

Green Mountain Power
Capital Investment Multi-Year Summary
FY 2019-2022

We provide this summary in support of Green Mountain Power’s (“GMP”) multi-year capital investment forecast. This summary provides more detail to the nature and type of capital investments GMP is forecasting to make during the multi-year period to continue to deliver on our obligations to our customers. The summary provides a year-by-year description for each capital department of the types of capital investments forecasted to be undertaken on behalf of our customers. The specificity of the forecast is greater in the early years than it is in the later years, as would be expected. The capital investment forecast by department for the multi-year period is:

Construction Summary by Cat	FY 2019 Fcst	FY 2020 Fcst	FY 2021 Fcst	FY 2022 Fcst
Install				
Information Technology	6,845,223	9,375,000	9,551,000	9,423,000
Distribution Lines Large Cap	7,861,736	9,500,000	9,500,000	9,500,000
Distribution Lines Line Extensions	4,480,867	4,500,000	4,500,000	4,500,000
Distribution Lines Small Cap	14,845,804	10,100,000	10,100,000	10,100,000
Distribution Substation	6,070,443	4,900,000	4,775,000	4,425,000
General Plant	401,537	***** included in Production *****		
Jt Ownership	1,466,364	2,000,000	2,000,000	2,000,000
Kingdom Community Wind	995,830	***** included in Production *****		
Meters	912,779	650,000	650,000	650,000
New Initiatives	5,129,795	5,000,000	5,000,000	5,000,000
Production	17,306,939	17,700,000	16,700,000	16,200,000
Property & Structures	329,413	1,500,000	1,400,000	1,400,000
Regulators and Capacitors	1,084,873	1,100,000	1,100,000	1,100,000
Transformers	3,607,634	4,500,000	4,550,000	4,600,000
Transmission Lines	4,625,839	7,100,000	8,524,000	8,852,000
Transmission Substations	7,146,630	5,575,000	4,150,000	4,250,000
Transportation	3,041,994	3,000,000	3,000,000	3,000,000
Wind Generation	245,854	***** included in Production *****		
Sub-Total Install	86,399,555	86,500,000	85,500,000	85,000,000

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Distribution Substations

FY2019

The capital investment planned for this period has been documented and included in GMP's 2019 rate adjustment filing.

FY2020

In this period, GMP will do smaller electronics upgrade projects at certain substations to bring the communications, controls, and security capabilities in these facilities to an acceptable level. These projects are estimated to be between \$50,000 and \$100,000 each and are necessary for continued reliable and secure operations.

During this period, we are forecasting two significant substation projects. The first project will re-build our Haystack substation. This project is a reliability-based improvement to reinforce our capacity to serve the local ski areas in the region. Our Dover and Wilmington substations are insufficient to serve this load with the voltage reliability needed. We are estimating the substation re-build at \$2.8 million. The second project will perform a voltage conversion at our Putney substation which will increase its voltage to GMP's minimum standard of 12.47kV. We have been converting substations below this voltage up to that standard to increase reliability. We estimate this project at \$1.5 million.

FY2021

In this period, GMP will do smaller electronics upgrade projects at certain substations to bring the communications, controls, and security capabilities in these facilities to an acceptable level. These projects are estimated to be between \$50,000 and \$100,000 each and are necessary for continued reliable and secure operations.

During this period, we are forecasting three significant substation projects. The first project will perform a voltage conversion at our Fair Haven substation, which will increase its voltage to GMP's minimum standard of 12.47kV. We have been converting substations below this voltage up to that standard to increase reliability. We estimate this project at \$1.25 million. The second project will deliver certain reliability upgrades to our Pleasant Street substation. This project will upgrade major components of the substations equipment, including relay equipment, replacing the RTUs, installing new breakers and bringing the security devices up to standard. This project will bring the facility up to standard and is estimated at \$750,000. The third project will install a motor-operated air brake ("MOAB") at GMP's Wilder substation. A MOAB with load break capability improves reliability and facilitates restoration by providing sectionalizing capability

during contingencies. The installation would allow the line to be sectionalized under load remotely. The project is estimated at \$1.5 million.

FY2022

In this period, GMP will do smaller electronics upgrade projects at certain substations to bring the communications, controls, and security capabilities in these facilities to an acceptable level. These projects are estimated to be between \$50,000 and \$100,000 each and are necessary for continued reliable and secure operations.

During this period, we are forecasting two significant substation projects. The first project will perform a voltage conversion at our Hydeville substation to increase its voltage to GMP's minimum standard of 12.47kV. We have been converting substations below this voltage up to that standard to increase reliability. We estimate this project at \$1.25 million. The second project will deliver certain reliability upgrades to our Newbury substation. This project will include installing a new foundation for the transformer, installation of a new circuit breaker and security system, as well as replacing porcelain insulators to improve safety within the facility. The project is estimated at \$1.25 million.

Distribution Lines

FY2019

The capital investment planned for this period has been documented and included in GMP's 2019 rate adjustment filing.

FY2020

During this period, GMP will deliver a number of capital investments to improve the performance of our distribution line operations. We will do a number of projects to replace existing plants that have gone beyond their useful age and need to be replaced in order to avoid near-term failure, as well as re-locating distribution lines from off-road locations to roadside as a reliability improvement measure. These projects include:

- Shrewsbury Line 4: pole replacements and re-conductoring. This project is estimated at \$300,000;
- Pomfret Line 201: pole replacements, re-conductoring, and re-location to roadside. This project is estimated at \$300,000;
- Royalton Line 01: pole replacements, re-conductoring, and re-location to roadside. This project is estimated at \$300,000;
- Barnard Line 1: pole replacements and re-conductoring. This project is estimated at \$330,000;
- Middlebury Line 56: pole replacements and re-conductoring. This project is estimated at \$395,000;
- Chester Lovers Lane: pole replacements, re-conductoring, and re-location to roadside. This project is estimated at \$524,000;
- Fairfield Line 2 Rt. 36 Poles 68 to 52: three-phase re-location to roadside. This project is estimated at \$320,000; and
- Tie between Essex and Underhill: re-build this tie along Rt. 15 for reliability. This project is estimated at \$500,000.

FY2021 – FY2022

During this period, GMP will continue to make investments necessary to deliver reliable power to its customers. Our planning pattern looks at the distribution line infrastructure that has performed below our reliability expectations or has reached an age level where it is a candidate for replacement. We typically do the analysis to identify these projects eighteen months in advance of the period when we will begin construction. At this time, we have distribution line planning through the end of our fiscal year 2020 and have not yet begun the planning beyond that period.

Transmission Substations

FY2019

The capital investment planned for this period has been documented and included in GMP's 2019 rate adjustment filing.

FY2020

During this period, we are forecasting three significant transmission substation projects. The first project will implement certain upgrades at our East Ryegate substation for reliability reasons. These upgrades will include installation of a new transformer, oil containment, circuit breakers, relay protection upgrades and associated fence, ground grid, communications, and security improvements. We estimate this project at \$1.5 million. The second project will deliver certain reliability upgrades to our Irasville substation. This substation is tapped off from a 37-mile long line between Middlesex and Montpelier with inadequate remote line protection. The upgrades to the substation would be comprised of oil containment, 34.5kV circuit breakers, relay protection upgrade, yard expansion associated fence, ground grid, and communications upgrades. The project is estimated at \$2.5 million. The third project will deliver a reliability improvement at the East St. Albans substation. This project involves the installation of two SCADA controlled 3.6 MVAR capacitor banks at the GMP East St. Albans substation. GMP engaged VELCO to complete a study for a proposed load increase in the St. Albans area. The study identified low voltage in the St. Albans area with the loss of the St. Albans 115/34.5 kV source at existing loads. These two capacitor banks are needed to provide voltage support during emergency contingency situations as well as during planned maintenance on the St Albans area 34.5 kV network. We estimate this project at \$1.1 million.

FY2021

During this period, we are forecasting three significant transmission substation projects. The first project will deliver certain reliability upgrades to the Lowell substation. These upgrades are necessary to address aging infrastructure concerns to improve safety and reliability. The transformer at the Lowell substation is a 15/20 MVA, 46 kV to 34.5 kV bank that is 43 years old. The existing 34.5 kV B-20 breaker is a 1973 vintage of a style that has proven to fail without warning. The protection and control technologies are obsolete; utilizing electromechanical relaying. We estimate this project at \$2 million. The second project will replace breakers at the Richmond substation. The primary reason for completing this project is to improve reliability. The upgrades to the substation would be comprised of adding two breakers, associated relaying and control house. This will improve reliability to customers served out of Richmond and Bolton. We estimate this

project at \$750,000. The third project involves a replacement of breakers and relays at our North Rutland substation. The primary reason for completing this project is to improve reliability. The upgrades to the substation would be comprised of replacing six existing breakers and replacing the relay control panels. The replaced breakers are oil breakers that have a track record of failures. The Protection/Control relays are being replaced as the 1990 vintage relays have reached their limit for useful life. GMP has experienced several failures of this style of relay after approximately 15 years of service. We estimate this project at \$900,000.

FY2022

During this period, we are forecasting two significant transmission substation projects. The first project will construct a new substation in the Danby, VT area that will improve reliability in that area by implementing looped backup capabilities. The primary reason for completing this project is to improve reliability. The project consists of completing a loop between two radial transmission lines and installing a new substation in the Danby area. This substation will be equipped with a distribution circuit as well as two transmission lines. The distribution circuit improves reliability by providing feeder backup to the Wallingford substation. We estimate this project at \$2.25 million. The second project is a re-build of our Highbridge substation. The primary reason for completing this project is to improve reliability. The upgrades to the substation would be comprised of replacing an existing breaker and adding two new breakers, associated relaying, ground grid, fence replacement and control house. The project is estimated at \$1.5 million.

Transmission Lines

FY2019

The capital investment planned for this period has been documented and included in GMP's 2019 rate adjustment filing.

FY2020

During this period, we are forecasting two significant transmission lines projects. The first project will re-conductor transmission line 102 from pole 25 to pole 252. This project is being delivered for reliability. VELCO's analytical studies in support of its most recent Long Range Plan identified the Maple Avenue to Charlestown 46 kV path as potentially overloading under first contingencies at existing loads (i.e. loss of Lafayette Street to Maple Avenue), in violation of GMP criteria. We estimate this project at \$4.5 million. The second project is also a re-conductoring project of the 3309 line from McNeil to our Gorge substation. The primary reason for this project is reliability. VELCO's analytical studies in support of its most recent Long Range Plan identified the Gorge to McNeil 34.5 kV path as potentially overloading under first contingencies at existing loads (i.e. VELCO East Avenue 115/34.5kV source), in violation of GMP criteria. The project is estimated at \$1 million.

FY2021

During this period, we are forecasting three significant transmission lines projects. The first project will re-conductor transmission line 44 between Castleton and Rutland. This project is being delivered for reliability reasons. The project is designed to address aging infrastructure. We estimate this project at \$2.8 million. The second project is also a re-conductoring project of the 3306 line from Websterville to the VELCO Barre substation. The primary reason for this project is reliability. VELCO's analytical studies in support of its most recent Long Range Plan identified the Websterville to VELCO Barre 34.5 kV path as potentially overloading under first contingencies at existing loads (i.e. VELCO East Avenue 115/34.5kV source), in violation of GMP criteria. The project is estimated at \$1.75 million. The third project is another re-conductoring project on line 133 between the Johnson substation and VEC's Eden Corners substations. This is a reliability project and will address aging infrastructure. We estimate this project at \$3.224 million.

FY2022

During this period, we are forecasting two significant transmission lines projects. Both projects are re-conductoring investments to address reliability. The first project will re-

conductor transmission line 3334 between the Sand Road substation and Richmond. This project is being delivered for reliability reasons. The project is designed to address aging infrastructure. We estimate this project at \$3.3 million. The second project is a re-conductor of line 133 from VEC's Eden Corners to Lowell substation. This is a reliability project and will address aging infrastructure. We estimate this project at \$4.052 million.

Power Production

FY2019

The capital investment planned for this period has been documented and included in GMP's 2019 rate adjustment filing.

FY2020

During this period, GMP will deliver a mix of projects to maintain and improve the operating characteristics of our generating assets. Many of these projects are smaller in scale and cost and are necessary capital investments in order to prevent larger costs in future periods. Several of the other projects delivered in this period will be larger in scope and cost and represent continued investment in these important generation facilities as GMP maintains its fleet of in-state, low-cost, renewable resources. Among these larger projects are:

- Modernization of Plant Electrical Systems:
 - Milton District, Peterson Hydro: a full evaluation and maintenance/replacement/repair of turbine, governor, and electrical systems. This project is done for reliability purposes. The project is estimated at \$1.8 million.
 - Middlebury District, Beldens Hydro: a full upgrade of the electrical components of the plant to bring it to standards. This is a reliability project that will also improve safety and efficiency of operating the plant. The project is estimated at \$850,000.
 - Cavendish District, Dewey Hydro: a full upgrade of the electrical components of the plant to bring it to standards. This is a reliability project that will also improve safety and efficiency of operating the plant. The project is estimated at \$850,000.
- Rubber Dam Replacements:
 - Colchester District, Essex Hydro: this project will replace the rubber dam element of the plant. The rubber dam helps control river flows to maximize power generation or manage flows over the dam depending on plant operating conditions. These are automated systems that allow the plant to be operated safely, effectively, and in compliance with operating permits. The estimate for this project is \$1 million.
- Spillway Re-Build:
 - Middlebury District, Silver Lake Hydro: this project will re-build the emergency spillway, which is critical to operating the plant under high water conditions. The current spillway is limited to an open/closed setting. The new spillway will be automated and allow for incremental settings that will manage water levels more safely and effectively. The estimate for this project is \$850,000.

FY2021

During this period, GMP will deliver a mix of projects to maintain and improve the operating characteristics of our generating assets. Many of these projects are smaller in scale and cost and are necessary capital investments in order to prevent larger costs in future periods to repair failed elements of the plants. Several of the projects delivered in this period will be larger in scope and cost and represent continued investment in these important generation facilities as GMP maintains its fleet of in-state, low-cost, renewable resources. Among these larger projects are:

- Modernization of Plant Electrical Systems:
 - Montpelier District, Middlesex Hydro: a full upgrade of the electrical components of the plant to bring it to standards. This is a reliability project that will also improve safety and efficiency of operating the plant. The project is estimated at \$2.1 million.
 - Cavendish District, Cavendish Hydro: a full upgrade of the electrical components of the plant to bring it to standards. This is a reliability project that will also improve safety and efficiency of operating the plant. The project is estimated at \$2.1 million.
- Rubber Dam Installation:
 - Milton District, Peterson Hydro: this project will replace the rubber dam element of the plant. The rubber dam helps control river flows to maximize power generation or manage flows over the dam depending on plant operating conditions. These are automated systems that allow the plant to be operated safely, effectively, and in compliance with operating permits. The estimate for this project is \$1 million.
- Re-surfacing:
 - Colchester District, Essex Hydro: this project will re-surface the dam, which is required for compliance of the facility. This is the first part of a two-part project at this facility. The second part of the project will be delivered in FY2022. Dam re-surfacing is required periodically at hydro facilities to maintain the integrity of the facility and create a safe working environment. The estimate for this project is \$800,000.
- Penstock Replacement:
 - Rutland District, E. Pittsford Hydro: this project will inspect and replace the penstock that feeds water to the turbines at this hydro facility. Integrity of penstock is critical to the safe and productive operation of the plant. Penstock inspections are performed proactively every five years. The estimate for this project is \$1 million.
- Emergency Spillway Upgrade:
 - Montpelier District, Marshfield Hydro: this project will upgrade the emergency spillway, which is critical to operating the plant under high water conditions. The current spillway is limited to an open/closed

setting. The new spillway will be automated and allow for incremental settings that will manage water levels more safely and effectively. The estimate for this project is \$750,000.

FY2022

During this period, GMP will deliver a mix of projects to maintain and improve the operating characteristics of our generating assets. Many of these projects are smaller in scale and cost and are necessary capital investments in order to prevent larger costs in future periods to repair failed elements of the plants. Several of the projects delivered in this period will be larger in scope and cost and represent continued investment in these important generation facilities as GMP maintains its fleet of in-state, low-cost, renewable resources. Among these larger projects are:

- Unit Refurbishment:
 - Cavendish District, Deweys Mills Hydro: this project will do a refurbishment of the hydro unit including inspection and overhaul of the turbine unit. This project is done for reliability and safety reasons to keep the facility in solid operating condition for the years ahead. The estimate for this project is \$800,000.
- Re-surfacing:
 - Colchester District, Essex Hydro: this is the second part of a multi-year re-surfacing project at this facility. The first part of the project will be delivered in FY2021. The project will re-surface the dam, which is required for compliance of the facility. Dam re-surfacing is required periodically at hydro facilities to maintain the integrity of the facility and create a safe working environment. The estimate for this project is \$800,000.
 - Montpelier District, Middlesex Hydro: this project will re-surface the dam, which is required for compliance of the facility. This project is the first of three parts required at this facility. The second and third parts will be delivered in FY2023 and FY 2024 respectively. Dam re-surfacing is required periodically at hydro facilities to maintain the integrity of the facility and create a safe working environment. The estimate for this project is \$800,000.
- Penstock Replacement:
 - Montpelier District, Marshfield Hydro: this project will inspect and replace the penstock at the surge tank at this hydro facility. Integrity of surge tank penstock is critical to the safe operation of the plant and required for operation. The estimate for this project is \$1 million.
- Surge Tank:
 - Cavendish District, Dewey Hydro: this project will proactively repair and reinforce the structural elements of the surge tank. The surge tank is an important safety element of the facility and inspection shows that

the structural elements of the surge tank are due to be reinforced due to age. The estimate of this project is \$1 million.

Information Technology

FY2019

The capital investment planned for this period has been documented and included in GMP's 2019 rate adjustment filing.

FY2020 – FY2022

GMP will focus a large part of its IT capital investments on the regular cadence of projects to maintain and upgrade our software and hardware infrastructure. This planned and proactive rhythm of projects is required to maintain a strong foundation of safety, security, and reliability upon which our overall operation depends. IT has become a core part of our operating foundation and enables virtually all other functions within the organization.

Most data center and district service center/plant hardware equipment has a three to four year cycle of production before needing to be replaced. This is due to the high duty cycles of the equipment in our 24/7/365 operation as well as vendor-enforced technical obsolescence and support sun setting. Capital investments are necessary to replace, upgrade, or add servers, networking equipment, storage, and applications. During this period, capital projects are likely to include work to enable the following:

- Customer Service Improvements:
 - Call center application upgrades or replacement
 - Enhanced Salesforce and other cloud-based integrations
- Operational Improvements:
 - Implementation of a new Work Management System
 - Oracle Utilities Suite Upgrades
 - Greenmountainpower.com website enhancements
- Capacity Improvements:
 - Consolidation of Advanced Metering Infrastructure (“AMI”) head end systems
 - Consolidation of AMI communications networks
 - Upgrades to Exadata storage environment
 - Upgrades to NetApp storage environment
 - PBX infrastructure upgrades or replacement
 - Expansion of Big Data/Analytics environments
- Security Improvements:
 - RTU and switch replacements at substations and plants
 - Security appliances and software

- SCADA Communications
- Video surveillance and physical security improvements at substations/
generation facilities
- New Technology Evaluation:
 - Customer Web and messaging services (web-based chat, etc.)

Due to the dynamic nature of IT development and procurements, these projects are done on shorter cycles than most of the other capital areas of the organization. The specific fiscal year resource planning and project budgeting occurs more in real-time. At present, GMP has an IT plan and named capital projects through the end of the FY2019 time period, but has not initiated the FY2020 project-specific planning process.

Meters

FY2019

The capital investment planned for this period has been documented and included in GMP's 2019 rate adjustment filing.

FY2020 – FY2022

Capital investment related to the metering function will be specific to maintaining responsible inventories of meters for each of the meter types we utilize across our customer base. We do not forecast significant investment beyond that. Any back office information technology investments related to the metering function would be included in IT capital investments.

Property & Structures

FY2019

The capital investment planned for this period has been documented and included in GMP's 2019 rate adjustment filing.

FY2020

FY2020 is forecasted to have capital investments predominantly in the maintenance and upkeep of existing facilities to keep them in good working order and prevent more expensive downtime and repairs in the future. The types of investments planned, include:

- HVAC Replacement
 - Rutland Service Center
 - St. Johnsbury Service Center
- Parking Lot Re-paving
 - Royalton Service Center
 - St. Johnsbury Service Center
- Facility Updates
 - Montpelier Service Center Restrooms
- Fleet Garage Update
 - Montpelier Service Center Garage Heating System
 - Montpelier Service Center Garage LED Lighting & Ceiling Fans
- Backup Power Sources
 - St. Albans Service Center Generator
- Inventory Equipment Replacement
 - St. Albans Service Center Crane

FY2021

FY2021 is forecasted to have capital investments predominantly in the maintenance and upkeep of existing facilities to keep them in good working order and prevent more expensive downtime and repairs in the future. The types of investments planned, include:

- HVAC Replacement
 - Poultney Service Center
 - White River Junction Service Center Rooftop Units Replacement
- Parking Lot Re-paving
 - Poultney Service Center
- Facility Updates
 - Colchester Service Center Locker Rooms
 - Montpelier Service Center Electrical Service Upgrade
 - Montpelier Service Center Carpet Replacement

- Fleet Garage Updates
 - White River junction Garage LED Lighting
- Storage
 - St. Albans Service Center Out Building

FY2022

FY2022 is forecasted to have capital investments predominantly in the maintenance and upkeep of existing facilities to keep them in good working order and prevent more expensive downtime and repairs in the future. The types of investments planned, include:

- HVAC Systems
 - Sunderland Service Center Heat Pumps
 - Springfield Service Center Heat Pumps
- Parking Lot Re-paving
 - Operations Headquarters Re-paving
- Backup Power Sources
 - Colchester Service Center/HQ Generator
- Facility Updates
 - Colchester Service Center/HQ Redesign/Furniture

Transportation

FY2019

The capital investment planned for this period has been documented and included in GMP's 2019 rate adjustment filing.

FY2020

GMP will execute on our normal end-of-life cycle of vehicle retirements and replacements. In FY2020, GMP is forecasting to replace the following vehicle types that will reach the period of planned replacement:

- Six bucket trucks, all of which are model years 2007 or 2008;
- One digger truck; and
- Sixteen light vehicles, including twelve pickup trucks and four small SUVs.

FY2021

GMP will execute on our normal end-of-life cycle of vehicle retirements and replacements. In FY2021, GMP is forecasting to replace the following vehicle types that will reach the period of planned replacement:

- Six bucket trucks, all of which are model years 2007, 2008, or 2009;
- One digger truck; and
- Sixteen light vehicles, including twelve pickup trucks and four small SUVs.

FY2022

GMP will execute on our normal end-of-life cycle of vehicle retirements and replacements. In FY2022, GMP is forecasting to replace the following vehicle types that will reach the period of planned replacement:

- Six bucket trucks, all of which are model years 2008, 2009, or 2010;
- One digger truck; and
- Eighteen light vehicles, including fifteen pickup trucks and three small SUVs.

New Initiatives

FY2019

The capital investment planned for this period has been documented and included in GMP's 2019 rate adjustment filing.

FY2020 – FY2022

We have forecasted a conservative amount each year for the current and expanding portfolio of customer-facing programs that GMP is delivering to its customers to promote energy transformation. Certain of these programs include capitalized assets that GMP deploys to participating customers as part of the program, and are limited to the Powerwall 2.0 program today. We expect that as new innovative pilots are undertaken in the future that some may include capital assets and some may not. The specific nature and technologies of the pilots will dictate that.

Joint Ownership

FY2019

The capital investment planned for this period has been documented and included in GMP's 2019 rate adjustment filing.

FY2020 – FY2022

We have forecasted our regular, joint-ownership investments in these generation facilities:

- Millstone nuclear station;
- McNeil biomass station;
- Wyman generating station; and
- Stony Brook generating station.