacerbate existing constraints
 - Should be sited close to source of generation or load causing constraints
- High generation and low load scenario is most limiting
 - Even with excessive generation, storage unit could exacerbate issues when located on the wrong side of a constraint
- VELCO must maintain system reliability
 - A poorly sited storage project may become uneconomical when necessarily curtailed during specific times for the purpose of maintaining reliability

Burlington Net Zero Energy Plan

- Summary of plan
 - Source entire energy supply from renewables (including heating and transportation)
 - Utilize electrification and alternate fuels
 - Scenarios include completion by 2030 and 2040
- Winter peak load impact
 - 2040 scenario peak loads comparable to LRTP (no problems observed)
 - 2030 scenario peak loads exceed LRTP forecasts
 - NZE Plan assumes peak will occur at 11 pm, in contrast to LRTP assumption of 6 pm
 - Implications for peak load management programs

Generation Retirement

- Assess impact of retirement of thermal units
 - Older diesel and oil peaking units
 - Could be retired due to age and/or economics
 - Same assumptions and scenarios of base analysis
- Present usage of units
 - Called on by ISO-NE during capacity events or other high demand periods
 - Dispatched by Vermont system operators
 - Provide source of power during planned facility outages
 - Prevent adverse impacts of contingencies under stressed conditions

Generation Retirement (cont.)

- Additional and accelerated impacts pre-2030
 - Subtransmission
 - Several Montpelier area thermal and voltage issues
 - Burlington area thermal issue
 - Transmission
 - Multiple transformer thermal issues
 - Multiple transmission line thermal issues

Time Series Power Flow - Description

- First of its kind for transmission
 - Provides counter-factual look at system across time
 - Performs 8760 offline power flow simulations
 - Close collaboration with UVM and EGA for 3+ years
- Relies on historical weather and load data
 - 3 km weather granularity for renewable generators
 - Presently based on 2017 data
- Expanding capabilities
 - Vary load and generation hour to hour
 - Frequency and duration of issues for contingencies
 - Plan to incorporate load management

Time Series Power Flow - Inputs

- 2030 expected forecast peaks
 - 1072 MW summer
 - 1180 MW winter
- 950 MW of behind-the-meter solar PV
 - Same geographical solar distribution as today
- Tie flows regulated
 - F206 to NH: 0 to 200 MW
 - PV20 to NY: 0 to 120 MW
 - K7 to NY: -35 to 35 MW

Time Series Power Flow - Results

- Annual and daily peak remains after dark
 - 8 pm in summer, 6 pm in winter
 - Some daily spring peaks in morning, same as today
- Continued dependence on transmission
 - Import up to 1025 MW
 - Export up to 325 MW
- Subtransmission low voltage

Location	Total hrs.	# of events	Avg. duration	Max duration
Stowe	4743	679	7	96
Morrisville	3614	746	5	96
Blissville	1477	434	3.5	11
Websterville	144	56	2.5	6

Time Series Power Flow - Results (cont.)

- Subtransmission thermal overloads

Location	Total hrs.	# of events	Avg. duration	Max duration
McNeil – McNeil Tap	691	70	10	17
E. Arlington – Manchester	423	98	4.5	16
Websterville – S. Barre	402	145	3	8
Maple Ave – Charlestown	394	76	5	11
Mountainview – Berlin	313	124	2.5	7

- Transmission/transformer thermal overloads

Location	Total hrs.	# of events	Avg. duration	Max duration
Sand Bar – Essex	128	70	2	7
Vernon Road Transformer	16	16	2.5	4