STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Case No. _____

Petition of Green Mountain Power for a Certificate of Public Good pursuant to 30 V.S.A. § 248 authorizing the rebuild of the Lowell Substation and the upgrade of 18.1 miles of the B20 line from Johnson to Lowell, and Joint Petition of GMP, the Village of Morrisville Water and Light Department, and the Village of Johnson Water and Light Department for a CPG pursuant to 30 V.S.A. § 248 to authorize the upgrade of 1.5 miles of the B22 line, in the Towns of Lowell, Eden, Johnson, and Morristown, Vermont	

DIRECT TESTIMONY OF WITNESS
JOHN R. FISKE
ON BEHALF OF GREEN MOUNTAIN POWER

November 4, 2019

Mr. Fiske describes the overall Project. He also describes the proposed construction schedule and introduces the other witnesses offering testimony in support of this Project.

EXHIBITS

Exhibit GMP JRF-1 - Existing One Line

Exhibit GMP JRF-2 - Proposed One Line

Exhibit GMP JRF-3 - Site Plan

Exhibit GMP JRF-4 - Plan View

Exhibit GMP JRF-5 – South Elevation AA

Exhibit GMP JRF-6 – East Elevation BB

Exhibit GMP JRF-7 – West Elevation CC

Exhibit GMP JRF-8 – North Elevation DD

Exhibit GMP JRF-9 - Oil Containment Details

Exhibit GMP JRF-10 – Sheets 1 - 21

Exhibit GMP JRF-11 - Sheets 1 - 5

DIRECT TESTIMONY OF JOHN R. FISKE

Introduction

1. Q. Please state your name, occupation, and business address.

A. My name is John Fiske, and I am employed by Green Mountain Power ("GMP") as Lead of Engineering. My business address is 2152 Post Road, Rutland, Vermont 05701.

2. Q. Please describe your background and experience.

A. I earned a Bachelor of Science Degree in Electrical Engineering from the University of Vermont and am a Licensed Professional Engineer in the State of Vermont. Prior to my current position, I held the positions of Manager of Substation Design/Relay Protection, System Protection Engineer and Division Engineer at Central Vermont Public Service Corporation ("CVPS"). I also worked as a Manager of Engineering and System Protection Engineer at Vermont Electric Power Company in Rutland, Vermont.

3. Q. Have you previously testified before the Public Utility Commission (the "Commission")?

A. Yes, most recently, I have testified in the following Dockets: 7857 (Randolph Substation), 7887 (Vernon Road Substation Breaker Addition), 8029 (St. Johnsbury Substation Upgrade), 8030 (Woodstock Substation Upgrade), 8205 (Georgia Interconnection Project), 8308 (Waterbury/Duxbury Substation), 8867 Rutland Area Reliability Project, the 2017 GMP rate case (Case No. 17-3112-INV), and the new Airport Substation (Case No. 18-2910-PET).

4. Q. What is the purpose of your testimony?

A. I describe the proposed Project in general terms and detail the proposed construction schedule. I also introduce the other witnesses offering testimony in support of the Project.

5. Q. Please identify each of the witnesses other than yourself that will submit testimony and provide a summary of the topics they will cover.

A. The following individuals will offer testimony to support this Project as follows:

Witness	Subject
Doug C. Smith	Mr. Smith discusses how this Project, in addition to being a key asset condition and reliability project, is part of a least-cost package of solution steps that will cost-effectively reduce current congestion of the Sheffield-Highgate Export Interface ("SHEI"), resulting in a significant economic benefit to Vermont electric customers. Mr. Smith provides a detailed description of the current SHEI transmission constraint, describes the robust process that GMP and others have engaged in to explore potential ways to mitigate the SHEI constraint, explains why this Project is expected to reduce congestion, and provides an assessment of the net economic benefits that will flow to customers as a result of increasing the benefits that Vermont electric customers receive from renewable generation in northern Vermont.
Kim L. Jones	Ms. Jones provides evidence in support of the issuance of a Certificate of Public Good authorizing the rebuild of the Lowell Substation and the upgrade of 18.1 miles of the B20 line from Johnson to Lowell and 1.5 miles of the B22 line in the Towns of Lowell, Eden, Johnson, and Morristown, Vermont. She also addresses system stability and reliability, need, least-cost planning, consistency with Vermont's electric energy plan, economic benefit, and impacts on existing or planned transmission facilities. Ms. Jones also sponsors the project cost estimate.
Timothy O. Upton	Mr. Upton discusses the potential environmental and land-use impacts of the Project and the associated criteria under 30 V.S.A. § 248.

Craig Myotte	Mr. Myotte explains how the B22 upgrade component of the overall Project, which is owned by Morrisville Water and Light and the Village of Johnson Water and Light Department, will provide asset condition and reliability benefits to municipal customers. He also discusses the costs and benefits that will be considered by municipal voters under 30 V.S.A. § 248(c)(1).

I. General Project Description

6. Q. Are you familiar with the proposed Project?

A. Yes, I am familiar with the proposed Project.

7. Q. Please describe the Project generally.

A. The Project involves upgrades of two existing transmission lines and the rebuild of GMP's Lowell Substation. The Transmission line upgrades involve replacing existing structures and installing new conductor on 18.1 miles of GMP's B20 line and 1.5 miles of the B22 line owned by the Village of Morrisville Water and Light Department ("MWL") and the Village of Johnson Water and Light Department ("JWL"). The substation upgrade involves the replacement of like-in-kind equipment as well as the addition of newly added equipment to support the transmission system reconfiguration. The substation rebuild is to occur adjacent to the existing substation. The existing substation is to be retired after the commissioning of the new substation.

8. Q. Please describe the existing Lowell Substation.

A. The existing Lowell Substation, located in Lowell, Vermont, is a transmission substation that is part of GMP's looped subtransmission network. A voltage transformation takes place at this location which connects GMP's 34.5kV subtransmission network to the 46kV

network which is predominant in northern Vermont. The existing GMP Lowell Substation consists of a fenced-in yard (approximately 50' x 105' in size), a control building (16' x 18' in area and 12' tall), one (1) steel box structure (16' x 18', 26' tall), two (2) 34.5 kV gang operated airbreak switches (205, 441), six single blade circuit breaker disconnect switches (208, 209), one (1) 1973 vintage 38 kV oil circuit breaker (B20), one (1) 1973 vintage 15/20 MVA, 43.8/34.5 kV autotransformer with associated station class lightning arresters, three (3) potential instrument transformers for protective relaying purposes, and a station service transformer. The electromechanical transmission line protection relays and Remote Terminal Unit (RTU) for the 46 kV and 34.5 kV circuits are located in the control building. Reference **Exhibit GMP JRF-1** for the existing Operating Diagram.

9. Q. Please describe the proposed upgrades to the Lowell Substation.

A. The proposed Lowell Substation will be constructed adjacent to the existing GMP Lowell Substation to minimize the outage time of the Lowell Substation. Please see **Exhibits GMP JRF-2, GMP JRF-3, GMP JRF-4, GMP JRF-5, GMP JRF-6, GMP JRF-7, GMP JRF-8**, and **GMP JRF-9** for the Proposed Operating Diagram, Site Plan, Plan View, Elevation A-A, Elevation B-B, Elevation C-C, Elevation D-D, and Oil Containment, respectively.

The new Lowell Substation will consist of the following:

- A new fence with foundations to create a fenced in yard (approximately 130' x 120' in area, 8' high).
- New equipment foundations, ground grid, and below grade trench and conduit systems.
- One (1) new 30/40/50//56 MVA, 46/34.5 kV autotransformer with oil

containment including associated station class lightning arresters. The oil containment will be constructed with a volume no less than 110% of the new power transformer oil capacity plus 5 inches of freeboard rain. Please see Exhibit GMP JRF-9 for the details of a typical oil containment design. The sound level of the new power transformer will be designed to be 10dBA below the NEMA TR-1 standard.

- One (1) new 38 kV vacuum circuit breaker (B20) with associated single blade disconnect switches (208, 209), two bay steel structure (18 feet wide, 18 feet deep, and 26 feet 6 inches tall) and 34.5 kV bus work.
- One (1) new 72 kV vacuum circuit breaker (B-30) with associated single blade disconnect switches (308, 309), two bay steel structure (18 feet wide, 18 feet deep, and 26 feet 6 inches tall) and 46 kV bus work. The modification of the 46 kV transmission circuit entrance into the substation will include the removal of one (1) existing transmission pole with associated anchoring and the installation of two (2) new 50' transmission poles with associated anchoring. Please see Exhibit GMP JRF-3 for the details of the 46kV transmission reconfiguration in the vicinity of the Lowell substation.
- Three (3) phase to neutral bus potential transformers and one (1) phase to phase line potential transformer for 34.5 kV transmission line protective relaying purposes, all with associated fusing.
- Three (3) phase to neutral bus potential transformers and one (1) phase to phase line potential transformer for 46 kV transmission line protective relaying purposes, all with associated fusing.

- A normal 15 kVA station service transformer and an alternate 15 kVA station service transformer with associated transfer switch and AC distribution panel. The normal station service will be connected to the bus side of the B20 circuit breaker and the alternate station service will be connected to a local distribution feeder.
- One (1) control building (18 feet wide, 24 feet long, and 15 feet in height at the peak of the roof). The relay protection & control panels will be housed in the control enclosure along with the SCADA equipment, fiber optic communications equipment, and other miscellaneous control devices. The DC battery system and AC/DC distribution panels will also be housed in the control building.
- A new security system and substation yard lighting will be installed on steel poles (18 feet in height) inside the substation fence. The substation yard lighting will be utilized for maintenance and emergency activities. Please see Exhibit GMP JRF-4 and Exhibit GMP JRF-5 for the details of the steel pole arrangement and approximate mounting location with respect to the substation fence.

The existing GMP Lowell Substation will remain intact and energized during the construction of the new Lowell Substation, and will be retired after the commissioning of the new Lowell Substation.

10. Q. Please describe the plans to retire the existing Lowell Substation.

A. The retirement of the existing Lowell Substation will include the following:

- The retirement of the existing control enclosure and all electrical equipment contained therein, as well as the retirement of the existing fence and foundations.

- The removal of the existing 15 MVA 46/34.5kV autotransformer and associated oil containment, retirement of the existing 34.5 kV oil circuit breaker, existing steel box structure including all associated switches, and demolition of all existing equipment foundations.

11. Q. Please describe the existing B20 transmission line.

A. The existing B20 transmission line (Line 133), which utilizes standard 'T' construction, consists of two hundred ninety two (292) 1950 vintage structures, two (2) 1960 vintage structure, one (1) 1980 vintage structure, seven (7) 1990 vintage structures, thirteen (13) 2000 vintage structures, and thirty three (33) 2010 vintage structures and associated hardware with 4/0 ACSR conductor. It is part of the looped transmission system from Lowell to Johnson. This line serves the Vermont Electric Co-op (VEC) Eden Corners and Montgomery Distribution Substations. There are also two (2) 2014 vintage Motor Operator Load Break (MOLB) (112 & 520) switches in the vicinity of the tap for the VEC Eden Corners Substation.

12. Q. Please describe the proposed B20 transmission line upgrade.

A. The proposed B20 line work upgrades approximately 18.1 miles of 34.5 kV transmission line with three hundred fifty five (355) structures utilizing 'HLP' vertical construction and 795 MCM ACSR conductor within the existing transmission line corridor. The locations of the new structures have been selected to maximize the span lengths and to reduce environmental impacts. This design approach yielded the minimum amount of increased structures. All 348 original structures are to be retired.

The new B20 conductor is to be installed above the existing B20 line which will remain energized during the construction of the new B20 line. It is necessary to keep the existing B20 line in-service during the construction phase in order to maintain area reliability and minimize impacts to the Sheffield Highgate Export Interface (SHEI) limit and avoid generation curtailment in the area. During construction the existing conductor will remain in service until the new structures and conductor are installed. The existing structures and conductor will be retired after the new line is in service.

Exhibit GMP JRF-10, sheets 1-21, is the plan that provides a description of the proposed B20 transmission line (Line 133).

13. Q. Please describe the existing B22 transmission line.

A. The existing B22 transmission line runs from the GMP Johnson Substation to the MWL #3 Substation, and is approximately 6.8 miles. The area of the Project is the 1.5 mile portion of line starting near the vicinity of the Cady's Falls tap, at the intersection of Duhamel Rd. and Cadys Farm Rd., and ending at the MWL #3 Substation. This section of the B22 utilizes a double circuit 'T' construction where the B22 line is on an upper crossarm and the 3319 line is on a lower crossarm. This section of the B22 line consists of one (1) 1950 vintage structure, twenty four (24) 1960 vintage structures, three (3) 1970 vintage structures, two (2) 1980 vintage structures, two (2) 1990 vintage structures, and two (2) 2010 vintage structures and associated hardware. The existing B22 conductor is 336 MCM ACSR conductor and the existing 3319 conductor at this location is 3/0 ACSR. MWL witness Craig Myotte provides further details on the B22 line.

14. Q. Please describe the proposed B22 transmission line upgrade.

A. The proposed B22 line upgrade is for 1.5 miles of 34.5 kV transmission line with thirty seven (37) new structures utilizing a double circuit 'T' construction and 477 MCM ACSR conductor within the existing transmission line corridor. The proposed B22 span lengths have been modified to minimize the addition of new structures and the structures have been located to minimize environmental impacts resulting in only 3 additional structures. All 34 original structures are to be retired.

The new B22 conductor is to be installed above the existing B22 and 3319 lines which will remain energized during the construction of the new B22 line. It is necessary to keep the existing B22 and 3319 lines in-service during the construction phase in order to maintain area reliability and minimize impacts to the SHEI limit and avoid generation curtailment in the area. During construction, the existing B22 energized conductor will be transferred from the existing structures to the new structure and become the new 3319 line conductor (336 MCM ACSR) The existing structures will be retired and the existing 3319 3/0 ACSR conductor will be retired.

Exhibit GMP JRF-11, sheets 1-5, is the plan that provides a description of the proposed B22 transmission line.

15. Q. Will an outage to customers be necessary to upgrade the transmission lines and transmission substation?

A. These facilities do not directly serve distribution customers and are part of a looped transmission system. Pursuant to our plan for construction, no outage to customers is expected to be needed in order to upgrade either the Lowell Substation, the B20 transmission

line, or the B22 transmission line. However, should a need arise for an outage, GMP will prepare an appropriate communication plan.

16. Q. Will temporary construction be necessary to serve customers during construction?

A. Pursuant to our plan for construction, no temporary construction is expected to be needed in order to upgrade either the Lowell Substation, the B20 transmission line, or the B22 transmission line. As detailed above in my testimony, we anticipate utilizing the existing facilities during construction until such time as the newly constructed facilities are operational.

17. Q. Will lay down areas be utilized during construction?

A. Yes, GMP is proposing 2 lay down areas to be utilized during construction of the B20 line. Both lay down areas are the located in the vicinity of the middle of the Project. In Eden, Vermont, GMP proposes to use a 1 acre lot in the Eden Sand and Gravel Quarry, and in Hyde Park, Vermont, GMP proposes to use a 1 acre lot in a field directly accessed from Locke Ave. See Exhibit GMP-JRF-10 sheet 21 for a depiction and details of the lay down areas.

GMP also proposes using the cleared area directly east of the MWL#3 substation as a lay down area for the B22 line. See Exhibit GMP-JRF-11 sheet 4.

18. Q. Will the Project have any adverse effects on the safety of the public or adjoining landowners?

A. No. The project will be designed and constructed in accordance with current National Electric Safety Code ("NESC") requirements. GMP will use quality materials and

adhere to careful construction practices throughout the construction phase. The Project will not unnecessarily or unreasonably endanger the public or adjoining landowners.

II. Construction Schedule

19. Q. What is the anticipated construction schedule for the Project?

A. It is expected that construction of the Lowell Substation and the B20 line will commence in May 2020 and conclude in December 2020, assuming receipt of necessary Commission approval. Construction for the B22 line is planned to commence immediately after completion of the Lowell Substation and B20 work, which is expected to be in January of 2021, with the B22 work concluding in May of 2021.

GMP is requesting Commission approval of this Project by April 1, 2020 in order to allow MWL and JWL to hold the Town vote on the B22 portion of the Project at the regularly scheduled annually meetings in April 2020. This will also permit construction of the B20 to commence on schedule starting in May even if the B22 portion of the Project is not approved by the voters.

20. Q. What are the anticipated construction hours for the Project?

A. Construction hours for the Project will be from 7:00 a.m. to 7:00 p.m. Monday through Friday, 8:00 a.m. to 5:00 p.m. on Saturday, and shall cease on Sundays and state and federal holidays except where construction activities must be performed during required outages needed to maintain system reliability.

21. Q. Does this conclude your testimony?

A. Yes