STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Case No. _____

Tariff filing of Green Mountain Power requesting an	)
increase in its base rates starting January 1, 2019, to be	)
fully offset by bill credits through September 30, 2019	)

PREFILED TESTIMONY OF JASON LISAI ON BEHALF OF GREEN MOUNTAIN POWER

April 13, 2018

Summary of Testimony

Mr. Lisai details the projected generation from GMP's wholly owned and joint-owned facilities, the operation and maintenance expenses associated with generation facilities, and the interim and rate period capital costs associated with generation. Mr. Lisai also details how the generation team manages and operates the fleet of generation assets in a safe and responsible manner that provides customers the greatest benefit possible.

EXHIBIT LIST

Exhibit GMP-JL-1	GMP Generation from Owned and Joint Ownership Projects (2019)
Exhibit GMP-JL-2	Detailed Total Generation O&M Budget (2019)
Exhibit GMP-JL-3	Detailed O&M Breakdown for KCW (2019)
Exhibit GMP-JL-4	Generation Department Capital Planning Philosophy
Exhibit GMP-JL-5	Generation Capital Additions (2018–2019)

PREFILED TESTIMONY OF
JASON LISAI
ON BEHALF OF GREEN MOUNTAIN POWER

I. INTRODUCTION

Q1. What is your name and business affiliation?

A1. My name is Jason Lisai. I am employed by Green Mountain Power ("GMP") as Director, Generation Operations. My business address is 163 Acorn Lane, Colchester VT.

Q2. Please describe your educational background and business experience.

A2. I graduated from Johnson State College with a bachelor's degree in Environmental Science and Natural Resources in December of 1993. For the first 5 years of my career, I worked for Corporate Development at Smugglers' Notch Resort as a Planning and Project Coordinator. I was responsible for projects from design to completion for resort operations and development, including master plans for domestic water and wastewater expansion, energy use, and energy efficiency plans. In 2001, I was hired by Sugarbush Resort as Manager of Planning, Development and Regulatory Affairs, and was responsible for local, state, and federal regulatory relations and requirements, resource management of owned and leased lands, and project management of large capital projects. From 2004 until 2011, I was the Director/Vice President of Planning and Development for Sugarbush Resort, responsible for resort development, construction, and regulatory compliance, including oversight of staff, utilities, consultants, and the resort master development plan.

I joined GMP in 2011 as Power Production Supervisor. This role included oversight of field staff, capital projects, and outside contractors in addition to developing

and managing operating budgets. I am currently the Director of Generation Operations, which includes oversight of field employees and supervisors, as well as the operation and maintenance of our wind, fuel, and hydro generation assets.

Q3. Have you previously testified before the Vermont Public Utility Commission ("Commission")?

A3. Yes. I submitted testimony on behalf of GMP in Docket 8827—Purchase of Enel Plants and in Case No. 17-3112-INV—GMP's 2017 rate filing.

Q4. What is the purpose of your testimony?

A4. I provide an overview of GMP's power production portfolio and the capital projects associated with our generation assets. I first detail the projected generation from GMP's wholly owned and joint-owned facilities and the operation and maintenance ("O&M") expenses associated with generation facilities. I then identify and describe the interim and rate period capital costs associated with generation projects.

Q5. Please describe how GMP manages different energy sources to provide reliable service for customers.

A5. The primary goal of GMP's generation team is to manage and operate our fleet of generation assets in a safe and responsible manner that provides our customers the greatest benefit possible. We are focused on providing power that is low-cost, low-carbon, and highly reliable, and producing that power in a manner that meets our important regulatory and environmental obligations. To achieve these customer-focused

objectives, GMP generates energy from a range of different sources, some of which are solely owned by GMP, and some of which are jointly owned with other business partners.

The generation team is presently responsible for maintaining and operating more than 60 solely owned facilities, including 44 hydro facilities with over 117 MW of generation; two wind facilities totaling 70 MW; twelve solely owned solar projects totaling 3 MW; and six thermal peaking facilities totaling approximately 100 MW. We also have interests in four jointly owned facilities. In addition to these facilities, we also have an interest in five joint venture ("JV") solar projects that are forecasted to provide more than 36.4 MWh of power each year to GMP customers through power purchase agreements ("PPAs").

Finally, we are working hard to develop innovative and transformational energy projects, like battery storage facilities, that will provide important new benefits to customers while reducing costs for all. We presently have one battery storage project installed at an existing solar facility (Stafford Hill), one battery project under construction at another solar facility (Panton), and three JV Solar/Battery Storage projects under development, which are described further by Kirk Shields. I provide further details on our owned generation and joint ownership projects below.

II. PROJECTED OUTPUT FROM OWNED GENERATION

Q6. Please describe projected output for GMP-owned generation for the rate period.

A6. GMP's owned generation for the rate period (the period from January 1, 2019 to September 30, 2019) is projected to produce 630,482 megawatt-hours (MWh) of energy,

as shown on **Exhibit GMP-JL-1**. This includes projected output from the following categories of projects:

- Wind (including Kingdom Community Wind and Searsburg Wind)
- Hydro
- Solar
- Other Solely Owned Generation Projects (Non-wind, solar, or hydro)
- Jointly Owned Generation Projects

I will address each category in more detail below.

Wind Projects

The Kingdom Community Wind project ("KCW") is a 64.5-MW wind power plant consisting of twenty-one 3.075 MW Vestas V112 wind turbines. The four-year annual average for power production from the KCW project from 2014–2017 was 179,750 MWh. The annual forecast for 2019 has been reduced slightly to 170,914 MWh because we are working through a developing congestion issue in the Sheffield-Highgate Export Interface ("SHEI") that has impacted KCW's output. As Mr. Smith further explains in his testimony, the GMP team is developing a number of solutions that will help mitigate congestion costs in northern Vermont. Based on this annual forecast, the projected output for the 2019 nine-month rate period is 123,843 MWh. It should also be noted that GMP resells 8/63rds (approximately 12.7 percent) of the total site output to Vermont Electric Cooperative ("VEC"), resulting in a net GMP forecasted output for the rate period of approximately 108,117 MWh.

Our wind facility in Searsburg, Vermont consists of eleven 550-kW wind turbines, for a total capacity of 6 MW. The projected output from this facility for the rate period, based on historical production and accounting for planned outages for seasonal maintenance, is 8,010 MWh.

In total, the projected output of GMP's Wind projects for the rate period, net of resale to VEC, is 116,127 MWh.

Hydro Projects

GMP owns and operates 44 hydroelectric stations, including 72 units, for a total hydro capacity of 117 MWs. The plant sizes range from the 200 KWh Pierce Mills station to the recently rebuilt 10.50 MW Proctor station. Each year, GMP reviews the long-term historical production data, unit availability, planned system outages and upcoming enhancement projects to forecast the monthly and annual production for our hydro facilities. Based on this data, our forecast for hydro production is 310,286 MWh in the rate period.

Solar Projects

GMP owns and operates a number of distributed solar projects around our territory. These range from small projects located on GMP facilities to a 2-MW solar project located on a landfill in Rutland, Vermont, known as the Stafford Hill Project. In total, these projects are anticipated to provide 3,966 MWh of energy in the rate period.

In addition to our existing fleet of wholly owned solar generation, a GMP affiliate operates five jointly owned solar projects for a total capacity of approximately 22 MW. These projects were developed under a joint venture structure with a tax investor, allowing GMP to monetize the Federal Investment Tax Credit and provide all of that value directly to customers and reduce the cost to our customers of these projects by roughly 30%. The five JV GMP Solar projects are located in the towns of Hartford, Williston, Richmond, Williamstown, and Panton. Four of the five projects were brought on line by December 31, 2016, with the fifth site completed in early 2017. Together, these projects are forecasted to produce 31,400 MWh in the rate period. Because these projects were developed through a GMP affiliate, the power produced by the facilities is purchased by GMP through a PPA structure with each project entity affiliate company, and is not accounted for in my analysis as generation from GMP-owned facilities. Instead, power generated by the facilities is captured in the purchased power costs incorporated into GMP's power supply costs, which are addressed by GMP witness Doug Smith. Furthermore, as discussed by Mr. Shields, GMP is presently pursuing the construction and development of three JV Solar/Battery Storage projects using a similar partnership and PPA structure to drive down costs for customers, adding approximately 14.4 MW of solar to GMP's portfolio (not taking into account battery capacity). These projects are anticipated to provide 11,080 MWh during the rate period.

Other Solely Owned Generation (non-wind, hydro, or solar)

In addition to the wind, hydro, and solar facilities discussed above, GMP owns and operates six thermal peaker plants: Gorge Gas Turbine, Essex Diesels, Vergennes

Diesels, Berlin Gas Turbine, Ascutney Gas Turbine, and the Rutland Gas Turbine. While these units will provide some energy value when dispatched, their primary purpose is to supply capacity and reserves and they are typically dispatched on an economic basis. Based on a 6-year average of production from these facilities, we forecast approximately 3,047 MWh produced from our thermal peaker facilities in the rate period.

Jointly Owned Generation Projects

Lastly, GMP is a joint owner in four other power generation facilities:

1. The McNeil Biomass Plant, located in Burlington, Vermont, in which GMP has a 31% ownership stake;
2. The Stonybrook Combined Cycle plant, located in Stonybrook, Massachusetts, in which GMP has an 8.80% ownership share;
3. The Wyman 4 oil-fired facility in Yarmouth, Maine, in which GMP has a 2.92% ownership share; and
4. The Millstone 3 Nuclear facility, located in Waterford, Connecticut, in which GMP has a 1.73% ownership stake.

Based on historical production from these facilities, the total GMP share of production from these facilities is forecast to be 197,056 MWh in the rate period.

Summary

Based on the above, GMP forecasts overall production from our solely owned units to be 433,427 MWh in the rate period, and 197,056 MWh from jointly owned facilities, for a total production of 630,482 MWh (excluding JV GMP Solar projects and

JV Solar/Battery Storage projects). *See* **Exhibit GMP-JL-1.** This information is used by Mr. Smith in developing GMP's rate period power costs, which are discussed in his testimony.

III. OWNED GENERATION O&M EXPENSE

Q7. Please describe the rate period O&M expense for GMP-owned generation.

A7. The generation O&M budget covers all ongoing O&M for GMP's solely owned generation plants including wind, hydro, solar, and fuel. This includes the payroll costs for the generation team employees, as well as all outside consultants, Federal Energy Regulatory Commission ("FERC") licensing costs, permitting and compliance, and expense materials used at the various generation stations. The GMP generation team is continuously focused on keeping our fleet of power generation infrastructure operating as safely and reliably as possible at the lowest cost for our customers. This includes work to maintain all levels of compliance at our sites along with enhancements to maintain safe, compliant, and reliable operations. The generation team is responsible for maintaining all of GMP's solely owned generation facilities, which currently totals 64 facilities (44 hydro, 2 wind, 12 solar, and 6 thermal peaking).

For all facilities that GMP maintains, GMP's power generation team employees conduct necessary maintenance, safety, and reliability work, unless specialized skills or equipment are needed to assist (for example, engineering, concrete and civil work, and/or heavy equipment handling). Examples of these O&M activities include raking racks that gather debris in the river for hydro facilities, planned and unplanned repairs on various generation components, and preventative maintenance such as changing oil, filters,

lubricants, etc. The GMP team continuously focuses on performing as much of the work as they safely can, and then utilizes outside resources when it is no longer safe, efficient, or feasible to do so.

The generation O&M budget is based on spending in the test year and adjustments for known upcoming major expenditure requirements, such as a large annual FERC or Public Utility Commission ("PUC") required dam inspection, and any potential O&M cost reductions due to improvements made in the prior year. The rate period O&M budget is included in **Exhibit GMP-JL-2.** KCW-specific costs are shown in more detail in **Exhibit GMP-JL-3.** With respect to the relationship between these expense breakdowns and the rate period Cost of Service, it should be noted that different aspects of generation facility O&M expenses appear in different components of the Cost of Service summary, including the Wholly Owned Production component (Cost of Service Adjustment #6), the Non-Base O&M KCW component (Cost of Service Adjustment #10), and the platform base O&M cost component.

As indicated on **Exhibit GMP-JL-2**, KCW is the largest GMP-owned generation facility, and thus represents the largest allocation of rate period O&M budget costs. The KCW O&M costs are composed of a few key elements:

- Turbine Maintenance Contract – This is an ongoing contract with availability guarantees provided by the turbine manufacturer, Vestas. This work includes complete maintenance and parts replacements of the entire turbine but does not include damage due to weather. We include the assumption of one blade repair per year due to external factors. This blade repair assumption is based on our historical averages.

- Landowner Lease Payments – Lease payments to landowners and "Good Neighbor Fund" payments to surrounding towns – these payments are based on anticipated production and the forecasted value of the energy, capacity, and REC markets.
- Station Service – The cost of electricity for providing station service for the turbines, substation, and building.
- Environmental and Operating Permit Compliance – All required permit and environmental compliance work such as water quality monitoring, stormwater system maintenance, and vegetation maintenance, along with other permit conditions to comply with our state permits.

IV. GENERATION CAPITAL EXPENSE (INTERIM AND RATE PERIODS)

Q8. What criteria does GMP use to select capital projects relating to owned generation?

A8. As with any capital improvement that GMP makes on behalf of our customers, the review begins with the same question: what value will this project provide to our customers and how does it compare to the many other customer priorities we are managing to balance cost? Within the generation team, we have a 10-year capital improvement forecast that is regularly updated based on the various needs to keep all of our facilities running safely, smoothly, and efficiently.

Overall, GMP's power generation capital planning is focused on improving the performance of its hydro, wind, fuel generation, and emerging battery storage assets in one of several programmatic categories: Safety, Reliability, Production Output, and Regulatory Compliance. The power generation planning process looks at best practices

and emerging technologies as a way to achieve these goals, whenever possible. The generation team's capital planning philosophy is set forth in detail in **Exhibit GMP-JL-4**.

Where feasible, the team is always assessing how to optimize each facility's output in the most cost-effective and safest way possible to benefit customers. This can include complete electrical upgrades to automate a facility, a hydro runner replacement or generator rewind, concrete resurfacing, or small projects like replacing the lighting in a plant facility. In addition, these projects may include improving the required responsiveness of generation units to ISO-New England operating commands, such as improved SCADA controls and electrical upgrades for automating the power production facilities.

In addition to ongoing capital improvements to our owned-generation facilities, we look for opportunities to create new value for our customers while furthering Vermont's and GMP's energy goals of getting to 90% renewable by 2050. This includes developing cost-effective solar, implementing energy storage, and looking for strategic acquisitions for customers, such as hydro facilities.

Q9. How are projects identified and selected to be included in the generation capital plan?

A9. The GMP generation team manages an ongoing list of potential capital improvements, which is updated on an ongoing basis as issues occur at plants or as work is completed. We weigh the value and necessity of each project based on the factors described above, which in turn affects the prioritization of each project. Projects involving safety and

compliance are the highest priority, with plant reliability and production improvements following as the next priority.

Each project includes an initial planning grade cost estimate, based on the general concept of the project and costs from similar projects or based on engineering and third-party construction management cost opinions and assumptions.

As described in the testimony of witness Brian Otley, the proposed capital expenditures from the generation team are provided to the Capital Management Team ("CMT") along with proposed expenditures from other GMP departments. The CMT works with each team to select the projects to be recommended for potential inclusion in the final capital budget. For each project identified as potentially viable, a more detailed estimate is developed, which includes quotes from contractors, suppliers, or consultants as well as information on GMP internal costs. This overall capital budget process is further described in witness Brian Otley's testimony.

Joint ownership capital upgrades are provided to GMP by the operators of each location. GMP is responsible for our ownership percentage share of each joint-owned facility upgrade.

Q10. How does GMP develop the cost and anticipated in-service dates of generation projects?

A10. The estimation process goes through stages similar to the development of the project described above. We begin with a planning-grade estimate. This stage also includes the initial development of a project team and schedule for regulatory approvals, engineering and design, construction, and commissioning. A project moves through three phases of

design: Planning/Conceptual design, Schematic Design, and Construction Design/documentation. At the completion of each phase, the overall project schedule, scope, and project cost are evaluated and project requirements are aligned with the original goals of the project. Further detailed estimates, competitive equipment quotes, and construction bids are obtained for major components of the project to create the overall project plan. This includes a detailed estimate and schedule and also identifies major risks, permits, and compliance requirements. Smaller projects are grouped into blankets and the related costs are developed, in part, based on the historical average for a given blanket category. The in-service date takes into account the entire project schedule along with the allowance for time to close out the project, including closing contracts, posting to GMP's fixed asset system, and completing any compliance obligations.

Q11. Please summarize the generation projects included in the interim period and rate period cost of service.

A11. The project categories and projected costs are summarized in the following table. The Interim Period runs from October 1, 2017 to December 31, 2018, and the Rate Period runs from January 1, 2019 to September 30, 2019.

Category	Interim Period (10/1/17-12/31/18) ($000)	Rate Period (1/1/19-9/30/19) ($000)	Total ($000)
Owned Generation	$27,622	$3,551	$31,173
Joint Ownership	$1,855	$1,879	$3,734
Generation Blanket	$588	$595	$1,183
Total	$30,065	$6,025	$36,090

More detailed information concerning projects in each of these categories, including project description, plant addition amounts, in-service dates, and project criteria are contained in **Exhibit GMP-JL-5** and further summarized below.

Q12. Can you please identify and describe some of the major projects included in the Owned Generation category for the interim period and rate period?

A12. Yes. The planned capital expenditures on Owned Generation for the interim period and rate period include a number of projects. I have identified several of the larger projects, by year, below.

Interim Period (October 1, 2017–December 31, 2018)

Essex Rubber Dam – $509,288. The Essex Rubber Dam project was originally in our 10-year capital plan for 2025 as the equipment was nearing the end of its expected service life. In November of 2017, section 2 of the rubber dam failed during operations after a high-water event. The Essex Rubber dam was installed in 1993, and the rubber bladder sections were nearing the end of their service life. The failure of the rubber dam

impacts our ability to maintain consistent water levels as defined by our operating permits and reduces the amount of power generated due to the loss of head. GMP immediately began planning for the replacement of sections 1 and 2 of the rubber dam. While Section 1 did not fail, it will be replaced, as it is the same age and in similar condition as section 2, and is immediately adjacent to the failed section. Replacing Section 1 before it fails will avoid the costs associated with reacting to an unplanned project.

Chittenden Saddles 2018 – $865,711. This project is the second phase of work for the retirement and replacement of saddles along sections of the Chittenden penstock. The penstock, which is 3.1 miles long, connects the Chittenden Reservoir to the East Pittsford Powerhouse. The first phase of work was completed in 2017 under work order 146734 Chittenden Saddles. This project involves the replacement of saddles (concrete and/or metal cradles that support the penstock), which were no longer adequately supporting the penstock, causing stress points on the penstock and increasing the potential for catastrophic failure. The penstock travels through very rugged terrain, and has limited access. Many existing saddles were tipped or previously settled and were no longer supporting the penstock. In the first phase, these saddles were removed, and new foundations and saddles installed. During this phase of the project, a road was constructed alongside the penstock, allowing access to the penstock with small track vehicles. All of the concrete for the construction of the saddles was mixed on site and placed by hand. Most of the excavation was completed with hand tools. The second phase will require the same type of work on different sections. The project is on schedule to start in the summer of 2018 and complete on-time by December 2018.

Marshfield Gatehouse Upgrades – $608,578. This project is part of a multi-year investment into the dam infrastructure at Marshfield to ensure its continued safe and efficient operation. It will bring the electrical equipment inside the gatehouse up to current electrical standards to improve worker safety, automate the current head gate operation to allow for remote operation by the Control Center, replace the pond indication equipment, and replace the gatehouse access ladder with a bridge from the crest of the dam directly into the gatehouse. In addition, there will be some site-work performed on the crest of the dam to remove deviations in elevation. Pond indication, a critical metric for compliance and safe operation, is currently communicated to the plant programmable logic controller ("PLC") by a radio circuit. That equipment has reached the end of its service life and is no longer supported by spare parts. The gatehouse ladder creates safety concerns for workers performing maintenance and accessing the gatehouse during high-water events or nighttime hours; the access bridge mitigates these potential safety hazards.

Panton Battery Storage Project – $2,932,700. This is a commercial-scale 1-MW battery storage project. The main components include inverters, Tesla Powerpack 2.0 lithium batteries mounted to a concrete foundation located within the GMP Panton Solar site, and all equipment needed to grid-tie the battery storage system. The Project is a key initiative within GMP's Grid of the Future program to leverage innovation to drive down costs, and represents another step in transforming how Vermonters use and manage energy in keeping with Vermont's goals for clean, renewable energy, decentralizing generation, and exploring improved grid function and storage. It provides both direct

benefits, as well as the opportunity to learn and develop new techniques for improving grid reliability and reducing peak loads to benefit customers.

Rate Period (January 1–September 30, 2019)

KCW ADLS – $1,138,909. This project is the installation of an Aircraft Detection Lighting System ("ADLS") for the KCW project. KCW includes 21 3 MW Vestas V112 wind turbines. ADLS is a Doppler-radar-based technology that allows Federal Aviation Administration ("FAA") lights to remain off at wind generation facilities during nighttime hours when aircraft are not within the project's airspace. ADLS will detect and track aircraft that are within a 3-nautical-mile perimeter of the turbines. When an aircraft enters this airspace at night, the FAA lights will illuminate. The lights will remain off during all other nighttime hours. ADLS is required under KCW's CPG and has only recently been approved by federal regulators.

Marshfield Spillway – $1,666,651. This is a project to resurface the deteriorated and spalled concrete of the vertical wall and floor slab in the service spillway and replace the existing safety railings. The service spillway is located adjacent to the intake & penstock on Molly's Pond, a reservoir upstream of the Marshfield Hydro Station. The spillway is positioned within the earthen dam and is utilized to discharge flood waters from the reservoir. The service spillway is adjacent to an additional spillway referred to as the Emergency Spillway. This project is currently in process and expected to be completed in conjunction with 153316 Marshfield Gatehouse Upgrades.

Q13. Can you please explain what the Generation Blanket is used for?

A13. The generation blanket category is established to cover miscellaneous smaller projects that arise throughout the year due to equipment failure, replacement of damaged equipment from high-water or other weather-related events, updated regulatory requirements, and safety concerns, among other factors. Typically, projects that fall within this category are relatively low cost and are completed very quickly. These projects are generally needed immediately and result from unplanned equipment failures. The total budget amount is developed based on a 5-year historical spending average in these categories and includes hydro, wind, fuel, and solar.

Q14. Can you provide some examples of the types of projects that have historically been covered under the blanket?

A14. There are a number of examples of planned and unplanned projects within our capital blanket.

For example, in February 2018, field personal purchased a chain-hoist to perform work at our West Danville hydro station turbine at a cost of $1,848.00. The unit was out of service due to a mechanical failure. West Danville is not equipped with a building crane, and the chain hoist was needed to safety remove and work on the turbine components.

Another example is the replacement of a failed drive motor and controls for the plant crane at the Fairfax station. The plant crane is a critical component of operations at hydro stations, and is typically used during annual inspections, turbine repairs, major projects, or generator cleaning. At the time of the failure, the field personal were

preparing to start disassembling and lifting the generator stator for cleaning and repairs. The project therefore had to be completed immediately to safely perform the work and complete the planned maintenance. It was a relatively low-cost project, at $3,967.55.

Q15. Please describe the type of projects included in the Joint Ownership category for the interim period and rate period.

A15. Joint ownership projects are provided to GMP by the various operators of the jointly owned facilities. For example, the McNeil facility will require capital improvements in the rate period of which GMP will pay 31% of the costs, our ownership share of the plant.

Q16. Does this conclude your testimony?

A16. Yes.