



**ANNUAL REPORT
TO THE PUBLIC UTILITIES COMMISSION &
PUBLIC SERVICE DEPARTMENT**

January 29, 2018

INTRODUCTION

In accordance with the Memorandum of Understanding (MOU) approved by the Public Utilities Commission (PUC or Commission) in Docket 7081 as amended¹, this document comprises the annual report of the Vermont System Planning Committee (VSPC) detailing activities undertaken in 2017.

Among its provisions, the Docket 7081 MOU requires that the VSPC provide a report to the PUC and Public Service Department (PSD) by February 15 of each year and post that report on the VSPC website. The report must consist of at least the following:

89. A report on each Reliability Deficiency identified to date in the [Long-Range Transmission] Plan or through the process described in Steps 1 through 6, above [sic], including:
 - i. The status of NTA [Non-Transmission Alternative] Analysis for the Reliability Deficiency.
 - ii. The status of decision-making on the selection of alternative(s) to address the Reliability Deficiency.
 - iii. The status of decision-making on the allocation of costs of the alternative to address the Reliability Deficiency.
 - iv. The strategy chosen for implementing the alternative selected to address the Reliability Deficiency.

¹ Investigation into Least-Cost Integrated Resource Planning for Vermont Electric Power Company, Inc.'s Transmission System. Amended 1/30/2012, 8/1/2012 & 11/6/2013.

- v. The status of implementation of the alternative(s) to address the Reliability Deficiency.
 - vi. All documentation pursuant to paragraph 86, above, relating to advisory votes within the preceding calendar year.²
90. A statement of the dates and locations of all VSPC meetings held during the preceding year.³

In 2014, the Commission approved a recommendation by the VSPC, designed to harmonize reporting procedures, that the VSPC annual report incorporate annual utility updates on areas that have been approved for energy efficiency geographical targeting.⁴ At this time, no area of the state is approved for energy efficiency geographic targeting so no such annual utility updates are provided for the current year.

This document comprises the VSPC annual report on the status of transmission and non-transmission analysis, solution selection, cost allocation, and implementation planning of all identified reliability deficiencies as defined by the MOU, as well as the meetings and organizational work of the VSPC during 2017.

VSPC ACCOMPLISHMENTS, MEETINGS AND PROCESS

The past year was the tenth full year of VSPC operation. During this year, the major activities and accomplishments of the Committee included:

- Received regular briefings each quarter from lead utilities on all reliability deficiencies identified in the 2015 Vermont Long-Range Transmission Plan.
- Developed, and filed on October 22, 2017, the annual geographic targeting recommendations to the Commission. The development of the recommendations followed a full review by the Geographic Targeting Subcommittee of transmission and subtransmission issues, as established in Docket 7081, and distribution issues, as established in Docket 7873/7874.
- Used both the July and October meetings for an in-depth focus on issues related to the curtailment of renewable energy exports from the Sheffield-Highgate Export Interface (SHEI), across the northern tier of Vermont. These meetings drew a very high level of attendance and interest, with 80 people attending the summer meeting and 35 at the fall gathering.

² ¶ 86 requires the VSPC to take advisory votes to resolve disputes regarding determinations of affected utilities and cost allocation.

³ Docket 7081 MOU at 35-36.

⁴ Docket EEU-2013-11, In re: VSPC Geographic Targeting Process Improvement Analysis, 1/24/2014.

- Created a dedicated page on the VSPC website⁵ to maintain a library of communications and documents related to the SHEI. VELCO used this page as a mechanism to ensure equal and timely access to all its SHEI-related materials.
- Received regular briefings on a variety of current policy proceedings, such as the net metering and interconnection rule revisions, utility Renewable Energy Standard plans, the Vermont Weather Analytics Center, IEEE 1547 standard revisions, merchant transmission in New England, cyber security, and the reinvigoration of the Regional Utility Group.
- With regular participation by an ISO-New England (ISO-NE) representative, and briefings by VELCO, updated participants regularly on significant policy developments at the regional and federal level. Topics of particular focus included: the Forward Capacity Auction, ISO-NE’s Competitive Auctions with Sponsored Policy Resources (CASPR) proposal for market changes, transmission planning changes adopted in conformance with FERC Order 1000, and the activities of the Distributed Generation Forecast Working Group (DGFWG)
- The VSPC held the following full committee meetings during 2017:

1/25/2017	Quarterly meeting, South Burlington, VT
4/26/2017	Quarterly meeting, Middlebury, VT
7/12/2017	Quarterly meeting, Burlington, VT
10/18/2017	Quarterly meeting, Rutland, VT

The subcommittees of the VSPC met throughout the year as follows:

- Public Participation Subcommittee: The Public Participation Subcommittee did not meet in 2017.
- Coordinating Subcommittee: The Coordinating Subcommittee met by phone January 4, April 7, June 14 and October 4 to plan the agendas for regular VSPC meetings.
- Forecasting Subcommittee: The Forecasting Subcommittee met on January 24, March 28, June 27, and August 2. The main focus of the subcommittee was to advise VELCO and its contactor, Itron, on the development of the Vermont statewide load forecast for the 2018 Vermont Long-Range Transmission Plan. In particular, the subcommittee was consulted on various assumptions regarding the treatment of energy efficiency, cold-climate heat pump and electric vehicle adoption, impacts of Tier III Renewable Energy Standard programs, and the growth of distributed generation. The subcommittee also helped VELCO select scenarios to be analyzed in the Plan update.

⁵ <https://www.vermontspc.com/grid-planning/shei-info>

- **Geographic Targeting Subcommittee:** The Geographic Targeting Subcommittee met on January 10, March 28, and October 10. The group carried out its responsibilities for receiving reports from Vermont’s electric utilities and reviewing all current load growth-related reliability issues. This review formed the basis for drafting the VSPC’s geographic targeting recommendations and recommendations on the need for reliability plans in accordance with Docket 7873/7874 to the Commission on October 22, 2017.

The calendar of VSPC meetings is posted on the VSPC website at:

<http://www.vermontspc.com/calendar>

Agendas and meeting minutes for the full VSPC meetings are posted on the VSPC website at:

<http://www.vermontspc.com/vspc-at-work/meetings>

Subcommittee agendas and meeting minutes are posted on the VSPC website at:

<http://www.vermontspc.com/vspc-at-work/subcommittees>

No advisory votes were taken in 2017.

REPORT ON IDENTIFIED RELIABILITY DEFICIENCIES

Paragraph 51 of the Docket 7081 MOU requires that the VSPC, VELCO and the distribution utilities report progress on identified reliability deficiencies at least annually to the Commission. The following sections address all identified reliability issues as follows:

1. *Issues that screened in for full NTA analysis in the 2015 Vermont Long-Range Transmission Plan (the Plan)⁶ and are currently the subject of Project-Specific Action Plans/Reliability Plans.* The Rutland area is the only area identified in the plan that fits into this category. As previously reported to the Commission and described below, GMP now projects that this reliability gap will not arise within the 10 to 20 year horizon.
2. *Transmission and subtransmission issues that screened out of full NTA analysis in the 2015 Plan and are the subject of brief updates.* These include: Connecticut River Valley and Central Vermont. VEC has determined that the Northern Area is no longer a concern because reliability concerns arise when a large customer’s load that is currently disconnected is re-energized. VEC will continue to monitor the load, and appropriate steps will be taken once the customer requests to be reconnected. A brief update is provided.

⁶ The 2015 Vermont Long-Range Transmission Plan, filed with the Commission on 6/25/2015, serves as the basis for the current list of identified bulk system and subsystem reliability issues. The Plan is posted at <http://www.velco.com/longrangeplan2015>

3. *Distribution issues that are the focus of reliability plans as required by the Docket 7873/7874 Screening Framework and Guidelines for Implementation of 30 V.S.A. § 8005a(d)(2).* The Hinesburg area is included in this section.

GROUP 1—ISSUES THAT SCREENED IN FOR FULL NTA ANALYSIS IN THE 2015 PLAN AND ARE CURRENTLY THE SUBJECT OF PROJECT-SPECIFIC ACTION PLANS/RELIABILITY PLANS.

RUTLAND

As previously summarized in the VSPC’s report of 2016 activities, GMP filed a reliability plan for the Rutland area on April 1, 2015.⁷ The plan indicates that various developments that have occurred or are projected have eliminated the projected reliability gap for the Rutland area within the next 10 to 20 years. In effect, the re-analysis has removed the Rutland area from the current list of issues requiring continued tracking through the Docket 7081 process since no reliability gap is now projected within the 10-year time frame. A brief update of status follows.

GMP’s analysis of the Rutland area shows that the previously identified reliability gap is no longer likely to emerge as a result of developments in the Rutland area, particularly economic conditions and the influx of solar power. GMP’s planned integration of former Vermont Marble Power Division into GMP’s system, including its plans to permanently close the normally open 46 kV tie at West Rutland (2019); reconductor the Florence-West Rutland 46 kV line (2018), and permanently close and reconductor the normally-open (second) Rutland-West Rutland 46 kV line (2018), will widen the reliability margin for the area. GMP’s plan further includes continued monitoring of area load growth to determine when the reliability margin is within three to four years of exhaustion; monitor load shapes and annual load duration curve; evaluate GMP energy initiatives, including Renewable Energy Standard implementation, to determine impacts on reliability margins; update studies as needed; and deploy identified resource options if and when a reliability gap is again projected.

⁷ The Rutland Reliability Plan may be accessed on the VSPC website at: <http://www.vermontspc.com/gmp-rutland-reliability-plan>

GROUP 2—TRANSMISSION AND SUBTRANSMISSION ISSUES THAT SCREENED OUT OF FULL NTA ANALYSIS IN THE 2015 PLAN

<i>Status update: Connecticut River Valley</i>	
Lead utility	Green Mountain Power ⁸
Description	Bulk system deficiency (see page 24 of the 2015 Plan). Overloads on Coolidge to Ascutney, as well as subsystem overloads. Low and high voltages, as well as voltage collapse in a subarea bordered by the Middlebury, Granite, Bellows Falls, and Webster 115 kV substations. Line overloads and voltage concerns for a single contingency that may remove one or more elements from service (N-1 conditions) and two succeeding contingencies (N-1-1.) The transmission overload is largely affected by power transfers from generation in Massachusetts and Vermont supplying New Hampshire load.
NTA Screening	A detailed NTA screening for the Connecticut River Valley deficiency demonstrates that an NTA would not be a viable solution. See page 25 of the 2015 Plan.
Proposed alternative	Reconductoring and rebuilding the 115 kV line from Coolidge Substation to Ascutney Substation (K31 Line), adding a +50/-25MVAR reactive device adjacent to the Ascutney Substation, adding a new bay at Ascutney Substation to accommodate the reactive device, rebuilding the Chelsea Substation into a 115 kV ring bus configuration, and splitting the 25MVAR capacitor bank at Hartford Substation into two 12.5MVAR capacitor banks.
Status of decision-making on cost allocation	This alternative will be funded per ISO-NE planning procedure 4 regarding pool transmission facilities, where New England utilities fund projects per their load ratio share of the New England load. Upgrades to GMP facilities will be funded by GMP.
Status and timing of implementation	ISO-NE Needs Assessment and Solution Assessment have been completed. VELCO NTA screening analysis has been completed. VELCO applied to the Commission for a Certificate of Public Good (CPG) on September 24, 2015, which was granted on June 9, 2016. At the time of publication the Coolidge-Ascutney 115 kV line reconductoring and pole replacement, and the Hartford capacitor banks are completed and in service. The remaining components will be completed in 2018.

⁸ The Docket 7081 MOU defines the lead utility as the distribution utility with the responsibility for leading the NTA analysis. Although GMP was designated as the lead, VELCO is the petitioner for the transmission upgrade to resolve this reliability issue.

<i>Status update: Central Vermont Area</i>	
Lead utility	Green Mountain Power ⁹
Description	Bulk system deficiency (see page 25-26 of the 2015 Plan). Coolidge to Cold River overload. No voltage concerns assuming the Connecticut River upgrades are completed. Line overloads when more than one element is out of service (N-1-1 condition). However, 1030 MW critical load level is not projected to be reached until 2028, barring the addition of new generation or an increase in imports of power through Vermont, which could hasten the need date for this project.
NTA Screening	Screens out due to a year of need beyond the 10-year horizon.
Preferred alternative	Rebuild 115 kV line.
Status and timing of implementation	This project is on hold and will be re-evaluated in the 2018 Plan update.

<i>Status update: Northern Area (Highgate, Jay, Newport, Irasburg, Burton Hill)</i>	
Lead utility	Vermont Electric Cooperative
Description	Predominantly bulk system deficiency (see page 28 of the 2015 Plan). Low voltages in the northern subarea that occur when one element is out of service (N-1) conditions. This is a predominantly bulk deficiency that affects the sub-transmission system.
NTA Screening	To be determined
Preferred alternative	Addition of 46 kV capacitor banks. Upgrade of Moshers Tap. These upgrades will be completed in stages as load grows.
Status and timing of implementation	The need date of this project is undetermined. The timing of need is highly dependent on the status and amount of a single large customer’s load. Load levels elsewhere in the northern area, such as the Jay ski resort, may also affect the timing of need. VEC has determined that system analyses can be placed on hold until such time the large customer requests to be reconnected. VEC will continue to monitor any changes in load predictions and other factors.

⁹ The Docket 7081 MOU defines the lead utility as the distribution utility with the responsibility for leading the NTA analysis. GMP is designated as the lead in terms of Docket 7081; however, VELCO would be the petitioner should a transmission solution be required.

GROUP 3—DISTRIBUTION ISSUES THAT ARE THE FOCUS OF RELIABILITY PLANS

HINESBURG

GMP has identified a distribution system constraint in the Hinesburg area for which it filed a reliability plan on October 1, 2016.¹⁰ GMP customers in the Town of Hinesburg are served by an eight-mile-long distribution line which originates at the GMP Charlotte substation. The load concentration in Hinesburg, together with its distance from the Charlotte substation, results in potential thermal overloads, voltage limitations, and challenges to adequately protect the distribution line for contingencies. While GMP has identified a solution to the existing protection issues, there remain a number of unresolved issues including the potential for future load growth, voltage constraints, high solar penetration, and motor start limitations. GMP analyzed a number of possible solutions to address the long-term reliability needs of the Hinesburg area. These solutions were considered in combination with the goal of producing a robust, cost-effective, long term solution for the area. The potential solutions include: a new GMP substation; a new or upgraded substation with the Vermont Electric Cooperative (VEC); installation of distance relaying; distributed generation; energy efficiency; and battery energy storage.

After analysis and consideration, GMP plans to install a battery energy storage system (BESS) in the Hinesburg area while participating with VEC in a new or upgraded substation. Installation of a BESS, in conjunction with a substation, provides GMP with a flexible solution that allows for the deferral of certain transmission and distribution infrastructure while providing the potential to be the lowest cost solution to area deficiencies. GMP is committed to constructing additional storage facilities on its electric system to obtain benefit streams including reduced power and transmission expenses, deferral of transmission and distribution projects, reduced power supply risk, and enhanced resiliency. The Hinesburg area provides a particular opportunity for GMP to gain insights into the costs and effectiveness of a BESS solution in addressing an actual reliability deficiency. The Hinesburg area reliability deficiencies include multiple facets of interest, including high solar penetration and a relatively weak distribution system with limited capacity for future growth. GMP has stated that, given the inherent advantages of battery storage modularity, a battery solution in this area will effectively address uncertainties surrounding load growth and solar penetration while providing insights on the ability of storage solutions to address reliability needs. The actual timing of the BESS has not been determined. GMP will continue to monitor the area load growth and is investigating opportunities for land purchase for the future BESS.

¹⁰ GMP's Hinesburg Reliability Plan may be viewed on the VSPC site at http://www.vermontspc.com/library/document/download/5518/2016_09_30_GMP_HinesburgReliabilityPlan.pdf