Project Number and Title	Additional Information	Project Description	Project Justification
Production - Interim Period (Oct. 2017 - Dec. 2018)			
153354: Middlebury Lower Rewind	Project Type: Production In-Service Month: 10 In-Service Year: 2017 Primary Purpose: Reliability Secondary Purpose: Safety Priority: Required Total Project Spending: $175,749	This is a project to rewind the Middlebury Lower #3 hydro generator stator. After routine cleaning, in the summer of 2016, testing was performed on the generator before it was returned to service. The stator Megger test results were too low to safely return it to operation. This project was initiated following annual Megger testing of the Middlebury Lower #3 generator stator, the results of which showed that the insulation has degraded to a point where the unit can no longer be operated. Based on these test results, the unit was taken out of service and is no longer generating power, reducing the operational efficiency of this station by 33 percent. It was thought that the stator had absorbed moisture from the cleaning and humid summer air, so additional heat was applied to the generator for a few days and tested again. The test was still unsatisfactory. The scope of the project was to rewind the stator, install six new resistance temperature detectors, test the core laminations and replace as necessary. The core tested fine and was not replaced.	The project was necessary to complete so the hydro generator could be returned to service. It provides revenue of $864/day operating at full load and assuming LMP (locational marginal pricing) of $40 per MWh.
156726: Kendall Farm Compressor	Project Type: Production In-Service Month: 10 In-Service Year: 2017 Primary Purpose: Reliability Secondary Purpose: n/a Priority: Required Total Project Spending: $38,307	This project involved the replacement of a compressor at the Kendall Farm Synchronous Condenser site in Winhall, VT, and was completed in October 2017. This project was not included in the 2018 rate filing because project costs were not fully known at the time of filing. This project was initiated following a failure of the #2 compressor at the Kendall Farm site. The compressor is a device utilized to cool the #1 chiller for the #1 Synchronous Condenser. Kendall Farm has 2 Synchronous Condensers, 2 Chillers and 4 compressors. A synchronous condenser's purpose is to adjust conditions on the electric power transmission grid. Its field is controlled by a voltage regulator to either generate or absorb reactive power as needed to adjust the grid's voltage, or to improve power factor. The condenser's installation and operation are identical to large electric motors and generators. Each synchronous condenser has two compressors for cooling that can work independently or together depending on the cooling needs at any given time. At times when the cooling needs are not significant, the two compressors can provide a level of redundancy; however, during high demand, both units are necessary to provide adequate cooling. This work order covers the installation of a new compressor for #2 only.	The Kendall project was built in 2004. Prior to failure, the #2 Compressor was reaching the end of its serviceable life. The three remaining compressors at the Kendall site had been replaced in prior years due to failures. When the #2 Compressor, failed the remaining compressor on the synchronous condenser was unable to provide sufficient cooling during high demand. In addition, with only one compressor functional, the redundancy factor at low demand times was eliminated and if the second compressor failed the synchronous condenser would have to be shut down. Therefore, it was necessary that the #2 Compressor be replaced.
151201: Proctor Station Windows	Project Type: Production In-Service Month: 11 In-Service Year: 2017 Primary Purpose: Regulatory Compliance Secondary Purpose: Reliability Priority: Required Total Project Spending: $107,602	This project was completed in November 2017. This project was not included in the 2018 rate filing because it did not meet the known and measurable standard at that time. Since the 2018 rate filing, GMP gained approval, purchased 7 new windows, and installed them. This project included the replacement of windows at the Proctor Hydro Electric Facility in Proctor VT. This project was identified following the Proctor Redevelopment, which was completed in recent years. One aspect that was not addressed was replacement of the existing aluminum storm windows that were functioning as windows. These windows were also not historically accurate, nor did they provide ventilation.	This project was necessary due to the decay of the original windows. In addition the existing windows were improbably installed in an earlier renovation prior to GMP ownership. The original storm windows were not historically accurate. In order to replace the windows, GMP needed to comply with DHP requirements. . The secondary purpose for completing the work is increased airflow in the facility. There are instances in the summer when the #5 Turbine must be shut down due to overheating, reducing the production of clean, low-cost energy. The smaller windows were no longer operational and affected the facility's natural cooling in the summer. The new windows increase the ability to vent the space and draw in fresh air through the pre-existing mechanical fans located in the building.
153335: 2017 Searsburg Gearbox	Project Type: Production In-Service Month: 11 In-Service Year: 2017 Primary Purpose: Reliability Secondary Purpose: Operational Efficiency Priority: Required Total Project Spending: $113,557	This project was completed in November 2017. It included the rebuild of a gearbox for the Searsburg Wind Site. The gearbox is located between the turbine blades and generator located at the top of the wind tower in an enclosure called a Nacelle. Searsburg wind facility has eleven 550KW wind turbines. One gearbox is rebuilt yearly to stay ahead of failures. The 2017 rebuild incorporated a new style of gearing, and gearbox-housing modifications were needed to accommodate the new style of gears. The new gears have been utilized at other facilities within the same gearbox, and the typical result is longer gear life. There is no added cost for the gearing over previously used gearing, however there is a small added cost associated with the housing modification. The gearbox was completely disassembled, the high-speed pinion was replaced, bearings were replaced, and the gearing was replaced. The gearbox housing gear centerlines were adjusted to accommodate the new gearing. All other components were inspected for wear and reinstalled during the rebuild.	To ensure all turbines at Searsburg remain online at Searsburg, we need to remanufacture one gear box per year. Typically, the gearbox life span is 10-15 years. Remanufacturing one gearbox yearly keeps the site on schedule, and ahead of failures. If the gearbox were to fail prior to preventative maintenance, GMP would lose generation during the 6-month period required for remanufacturing. This period is longer if a gearbox fails in the winter, as cranes can only safely access the site after the spring.

Project Number and Title	Additional Information	Project Description	Project Justification
156309: KCW 5 and 9 Leads	Project Type: Production In-Service Month: 11 In-Service Year: 2017 Primary Purpose: Operational Efficiency Secondary Purpose: Innovation Priority: Required Total Project Spending: $52,015	This project will add Leading Edge Protection (LEP) coatings to wind turbine blades at the Kingdom Community Wind project. Wind turbine blades are the largest and most costly component of the wind turbines. Wear on blades comes from environmental attributes such as ice, rain, sleet, snow, dirt, sand, and any other particulate present in the environment while the turbines are operating. The leading edge of the turbine blade is traveling through the particulate at speeds up to 171MPH at the tip, constantly wearing down the surface on the leading edge. It is recommended that blade repainting takes place every 5 years to minimize damage to the turbine blade. With the use of LEP, the product is expected to last 8-10 years depending environmental aspects. Vestas personnel who are trained in the techniques needed to apply the LEP will conduct the project work. The technicians are able to utilize basket to complete the task while the blade is attached to the turbine, minimizing costs associated with the project. Turbine blades are sanded and prepped for the multi-coat application. The LEP is more robust than the paint applied at the factory, enabling longer timeframes between applications. This project was completed in the summer of 2017; however it was not closed until November 2017. This project was not included in the 2018 rate filing because we did not have sufficient cost information at the time of filing.	Turbine blades at KCW have been in service for 5 years at this time. Ensuring blades on turbines are in optimal condition will ensure the longest life possible out of the blades, which are the most expensive part of the turbine. Our intentions are to have these turbine blades last the entire life of the project, and LEP applications will give KCW the best opportunity to meet this goal.
146734: Chittenden Saddles	Project Type: Production In-Service Month: 12 In-Service Year: 2017 Primary Purpose: Regulatory Compliance Secondary Purpose: Safety Priority: Required Total Project Spending: $1,406,855	This project was completed in December 2017. The project included the replacement of penstock saddles. The penstock, which is 3.1 miles long, connects the Chittenden Reservoir to the East Pittsford Powerhouse. The penstock was inspected in the late summer of 2015. The work that was completed in the Summer/Fall of 2017 under this work order was directly connected to items uncovered during the third-party inspection of the penstock, which determined that the saddles (concrete and/or metal cradles that support the penstock) were no longer adequately supporting the penstock, which causes stress points on the penstock and increases the potential for catastrophic failure. Due to the scale of this project, it had to be completed in two separate construction seasons. This project was the first phase. Phase II will occur in 2018 under a separate work order, 153707 Chittenden Saddles Phase II. This phase of work addressed a 2,500-foot portion of the penstock. 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. 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 purposes of this project are regulatory compliance and safety. The compliance piece addresses deficiencies identified by a third-party engineer. The safety purpose concerns public and worker safety. The saddle project needed to be constructed in 2017 because many of the existing original saddles had failed, creating an unsafe working environment. In the event of a penstock failure due to weakened supports, there could have been major environmental and potentially safety impacts. Proactively installing new supports ensures safe, reliable operation of the penstock, and reduces the risk of failure. Putting these improvements off unnecessarily endangers employees, local residents and people downstream from the site. There are three ways to remove water from Chittenden Dam, which is classified as a high-hazard facility: 1. The penstock, 2. The waste gate into East Creek, 3. Uncontrolled releases over the top of the spillway. While we do use the waste gate at least annually to maintain our water rights downstream, using this mechanism alone, rather than using the penstock as well, would significantly reduce the margin of safety and significantly reduce our ability to manage appropriate water levels for safety, public access and generation. Maintaining a functioning, well-maintained penstock is critical to our ability to provide good generation and public safety. The penstock work will also help support continued generation of clean, renewable energy, in support of state goals and policy.
153236: Milton HPU & Excitation Upgrade	Project Type: Production In-Service Month: 12 In-Service Year: 2017 Primary Purpose: Reliability Secondary Purpose: Operational Efficiency Priority: Required Total Project Spending: $457,460	The Milton HPU & Excitation Upgrade is a project to replace the excitation equipment and upgrade the governor controls at Milton Hydroelectric Plant. This project was completed under approved budget. This project was placed into service in December 2017. The last invoice was not received at the time the project was complete, therefore a forecast is provided with this work order to account for final invoicing. The excitation equipment, which regulates the voltage, is used for system stability, voltage control, and start-up and synchronizing. The efficiency of the unit can be reduced if this equipment is not working properly. The existing equipment reached end of life and was no longer supported by the vendor. In addition, GMP upgraded the facilities Governor Controls in December of 2017. The governors control the wicket gates of the turbine, which manipulate the water, adjusting the turbine speed. Prior to the upgrade, the governors were not controlled by SCADA or the plant PLC, so they could only be manually operated. GMP retrofitted the existing governors with an intelligent proportional valve and electronic components to permit PLC control of the unit.	The construction of this project was completed in December 2017. The project was necessary at this time for two reasons: 1 – The excitation equipment was replaced for reliability. As noted above, the existing excitation equipment has reached the end of its useful life and a failure of this equipment would result in an unplanned, extended outage due to the required engineering and time to procure and install the new equipment. The average delivery is 12-16 weeks upon completion of initial engineering and order placement. 2 – The Governor Controls were replaced to allow the company to comply with Independent System Operator – New England's (ISO-NE's) dispatch instructions requirements. The Milton hydro station is part of the Lamoille Composite, which is offered into the ISO-NE wholesale market as a non-intermittent, electronically dispatchable resource. As part of being offered into this market, GMP's control room receives real time dispatch instructions from ISO-NE's control room that dictates the generating level of the Lamoille Composite that GMP must immediately comply with. The recent changes in ISO-NE market rules and how our units are being offered in have required GMP's control room to react to a much higher frequency of dispatching the units to various loads. The existing 1929 mechanical controls for the governor were failing to respond and or were not able to maintain the generation loads as required by ISO-NE market rules. Since the project no longer must be operated manually, we can now respond more quickly and with less safety risk for our employees.

Project Number and Title	Additional Information	Project Description	Project Justification
153610: Chitt Dam Headworks & Manholes	Project Type: Production In-Service Month: 12 In-Service Year: 2017 Primary Purpose: Regulatory Compliance Secondary Purpose: Safety Priority: Required Total Project Spending: $1,483,685	This project was completed in December 2017. The penstock, which is 3.1 miles long, connects the Chittenden reservoir to the East Pittsford Powerhouse. The 3.1-mile penstock was upgraded with several penstock access risers. In addition, drains were added at several low points in the penstock that collect water when not in operation, and new access ports were added to the penstock. Upgraded riprap backfill was added around the penstock in locations to prevent erosion, and to ensure protection of the penstock when vehicles traverse underground sections. Work also included the installation of new motorized openers for the four dam-control gates. Work on the gates included SCADA control, which provides remote operation of the gates by individuals in the Rutland Control Center (vs. only local operation of the gates). The control building for the penstock gate was replaced, and the surge tank skin was upgraded. At the two penstock trestle crossings, safety walkways and rails were replaced.	This project will ensure the continued safe operation and ability to move water out of the dam as well as continue the safe operation of the generation facility, East Pittsford, downstream. The dam gate control operators are original to the construction of the dam, which was more than 100 years ago. Mandatory annual penstock inspections identified many low spots in the penstock with no access to pump or drain the pipe for adequate inspection of their integrity. Low areas create safety hazards for workers during the inspection process. Penstock access risers were also added to the penstock to ensure worker safety while accessing the penstock for inspections. While safety is the core focus, GMP also expects to realize modest O&M savings as a result of this project. • The motorized gate openers were nearing the end of their life expectancy and SCADA controls will enhance operational safety and performance. • Penstock access has been historically challenging; these enhancements improve safety and reduce downtime during routine inspections. • The continued safe operation of the facility is GMP's top priority, and as many of these items reached the end of their functional life, safety hazards were created. Completing these projects made working at these locations much safer and reduced the effort necessary to safely operate these facilities.
155196: Potencia Searsburg Generators	Project Type: Production In-Service Month: 12 In-Service Year: 2017 Primary Purpose: Operational Efficiency Secondary Purpose: Innovation Priority: Required Total Project Spending: $91,551	This project was completed in November 2017 and included the purchase of two Potencia generators. This project was not included in the 2018 rate filing because it did not meet the known and measurable standard. The GMP Searsburg Wind Project is located in Searsburg and includes 11 Zond Z-40 Wind towers. The generator is located in the nacelle of each turbine. The generator is connected to the turbine gearbox & blade assembly. The generator transfers the mechanical energy of the spinning Turbine blades to AC electricity. Prior to the completion of this project, GMP had no remaining generators for use as replacement units. The generators that had been purchased as replacements had all been used. GMP has previously worked with Allegheny Electrical to rebuild a generator. With the catastrophic failure that took out our last generator, the purchase of a new generator was necessary, to ensure that one spare unit remained at the site. GMP got a quote from Potencia for a new generator to be built. However, since there were savings if GMP purchased two units, GMP did so.	To ensure that all turbines at Searsburg remain online, we keep one generator onsite as a spare in the event of a failure. With the turbines beyond their initial lifespan, generators are failing at the rate of approximately one per year. Keeping a spare generator onsite allows to quickly install a new generator when a failure occurs.
155222: Glen Rack Install	Project Type: Production In-Service Month: 12 In-Service Year: 2017 Primary Purpose: Reliability Secondary Purpose: n/a Priority: Required Total Project Spending: $224,554	This project was completed in September 2017 and closed in December 2017. This was a reliability-driven project. This project was not included in the 2018 rate filing because it did not meet the known and measurable standard. The project consisted of the dredging and removal of an area directly in front of the intake rack structure, installation of a new 30-foot rack, gate stem and operator and associated controls. The former racks were 30 feet long, and approximately half of them were buried in river gravel and debris. A three-sided structure constructed of steel sheet piling was driven into the streambed to stabilize the area for excavation. After excavation, the old 30-foot long racks, old gate stem shaft and mounting plate, and electric gate operator were removed and retired. Following demolition, new rack frame bracing, a short extension on the top section of rack mounting frame, and new 30 foot racks were installed. A new gate stem and mount on top of gate frame and new electric gate opener on the top of the new gate stem and associated wire and controls for remote operation were also installed.	The racks were at the end of their useful life. There was significant corrosion between the supports that held the rack spacing in place, especially in the section that had been buried below the riverbed grade. A small section of the rack frame that had become chipped out of the concrete required replacement. This was necessary because if a section of the rack broke out, large rocks and sticks could get into the penstock and be forced down to one of the two generators, potentially causing catastrophic damage to the unit's runner or gates. Additionally, the gate stem had become worn and partially detached from the gate at the inlet of the penstock. This presented a hazard if the gate stem failed as we would not have been able to safely close the gate.
155519: Berlin GT Baseplate Switches	Project Type: Production In-Service Month: 12 In-Service Year: 2017 Primary Purpose: Reliability Secondary Purpose: n/a Priority: Required Total Project Spending: $42,568	This reliability project replaced the "baseplate" pressure switches on the Berlin Gas Turbine (GT). The switches are protection devices that monitor pressures in various locations on the engines. When the pressure is out of range, the switches will trip and shut the engines down or prevent startup. Many of the switches were original equipment on the early 1970s vintage gas turbine. They were worn out and at the end of their useful life, and responsible for causing many nuisance trips or failed starts. This project was completed in December 2017. This project was not included in the 2018 rate filing because it did not meet the known and measurable standard at the time of the filing.	The project was necessary to improve the reliability of the Berlin GT. The Berlin GT provides 50% of our thermal unit capacity for the Reserve and Capacity markets. This equates to $50,000 per month for Reserve and a conservative $208,000 per month for the Capacity market based on current market conditions. If the turbine fails to start or shuts down during a run, GMP is penalized by losing revenue.
156196: Essex Shaft Seal	Project Type: Production In-Service Month: 12 In-Service Year: 2017 Primary Purpose: Reliability Secondary Purpose: n/a Priority: Required Total Project Spending: $46,866	This project was completed in December 2017 with the purchase of seals. This is a reliability project to replace the shaft seals on two of the four large hydro turbines at the Essex plant. The two large turbines have been in service for over 100 years. Because of shaft wear, the original packing shaft seals were replaced with mechanical seals several years ago. These seals have had operational challenges since their installation, with many revisions over the years. The seals are complex, difficult to install and align, and do not maintain a positive seal.	The project is necessary to reduce the number of hours associated with maintaining the current seals. Each turbine has two seals. One turbine will be retrofitted with the new seals in a fiscal year. It is estimated that three man weeks per year are consumed maintaining and adjusting the current seals.

Project Number and Title	Additional Information	Project Description	Project Justification
156542: Vergennes #5 Rotor Rewind	Project Type: Production In-Service Month: 12 In-Service Year: 2017 Primary Purpose: Reliability Secondary Purpose: Safety Priority: Required Total Project Spending: $166,358	This reliability project was to rewind the rotor and overhaul components on the stator of the Vergennes #5 diesel generator. The project has already been completed. The generator was returned to service in November 2017 and the project was closed in December 2017. This project was not included in the 2018 rate filing because this was an unplanned project, required by a failure. Last fall, Electrical Maintenance was performing routine testing on the generator and found, through Meggar testing, that the rotor had a dead short. The generator was sent to a repair shop so the rotor could be cleaned and baked in hopes the short was caused by contaminates in the coils. After cleaning, baking, and retesting, the short remained. All rotor poles except for one tested poorly. It was decided then the rotor had to be rewound. Additionally, after inspection, issues were found with the guide bearing and stator coil serge rings. These issues were also addressed under this project. The scope for this project included a complete rewind of the rotor, cleaning and baking the stator, replacement of the stator coil serge rings, and replacement of the guide bearing and bearing insulation.	The project was necessary at this time because the generator could not be safely operated with a dead short in the rotor. This diesel generator resides in the reserve and capacity market. It provides capacity as well as stability to the system in the Vergennes area. This unit generates revenue of $5,300 per week to be available when the unit is functional. Having this unit offline costs GMP's customers that revenue.
157141: Fairfax Unit 1 Stator Leads	Project Type: Production In-Service Month: 12 In-Service Year: 2017 Primary Purpose: Reliability Secondary Purpose: Safety Priority: Required Total Project Spending: $80,648	This was a safety and reliability project to replace the Fairfax Unit #1 generator leads. The project is complete and the unit was returned to service in November 2017. While performing work on the Fairfax Unit #2 during the summer of 2016, the insulation on its generator leads was found to be in poor condition and had to be replaced. Because of this, the Unit #1 generator leads were inspected and found to be in the same poor condition. The generator lead insulation material was no longer oil resistant. After years of operation in an oily, grimy environment, the generator lead insulation had swelled, weakened, and became detached from the cables. If left alone, the insulation would have eventually broken away from the generator leads, exposing the conductors. The scope of this project was to disassemble the generator and remove the stator, ship the stator to a repair shop where it was cleaned and baked, and replace the generator leads. The rotor was cleaned, inspected and tested on site.	It was necessary to replace the generator leads at this time to preemptively prevent an electrical fault due to failed insulation. An electrical fault would cause equipment damage, possibly a fire, and could cause harm to employees.
154162: Beldens Runner install	Project Type: Production In-Service Month: 2 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: Regulatory Compliance Priority: Required Total Project Spending: $50,384	This project involved replacement of the bolts securing the turbine blades to the runner of the #3 Hydro unit. It was initiated in March 2017 after an inspection of the unit revealed leakage around the blade seals. Leaking oil could potentially enter the river, which is an environmental hazard. Since GMP has an obligation to ensure the safe and reliable operation of its units, the unit was taken out of service. Normally, seal work is managed as a maintenance project; however, once contractors gained access to the hub, they realized that the bolts securing the blades to the runner had reached the end of their life and required replacement. The blade bolt replacement was the primary scope of work performed under this work order. The bolts were purchased under a separate project number (153135 Belden #3 Bolts).	The project was necessary to complete so the hydro generator could be returned to service. Beldens #3 is a large unit, with a nameplate capacity of 4.1 MW. Assuming locational marginal pricing of $40 per MWh, this unit can produce $3,936MW in revenue each day.
155392: Gorge #18 Blade Seals	Project Type: Production In-Service Month: 2 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: n/a Priority: Required Total Project Spending: $149,489	This project had two objectives: To replace the blade servomotor lower seal in the Gorge hydroturbine, and to install a vacuum system on the collector rings of the Gorge generator. The Gorge hydroturbine water wheel is a Kaplan. Kaplan wheels are propeller-style wheels where the pitch of the blades varies to improve operational efficiency. The blade servomotor is a hydraulic cylinder built into the turbine shaft, which actuates the blades. The Gorge shaft and seal are designed with a relief port and site glass. Early last year, oil began collecting in a site glass indicating the seal was failing. Collector rings are used to transfer power from the (stationary) generator exciter to the (rotational) generator rotor. Carbon brushes make the physical contact to the collector rings. Carbon brushes are used because of their ability to conduct electricity and low friction. Because of the large diameter of the Gorge collector rings, the speed of the rings against the brushes is very high, causing the brushes to wear at a high rate. Carbon dust from the brush wear, builds up on the brush holders, collector rings, and ring retainers. Ovr time, the built up carbon dust allows electrical tracking. The generation protection detects when the tracking reaches too high a level, and shuts the unit down. A vacuum system was installed to collect the carbon dust as it is generated so it can't build up on the equipment.	It was necessary to replace the servomotor seal to improve the reliability and environmental safety of the turbine. The leakage site glass is mounted on the turbine shaft in the wheel pit. The wheel pit is the chamber between the powerhouse and the river, where the turbine shaft enters the water. It is typical for some water to leak around the shaft seal into the wheel pit. This water is evacuated out of the wheel pit and returned to the river. Since the leakage site glass is in the wheel pit, it is critical that any issue is addressed as soon as oil is seen in the site glass, to prevent oil from entering the river water. Installing the vacuum system was necessary to improve the reliability of the turbine as well. Carbon build up on the collector rings is responsible for approximately four unplanned shutdowns per year. These shutdowns can last for several days while the rings are cleaned. At full load, the machine is capable of producing approximately 96 MWh of clean, renewable electricity per day. Assuming a locational marginal pricing of $40/ MWh, the machine generates revenue of $3840/day.

Project Number and Title	Additional Information	Project Description	Project Justification
153290: Essex Excitation	Project Type: Production In-Service Month: 3 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: n/a Priority: Recommended Total Project Spending: $521,691	Recently (January 2017) GMP has been having trouble with regulating VAR s on the Hydro units (1-4) at Essex. (VARs are the units by which reactive power is expressed in an AC electric power system and are critical during abnormal system conditions.) This issue is especially apparent when more than one unit is connected to the grid. VARs are controlled by the excitation equipment. Eaton assisted GMP in troubleshooting the failing excitation devices at Essex and concluded that ongoing failure of the original excitation equipment at Essex was a root cause. The excitation equipment was original and no longer supported by the manufacturer, Siemens. In addition, the excitation equipment parameters are linked to grid characteristics: grid strength and regulation was very different at the time the original Siemens' equipment was specified and installed. It has been determined the excitation equipment at Essex needs to be replaced. GMP has elected to proceed with engineering, procurement and installation of excitation equipment for units 1-4. Reliability is the primary reason for completing this project. The VAR issue is directly related to KW output. When the units spend time "hunting," or changing VARs above or below grid unity, excess heat is generated locally, reducing output. Addressing this issue will increase output.	This project was appropriate at this time because the existing equipment reached the end of its service life and required replacement to maintain reliable operation and output. This project was a reliability-driven project. The equipment procurement involved a 16-week lead-time. By being proactive, GMP was able to replace this equipment with limited generation outage.
153323: Rec Project #2 Parking Lot	Project Type: Production In-Service Month: 3 In-Service Year: 2018 Primary Purpose: Regulatory Compliance Secondary Purpose: State Energy Policy Priority: Recommended Total Project Spending: $46,717	This project was in response to receiving a new License to Operate the Waterbury Hydroelectric site. A requirement of that license has been the installation of recreational improvements for the public. This project was the first of many, and was completed in December of 2017. The project was the removal of the existing entrance gate on the access road to the powerhouse, the development of a parking area for approximately four to six vehicles, and hardening and stabilizing of the existing trails. This project was completed for less than approved budget.	This project was completed in November 2017. This project is a component of the new license granted by FERC to the Waterbury Hydroelectric Project on February 19, 2016. Article 404 of the FERC license, as well as Condition K of the Vermont Department of Environmental Conservation's ("VT DEC") Water Quality Certification ("WQC"), require GMP to file a Recreation Plan detailing measures to be implemented for the new licensing period in consultation with the United States Fish and Wildlife Service ("USFWS"), VT DEC, Vermont Department of Forests, Parks, and Recreation ("VT FPR"), and the town of Waterbury, Vermont. On October 19, 2016, and supplemented January 6, 2017, GMP filed a Recreation Plan pursuant to Article 404 of the project license. On March 1, 2017 FERC issued an Order approving the Recreation Plan and specified that all work regarding the Recreation Plan must be completed by December 31, 2019. GMP has worked with VT FPR, VT DEC, VT ANR and the town of Waterbury, VT and determined that it would be advantageous for all parties and the common good to have these recreational resources constructed and in place for the beginning of the 2019 recreational season.
158839: Rutland GT fuel pump	Project Type: Production In-Service Month: 3 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: n/a Priority: Required Total Project Spending: $204,418	This project is complete and included the rebuild of a failed fuel pump that is necessary for the operation of the Rutland Gas Turbine (GT) generator. In December 2017, Vermont experienced extreme cold conditions. The Rutland GT (along with all GMP fuel units) were called upon by ISO-New England for operation (ISO NE), but the Rutland GT failed to start. After diagnosis, it was found that the fuel pump that supplies pressurized fuel and creates ignition in the turbine had failed. GMP installed the new spare pump that we keep on hand for this scenario. Following installation of the new spare pump, a test run of the turbine was conducted and the turbine ran fine and was put back in service. ISO NE then called for the unit to be operated and it ran properly for approximately 10 hours before the replaced pump failed. GMP had no additional pumps available for immediate installation, resulting in an outage of the Rutland GT for approximately 2 weeks.	The regional electric grid relies on peaking fuel units to stabilize the grid during extreme temperature weather events. ISO NE is responsible for keeping electricity flowing across the six New England states and ensuring the region has reliable, competitively priced wholesale electricity today and into the future. GMP is obligated to ISO NE to have our fuel units available. As GMP was not meeting this obligation with the failure of Rutland GT, GMP elected to proceed with this project as quickly as possible to bring the asset back to the market.
143387: 2016 Ascutney GT PLC Upgrd	Project Type: Production In-Service Month: 5 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: n/a Priority: Required Total Project Spending: $777,784	This is a project to replace the Ascutney Gas Turbine (GT) system control computer (PLC) and software. The current PLC is experiencing intermittent failures, which has caused several missed starts. The Ascutney GT is included in various capacity markets for ISO NE, and can provide a daily value of $4,000 - $8,000. A failure to start can result in partial loss of daily value based on being penalized and or a cumulative loss of revenue until capacity of the unit is re-established. The project is required at this time to replace the PLC before it completely fails. As with other recent modernizations, this project will improve the Control Center's ability to remotely operate and diagnose issues at the facility, which will help maintain the production of energy from the site.	In addition to the reliability benefits, the project will also provide operational efficiency benefits. This project will result in a reduction of Relay Technician and Power Production Worker emergency call-outs; possibly increased capacity value for this site; and a reduction in fuel consumed for unnecessary tests required after failed starts.
148901: Weybridge FERC	Project Type: Production In-Service Month: 5 In-Service Year: 2018 Primary Purpose: Regulatory Compliance Secondary Purpose: Operational Efficiency Priority: Required Total Project Spending: $55,778	This project is required under GMP's FERC license for the Weybridge facility, which required GMP to develop a Historic Properties Management Plan ("HPMP") establishing a process to identify the nature and significance of historic properties possibly affected by project maintenance or operation. The HPMP also established procedures for consulting with the Vermont Division for Historic Preservation ("VDHP") and the public concerning the potential effects of the projects on historic properties. The project includes the remaining Phase III data recovery work associated with the Wyman Island archaeological site. The island is immediately downstream from the Weybridge project and is surrounded by a series of islands, river bends and complex river channels. Variations in natural river flows and project operation combine to add to the complexity of river flow in these channels including those surrounding the island. The archaeological site (VT-AD-496) is actively eroding and field work was complete in 2015. The balance of work required is analysis of recovered artifacts, reporting, curation and public education in accordance with Historic Properties Management Plan (HPMP) requirements.	Development of the Historic Properties Management Plan (HPMP) is a FERC license requirement under the Section 106 National Historic Preservation Act. The HPMP for the project license is a 'living document' that spans the license life and thru consultation with the State Historic Preservation Officer, identifies cultural resources at the project that require further identification, protection or mitigation. This project is required by the FERC license, and supports state and federal policy as regards Native sites.

Project Number and Title	Additional Information	Project Description	Project Justification
143389: 2016 Berlin PLC HMI RTU Upgr	Project Type: Production In-Service Month: 6 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: Operational Efficiency Priority: Required Total Project Spending: $688,053	The proposed project will replace the existing control system (PLC) and associated electrical and communication equipment with new, serviceable equipment. The existing PLC is now obsolete and no longer supported by General Electric or Integrated Control Systems. Further, the logic computer, which is the heart of the control system, is experiencing intermittent input/output card continuity issues. In order to maintain control needs in the future and reduce risk of a start failure or major control failure, the control system needs to be replaced.	The existing PLC is now obsolete and no longer supported by General Electric or Integrated Control Systems. Further, the logic computer, which is the heart of the control system, is experiencing intermittent input/output card continuity issues. This has contributed to periods of poor reliability, and failed starts when called upon by ISO NE. In order to maintain control needs in the future and reduce risk of a start failure or major control failure, the control system needs to be replaced. The primary revenue stream for the Berlin GT is participation in the Capacity and Forward Reserve Markets. In June of 2018, ISO New England will institute the Pay for Performance program, which has increased value and risk for peaking units. The estimated annual value of the Berlin GT from June 2018 – June 2019 is $4.2 million based on these changes. Failure to perform when called upon from ISO NE will reduce this forecasted revenue.
157233: Berlin Exhaust Stack	Project Type: Production In-Service Month: 6 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: Safety Priority: Required Total Project Spending: $336,292	This is a reliability and safety project to replace the two exhaust stacks on the Berlin Gas Turbine (GT). This project was initiated in fiscal year 2017 with the purchase of used exhaust stacks for the Berlin Gas Turbine. This project was not included in the 2018 rate filing because project costs were not fully known at the time of filing. The Berlin GT is a peaking unit. It sits idle the majority of the time. When it is called to service, it transfers from being off to producing full load in less than ten minutes. This type of operation causes much thermal shock and cycling to the entire machine, and particularly to the hot gas path components. Because of the thermal cycling the stacks are exposed to, there are many cracks in the steel, in particular in the welds, which weaken the structural integrity of the stacks. As a result, two of the stacks are in need of replacement.	GMP employed The Wood Group, the maintenance group of Pratt & Whitney (the manufacturer of the Berlin GT turbines), to complete the annual inspections and major maintenance of the Berlin GT. After inspecting and finding cracks in the exhaust stack in a recent inspection, The Wood Group recommended the stacks be repaired or replaced. GMP has opted for replacing the stacks as this method will provide a longer life expectancy and therefore, greater reliability.
148900: Vergennes FERC	Project Type: Production In-Service Month: 7 In-Service Year: 2018 Primary Purpose: Regulatory Compliance Secondary Purpose: n/a Priority: Required Total Project Spending: $236,312	This project is required under GMP's FERC license for the Vergennes facility, which required GMP to develop a Historic Properties Management Plan ("HPMP") establishing a process to identify the nature and significance of historic properties possibly affected by project maintenance or operation. The HPMP also established procedures for consulting with the Vermont Division for Historic Preservation ("VDHP") and the public concerning the potential effects of the projects on historic properties. The project includes the remaining work associated with the Focus 1 Phase III (field) work related to the Wales site. (Note: the Wales site is one of the archeological dig locations where artifacts were uncovered). The field work was completed in December 2016 and the remaining work will occur in 2018. The balance of work required is analysis of recovered artifacts, reporting, curation and public education in accordance with Historic Properties Management Plan (HPMP) requirements.	Development of the Historic Properties Management Plan (HPMP) is a FERC license requirement under the Section 106 National Historic Preservation Act. The HPMP for the project license is a 'living document' that spans the license life and thru consultation with the State Historic Preservation Officer, identifies cultural resources at the project that require further identification, protection or mitigation. This project is required by the FERC license, and supports state and federal policy as regards Native sites.
158849: W. Danville Mech Rebuild	Project Type: Production In-Service Month: 7 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: n/a Priority: Required Total Project Spending: $261,633	Late last year, a wicket gate stem sheared in the West Danville hydro turbine, forcing the unit to be shut down and removed from service. Upon disassembly to inspect the wicket gate, several additional items were found to be in need of repair/replacement. The major items identified included a destroyed turbine guide bearing, cavitation wear on the runner buckets, and wear on bearing journals. The project scope will include the following: • Replacement of all wicket gates, bushings, and seals • Welding and grinding areas of cavitation on runner buckets • Resurfacing shaft bearing journals • Refurbishing the turbine guide bearings (Rabbiting) • Restoration of bearing to housing fit on drive end turbine guide bearing	The project is necessary at this time to return the West Danville hydro turbine to service. The machine is capable of producing 1,000 kW, or 24 MW-h of electricity per day at full load. Assuming an LMP of $40 per MW-h this realized revenue of $960/day.
159580: Milton #4 Rewind	Project Type: Production In-Service Month: 7 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: n/a Priority: Required Total Project Spending: $351,351	This reliability project consists of the electric rewind of the #4 generator stator at the Milton Station. The stator is a key component of a generator that converts the rotating magnetic field to electric current. Based on inspection and testing performed on the generator during disassembly, options to this work may include replacing the generator's laminate core and/or reinsulating one or more of the rotor poles, and rebabbitting, or resurfacing with metal, the guide and/or thrust bearings.	This project is necessary at this time to improve the reliability and safe operation of the Milton #4 hydro generator. The Milton hydro generators are two of the most productive generation units in the GMP fleet. During a recent cleaning of the #4 generator, the stator coil insulation, upon inspection, was found to be significantly deteriorated. Large sections of the insulation had flaked off of one coil. To prevent an internal electrical fault and return the unit to service to capture spring run-off, the coil was cut out of the circuit. The unit is still in service, but remaining coils and wire insulation are continuing to degrade. GMP has elected to immediately address the issue by engaging PC Construction for preconstruction services including soliciting bids for a rewind. If GMP were to postpone the work, the generator could eventually fail causing a greater cost to the project due to loss generation.

Project Number and Title	Additional Information	Project Description	Project Justification
141781: Waterbury FERC upgrades	Project Type: Production In-Service Month: 8 In-Service Year: 2018 Primary Purpose: Regulatory Compliance Secondary Purpose: State Energy Policy Priority: Required Total Project Spending: $6,556,303	This project is necessary to improve our Waterbury hydroelectric facilities as required by state and federal government agencies. GMP received the FERC license for the project on February 19, 2016. The license requires GMP to modify and upgrade operations to meet current environmental, regulatory and operational obligations, which require major capital improvements to comply with the FERC License and Vermont 401 Water Quality Certification. The rules and laws around water quality are continually evolving. Often, a plant will have a FERC license for up to 30 years, and therefore, when it comes time to relicense and receive an updated Water Quality Certification, there is the potential to lose generation due to increasingly stringent, enhanced water quality measures. We work closely with the VT Agency of Natural resources to try and balance all of the factors, including environmental conditions, public recreation and low-cost, clean energy for our customers while maintaining safe operations. The Waterbury 401 requires a lower 'maximum flow' downstream, requiring a smaller turbine, as well as a continuous minimum flow downstream, which requires the installation of major valves and penstocks and flow-control equipment. The project includes a new runner, switchgear, unit controls/automation, pond elevation and flow monitoring, relay/protection, penstock valve, minimum-flow by-pass pipe and valve, structural modifications to the plant floor system, a Main Power Transformer for the upgraded substation, lighting, fire alarm and notification system, and associated building improvements. Other license required improvements include recreational area projects at locations determined by the State of Vermont. These will be shown as separate projects.	This project is currently under construction. This project is necessary to improve our Waterbury hydroelectric facilities as required by state and federal government agencies. GMP received the FERC license for the project on February 19, 2016. The license requires GMP to modify and upgrade operations to meet current environmental, regulatory and operational obligations, which require major capital improvements to comply with the FERC License and Vermont 401 Water Quality Certification.
148890: Panton E Town	Project Type: Production In-Service Month: 8 In-Service Year: 2018 Primary Purpose: Innovation Secondary Purpose: n/a Priority: Strategic Total Project Spending: $2,932,700	The Panton E Storage Project is a Commercial Scale 1MW Battery Storage Project. The main components include Inverters & Lithium Batteries provided by Tesla (Tesla Powerpack 2.0) mounted to a concrete foundation located within the GMP Panton Solar Site. The project includes all equipment to grid-tie the Battery Storage System (Electrical switchgear, metering, pad-mounted transformer, protection relays, and communication equipment).	The Project is a key initiative within GMP's Grid of the Future program and represents another step in transforming how Vermonters use and manage energy. This Project is in keeping with Vermont's goals for clean, renewable energy, decentralizing generation, exploring improved grid function and storage, and provides both direct benefits as well as the opportunity to learn and develop new techniques for improving grid reliability, and reducing peak loads.
156208: Fairfax sluice gate operator	Project Type: Production In-Service Month: 8 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: n/a Priority: Required Total Project Spending: $110,380	This project entails the replacement of the sluice gate operating mechanism at the Fairfax dam. The existing rack-and-pinion style mechanism will be replaced with a modern screw type mechanism. The new operator will have programmable settings to allow for overstress protection, which the old system did not have. The existing operator is an approximately 100-year-old rack-and-pinion style unit. It has had several major repairs through its lifespan and is at the end of its useful life. GMP experienced major failure last summer where a cast iron roller support bracket fractured, allowing the rack-and-pinion gears on one side of the gate to separate and that side of the gate to fall, which rendered the unit out of service. A repair was made and the gate is currently in service, but GMP has determined that the gate operating mechanism needs to be replaced entirely.	The project is necessary to ensure the safe and reliable operation of the sluice gate. The gate has multiple uses including providing a channel for the movement of debris cleaned off the hydro turbine trash racks, and more importantly, a means to manage river water flows in high-flow conditions. As noted above, the existing operator has been repaired a number of times, and is at the end of its useful life. If the operator fails, cleaning the trash racks becomes more labor intensive and less safe because the debris has be manually removed from the river and handled. Additionally, a failed operator eliminates the ability to manage water and relieve the dam's flash boards from high water, leaving them vulnerable to failure.
159587: Vergennes #5 Powerpack Replace	Project Type: Production In-Service Month: 8 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: n/a Priority: Required Total Project Spending: $239,636	This is a reliability project to overhaul the Vergennes #5 diesel engine following an unexpected failure. In January 2017, Power Production Workers noticed low coolant levels following a run of the #5 diesel. Upon further inspection, several of the cylinder liners were found to be cracked. It is clear based on inspection that the engine has reached the end of its lifespan. The scope of this project is to perform a complete overhaul on the engine. Work to include: • Teardown and complete inspection of engine. • Replace powerpacks (engine cylinders) • Replace injectors • Replace bearings as necessary	The project was necessary at the time because the engine could no longer be operated and was taken out of service. This diesel generator resides in the reserve and capacity market. It provides capacity as well as stability to the system in the Vergennes area. This unit generates revenue of $5,300 weekly to be available when the unit is functional. Having this unit offline costs GMP's customers that revenue.

Project Number and Title	Additional Information	Project Description	Project Justification
143369: 2016 Passumpic Fish Access	Project Type: Production In-Service Month: 9 In-Service Year: 2018 Primary Purpose: Regulatory Compliance Secondary Purpose: Operational Efficiency Priority: Required Total Project Spending: $574,911	Passumpsic station's FERC license (issued in 1993) required the installation of a downstream fish passage device. The existing device consists of narrow racks to prevent fish from entering the power canal/turbine and orients them towards a rough channel on the edge of the dam. This project consists of closing the rough channel at the dam and relocating new, narrow racks closer to the turbine. The power canal is a concrete channel that diverts water from just upstream of the dam to the powerhouse and turbine. The new downstream passage device consists of a fish collection box and discharge pipe constructed on the downstream side of the power canal. The discharge pipe will drop fish into a deep pool just behind the powerhouse. Attaching the new fish box and discharge pipe to the concrete canal requires a significant structural design and challenging construction conditions.	This project started in 2017 and its completion in 2018 is essential to both regulatory compliance and capital management/forecasting. State (VT Fish & Wildlife) and federal (USFWS) staff have been critical of the downstream fish passage device since the 1990s. Central Vermont Public Service, prior to the merger with GMP, deferred earlier requests to improve the fishway, but GMP has acknowledged and sought to address agency concerns. GMP has also received criticism of other mid-1990s downstream fish passage devices and recognizes downstream fish passage technology and designs have changed significantly in the past twenty years. The portage safety improvement component of the project is an opportunity to efficiently address a public safety risk for recreational users and provide improved access for construction workers while completing the fish passage work. The canoe portage is very steep, and CVPS, prior to the merger and GMP since the merger has received multiple complaints from the public about it. Completing needed public safety improvements in conjunction with the downstream fish passage is prudent given the synergies produced by completing both at the same time. GMP has applied for renewal of the Passumpsic project's Low Impact Hydropower Institute's certification. This certification qualifies the project for MA Class II Renewable Energy Credits. The downstream fish passage is an Active Condition in the recertification process. Failing to complete the project in 2018 would likely jeopardize renewal of the Low Impact Hydroelectric Institute certification and the corresponding Renewable Energy Credits, which provide value to our customers.
157330: 2018 Generation Small Blanket	Project Type: Production In-Service Month: 9 In-Service Year: 2018 Primary Purpose: Operational Efficiency Secondary Purpose: Safety Priority: Required Total Project Spending: $587,691	This work order is for the Generation Blanket, which is an overall budget for small unexpected and unplanned capital generation projects that must be completed in a timely manner. The Generation Blanket includes Hydro, Wind, Fuel, Hydro & Solar. The generation blanket is estimated using a historical average of five years' data, which is provided as supporting documentation. The historical average includes actuals from 2017. The actuals for 2017 represent a spike in spending which is directly connected to the purchase of 12 additional plants. GMP uses the blanket budget to manage planned an unplanned projects under $25,000.	When operating a fleet of generation facilities, some over 100 years old and in rural, often isolated places, it is expected that small, unplanned and unforeseen repairs and improvements will be required throughout the year. In addition, GMP uses the blanket budget to address small capital projects. These repairs may be necessary to get a plant back on line, or to address safety issues that crop up over the year. This includes minor component failures, site or building issues (in some cases due to severe weather), or the need to acquire small tools needed for specific jobs in the plants. The amount allocated to blanket capital spending for these sites is normally based on a historical average for similar unplanned work. If a planned or unplanned project is estimated to exceed $25K, it is rolled into the Generation Large Capital plan and the budget is adjusted accordingly.
159596: Proctor Hydro Roof	Project Type: Production In-Service Month: 9 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: Safety Priority: Recommended Total Project Spending: $74,692	The project will be to replace the existing roof at our Proctor Hydro Facility. The existing roof is over 20 years old and has reached the end of its useful life. The manufacturer's recommended life for this roof is 15 years.	The existing roof has reached the end of its useful life, and is regularly leaking and breaking down. The roof is pitched slightly and in the winter ice accumulates and has now started leaking down the west wall near the high -voltage switchgear that operates the turbines. This becomes a safety issue to operate the high-voltage gear in the station. Over the years and increasingly in recent years, we have made several repairs and patches to the roof to prevent leaks. This has resulted in many hours searching for the leaks and then fixing them. Due to the age of the existing roof, working on the roof has also caused other leaks to form. A portion of the roof (approx. 1500 sq') is a stone ballasted roof. The membrane under the stone has shrunk and pulled out from under the flashing along the edge of the roof. The other portion of the roof, (approx. 4000 sqf) is a rubber membrane without the stone ballast. The membrane is tenting in the corners, shrinking along the edges and deteriorating from the sun exposure. The clips that hold the roof in place are pushing up through the membrane and causing new leaks when trying to repair others.
153238: Essex - Dam Control Upgrades	Project Type: Production In-Service Month: 10 In-Service Year: 2018 Primary Purpose: Regulatory Compliance Secondary Purpose: Reliability Priority: Recommended Total Project Spending: $78,939	This is a project designed to address flow violations that occurred at the Essex Dam. It will include the reprogramming of the PLC, HMI, and Operator Interface Terminal ("OIT") devices. The existing Intake PLC that controls the rubber dam is connected through GMP's SCADA system to the station PLC, rather than being locally connected. A local connection of these devices is preferable, because when there is a disruption in the SCADA system, the Intake PLC is no longer being advised by the station PLC. In other words, the rubber dam does not know what the hydro units are doing and vice versa. This arrangement does not lend itself to coordination between the intake PLC and station PLC. This will be addressed with communication upgrades and programming that connects these two devices via local fiber, dramatically reducing the risk of flow violations as the intake PLC and plant PLC will supervise each other's actions. In addition, this project includes the installation and commission of instrumentation to monitor temperature on the 4 Hydro Units. The scope of work includes the replacement of 5 bearing and 6 stator Remote Temperature Devices ("RTDs") on each of the 4 units in order to protect the machines. The existing RTDs have failed. The PLC will be programmed to shut units down if temperatures approach unit limits.	The Essex Hydro Station is a key asset in GMP's generation fleet. Completing this work will accomplish the following goals: 1. GMP can dramatically reduce the risk of flow violations as the intake PLC and plant PLC will supervise each other's actions. 2. GMP will be able to monitor bearing temperatures on the four large Hydro units, improving GMP's ability to protect the machines from a possible failure.

Project Number and Title	Additional Information	Project Description	Project Justification
153316: Marshfield Gatehouse Upgrades	Project Type: Production In-Service Month: 10 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: Safety Priority: Required Total Project Spending: $608,578	This is a project to bring the electrical equipment inside the gatehouse up to current electrical standards, automate the current manual head gate operation to improve worker safety, 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; the access bridge will be safer.	This project will address important reliability and safety issues, while also providing greater efficiency by improving the remote functions of the plant. The improvements identified in this project are required to meet current electrical safety standards and ensure employee safety, operational efficiencies and overall plant reliability. As stated above, building upgrades and the elevation work on the earthen dam are additional items for the project, and will remedy the minor areas of uneven crest height found in a recent hydraulic study by Kleinschmidt. The Marshfield dam is a non-FERC high-hazard dam. GMP is committed to assuring continued safe, reliable dam operation, and will therefore address the crest work with the gatehouse project.
158792: Essex Rubber Dam	Project Type: Production In-Service Month: 10 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: Regulatory Compliance Priority: Required Total Project Spending: $509,288	The Essex 19 dam consists of a three section spillway with each section topped by a rubber dam (#1, #2 and #3 bags). When fully inflated, the rubber dam is 5 feet tall. The rubber dam, installed in 1995, is a safer, more efficient alternative to traditional, labor-intensive flashboard systems typically installed on hydroelectric dam crests. A PLC (computer) controls the rubber dam with continuous water level sensing and periodic operator inputs to inflate or deflate sections to continuously maintain a safe and compliant water level across a wide range of flows. The Essex 19 rubber dam has continuously improved power production, state and federal license compliance and public safety since its installation. During a Nov 2017 high water event, the rubber dam on the middle spillway (#2 bag section) split along a seam, causing a rapid, un-commanded deflation and water release. Since then, the dam impoundment operates five feet below the preferred level, causing an ongoing reduction in power production plus additional maintenance while reducing license compliance and safety factors. This project consists of the replacement of the unrepairable, #2 rubber bag section along with the first section rubber dam (#1 bag section) due to its age and accessibility during construction. The actual construction involves the placement of a crane and other construction equipment to facilitate the replacement of the rubber sections with new rubber dam sections. There will be a future project to replace the third and final section of rubber dam. That dam section is much larger and requires a different crane set-up on the other side of the river.	The failed #2 rubber dam affects power production (reliability). The secondary purpose is to maintain state and federal license compliance. The facility will not be compliant with regulations if this section of the dam is not replaced. In addition, this project affects both worker and public safety. Continuing to operate the dam without replacing the failed #2 rubber dam would be impracticable and irresponsible. Since we must replace #2, it makes sense to replace #1, which is aging, at the same time. Furthermore, since this dam is designated as a Significant Hazard Dam by the Federal Energy Regulatory Commission, the FERC could order GMP to install a new rubber dam for dam safety considerations alone. Likewise, FERC and the VT Department of Environmental Conservation expect GMP to operate the dam with a full pond and implicitly expect a fully functional rubber dam system. Reverting to a manual flashboard is impracticable because it would negatively affect power production, compliance and safety. The cost to downgrade the crest to a manual flashboard system would be high and also require additional life safety equipment.
143377: Vergennes 9B Redevelopment	Project Type: Production In-Service Month: 11 In-Service Year: 2018 Primary Purpose: Regulatory Compliance Secondary Purpose: Safety Priority: Required Total Project Spending: $1,669,844	Vergennes 9B redevelopment project is the replacement of the (2) penstocks that feed the 9B Turbine. The penstocks have previously been identified for replacement in a 2013 third-party inspection report as reaching end of serviceable life. The penstocks are original, installed in 1942. GMP is electing to proceed with the penstock work, marking the work a regulatory compliance and safety issue. The project was originally envisioned as a penstock and electrical modernization of the plant. As the design has unfolded, the scope has increased. To ensure GMP addresses the primary concern with the penstock, the project has been re-forecasted in this rate filing. GMP has removed the major electrical components but is proceeding with additional scopes of work to improve operational efficiency and whole system reliability. The items below are directly tied to the penstock replacement, therefore it made sense to perform those activities with this project.	This project is necessary at this time as the existing 76-year-old penstock has reached the end of its life. The penstock does not meet structural safety factors and has been repaired numerous times. In addition, the items identified above will be included in this project as they are directly linked to the penstock. For example, the head gates and gate operators are of similar vintage and have reached the end of their serviceable life; while the site is out of service for penstock replacement, GMP will replace those items as well.
153343: C. Rutland Concrete Resurface	Project Type: Production In-Service Month: 11 In-Service Year: 2018 Primary Purpose: Regulatory Compliance Secondary Purpose: Safety Priority: Required Total Project Spending: $225,468	This project includes improvements to the intake at the Center Rutland dam facility. The Center Rutland hydroelectric project is located in a heavily industrial and historic area. The project and its surroundings are best described as aged and deteriorated. GMP, in 2015, commissioned a FERC-mandated inspection of the six-foot diameter by 75-foot-long penstock from the dam to the turbine. The inspection by an independent engineer revealed several deficiencies with the penstock and its appurtenances and advised GMP to address the recommendations promptly. This construction project represents the second phase of project improvements recommended by the independent engineer. This phase of construction includes intake wall and penstock improvements. The actual work consists of three tasks. The first is the installation of new concrete facing along the upstream side of the intake structure (headwall) to prevent leakage and reduce the risk of breach where the penstock connects to the intake structure. The second is the coating of the exterior of the steel penstock with an epoxy-based coating to prevent corrosion and reduce further structural weakening of the steel over time. The interior of the penstock has significant pitting and rust that reduces the strength of the remaining steel. The third task is to improve support to the penstock by adding additional foundation (saddle) support with additional reinforced concrete. The existing supports do not meet current safety standards; the new foundations will contact greater surface area on the penstock.	The inspection report identified Center Rutland infrastructure in both poor and fair condition and recommended timely improvements. GMP prioritized the recommendations and completed project 150637 Center Rutland Pressure Case as a high priority project in 2016/17. GMP believes addressing the additional, fair condition, recommendations in 2018 will meet FERC's expectation that GMP address all the identified deficiencies in the inspection report. The Center Rutland project will also start the FERC relicensing process in 2018. Although the FERC relicensing program is separate from the FERC dam safety program, relicensing requires a dam design review. It is likely that unaddressed recommendations could affect the relicensing process and create costly process delays. The likely outcome would be a FERC order to address the recommendations.

Project Number and Title	Additional Information	Project Description	Project Justification
153297: Gage Headgate & Intake Upgrade	Project Type: Production In-Service Month: 12 In-Service Year: 2018 Primary Purpose: Regulatory Compliance Secondary Purpose: Safety Priority: Required Total Project Spending: $1,473,002	The Gage project is classified as a FERC low hazard dam, and GMP is obligated to assure continued safe, reliable operation. The concrete surface of the project's intake has deteriorated sufficiently that GMP, its Independent Consultant and FERC all concur that concrete resurfacing is necessary. Allowing further concrete deterioration over time would increase the future incremental cost of any deferred, future resurfacing and possibly allow concrete pieces to get into and damage the project turbines. The project includes replacement of the four existing timber headgates, gate guides, stems and actuators. The headgates are located at the intake of the facility and regulate water into the intake channel prior to powerhouse entrance. In addition to the headgates, the work includes concrete resurfacing of the deteriorated concrete at the intake wall upstream of the headgates. Finally, life safety improvements will be made with new grating and handrails at the intake.	The primary reason for this project is Reliability. The secondary reason is Project Safety. The project is necessary now because the concrete infrastructure has deteriorated considerably and immediate action is necessary to assure continued safe, reliable operation of the project. If GMP does not complete the project now, it is likely that FERC will eventually order completion of this work, and with the passage of time, further deterioration, hence greater cost, is likely.
153707: Chittenden saddles 2018	Project Type: Production In-Service Month: 12 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: Safety Priority: Required Total Project Spending: $865,711	This project is for the repair and replacement of saddles along a section of the Chittenden penstock. This is the second phase of work for Chittenden Saddles, the first half of which was completed in 2017. The first phase of work was completed in 2017 under work order 146734 Chittenden Saddles. The penstock, which is 3.1 miles long, connects the Chittenden Reservoir to the East Pittsford Powerhouse. The work that is estimated under this work order is directly connected to items uncovered during a third-party inspection of the penstock in the late summer of 2015. It includes the replacement of saddles, which are concrete and/or metal cradles that support the penstock. The supports were no longer adequately supporting the penstock, which causes stress points on the penstock and increase the potential for catastrophic failure. This is the second phase of saddle work, addressing a 2,500-foot portion of penstock. 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. 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 purposes of this project are regulatory compliance and safety. The compliance piece is a response to addresses deficiencies identified by a third-party engineer. The safety purpose concerns public and worker safety. There is a safety concern that the location of the penstock is right above the town and school of East Pittsford, Vermont. There is also the concern that a rock could come dislodged and roll down into the penstock pushing it off the saddles or a tree could fall and break the pipe. The saddle project is appropriate because many of the existing original saddles have failed, creating an unsafe working environment. In the event of a penstock failure due to weakened supports, there could have been major environmental and safety impacts. Proactively installing new supports ensures safe reliable operation of the penstock, reducing risk of failure. Putting these improvements off unnecessarily endangers employees and the public downstream. Maintaining a functioning, well-maintained penstock is critical to our ability to provide good generation and public safety. The penstock work will also help support continued generation of clean, renewable energy, in support of state goals and policy.
153727: EHC Penstock	Project Type: Production In-Service Month: 12 In-Service Year: 2018 Primary Purpose: Regulatory Compliance Secondary Purpose: Safety Priority: Required Total Project Spending: $1,400,978	The buried penstock (pipe) that delivers water from the US Army Corps of Engineers Hopkinton dam system to GMP's Hoague Sprague #1 turbine has been out of service for several years because the pipe deformed significantly where NH Rte 127 crosses over it due to pipe deterioration. In 2014 FERC directed the former owner to replace informal shoring with a fully engineered shoring system to prevent the penstock and Rte 127 from collapsing. The existing, buried penstock consists of a series of used steel pipe sections that were welded together to form a water conveyance structure. This project consists of the removal and replacement of 155 linear feet of the penstock with new steel pipe. The new penstock's diameter will vary from 6.5'-9' to facilitate connection at its ends with the existing penstock and the turbine. The work will require a detour of NH Rte 127 to allow for the excavation and removal of the existing penstock section followed by the installation and backfill of the new penstock. The work also includes the restoration of NH Rte 127 to NH DOT standards.	GMP purchased the Hoague Sprague project in May 2017 and FERC immediately directed GMP to provide a plan and schedule to replace the penstock. FERC intended for the existing, engineered shoring to temporarily prevent the penstock and road from collapsing. NH DOT has also recently inquired about GMP's schedule to replace the failed penstock. The project timing is especially critical because it requires the detour of NH Rte 127. GMP and its contractors must therefore coordinate and schedule this work with town officials, emergency responders and the NH DOT. Both FERC and the NH DOT expect GMP to address the failed penstock in 2018. Deferring the project may result in GMP receiving an order to complete the work. GMP also prefers to complete the work in 2018 to meet internal dam safety protocols and to resume generation from the Hoague Sprague #1 turbine and 960 kVA generator. GMP's preliminary schedule has work starting in late Aug and finishing by the end of Dec 2018. GMP expects to work closely with FERC, NH DOT and the other stakeholders starting in late winter to assure completion of the project in 2018.
159608: Berlin Fire Suppression	Project Type: Production In-Service Month: 12 In-Service Year: 2018 Primary Purpose: Safety Secondary Purpose: n/a Priority: Recommended Total Project Spending: $132,417	This project is for the installation of a High Pressure CO2 System that meets all electrical and safety standards applicable to this site. The existing Halon fire suppression system will be retired. The project will be completed during an outage of the facility in Fall of 2018.	The primary reason for completing this project is that the current configuration poses a worker and potentially public safety risk. The removal of the existing fire suppression system removes the ongoing safety risk. The project will also improve the reliability of the fire system, as the existing fire system is the original system installed with the GT. The Berlin Gas Turbine peaking facility is GMP's largest solely owned peaking plant at 50MWs. The project continues to provide substantial revenue to GMP customers through the Forward Capacity Market and the Forward Reserve Market. The existing Halon fire suppression system is considered a safety hazard to our field personal, is unable to be Locked Out/Tagged Out during specific maintenance activities, and more advanced and safe technology is available at this time. Because GMP cannot disarm the system with the existing control, GMP must work within the enclosed cab of the turbine with the halogen system armed. This is not a safe practice per GMP safety standards. In addition, Halogen production was ceased in 1994 under the Clean Air Act; Halogen is considered a Chlorofluorocarbon, which is an organic compound that contributes to ozone depletion.

Project Number and Title	Additional Information	Project Description	Project Justification
160277: Marshfield Spillway 2018	Project Type: Production In-Service Month: 12 In-Service Year: 2018 Primary Purpose: Safety Secondary Purpose: Reliability Priority: Required Total Project Spending: $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. Unlike the service spillway, the emergency spillway is not concrete; it is essentially an earthen channel. The Marshfield dam is a non-FERC, high-hazard dam and GMP, as owner, is obligated to assure continued safe, reliable dam operation. This project is intended to fulfill that obligation. The concrete surface of the service spillway has deteriorated sufficiently that GMP and an independent consultant concur that resurfacing of the service spillway is appropriate at this time. Several reports over the last few years have noted the deteriorated concrete including, but not limited to, Safety Inspection Reports (SIRs). Allowing further concrete deterioration over time would increase the future incremental cost of deferred resurfacing and reduce certain safety factors for the dam. GMP has obtained an estimate from PC Construction to perform the work. PC construction is acting at the Construction Manager on this project and will competitively bid each scope of work, providing assurance that the project will be implemented in a least-cost manner.	As noted above, the non-structural surface areas of the existing service spillway concrete are deteriorating and require resurfacing to maintain the asset. The work is recommended by engineering reports, but other planned and unplanned projects had pushed out the start of the service spillway concrete resurfacing. GMP believes it is important to move forward now to ensure we continue to fulfill our commitment to the safe and efficient operation of the facility.
Production - Rate Period (Jan. - Sept. 2019)			
153321: Rec Project #1-Moscow	Project Type: Production In-Service Month: 1 In-Service Year: 2019 Primary Purpose: Regulatory Compliance Secondary Purpose: n/a Priority: Required Total Project Spending: $94,415	This project is in response to receiving a new License to Operate the Waterbury Hydroelectric site. A requirement of that license has been the installation of recreational improvements for the public. The proposed plan includes the establishment of a new access point for canoe/kayak launches. In addition, boulders & native plantings will be placed along the bank line and the area around the steps. Minor parking lot grading and stormwater improvements are also included to eliminate existing drainage issues.	This project is a component of the new license granted by FERC to the Waterbury Hydroelectric Project on February 19, 2016. Article 404 of the FERC license, as well as Condition K of the Vermont Department of Environmental Conservation's ("VT DEC") Water Quality Certification ("WQC"), require GMP to file a Recreation Plan detailing measures to be implemented for the new licensing period in consultation with the United States Fish and Wildlife Service ("USFWS"), VT DEC, Vermont Department of Forests, Parks, and Recreation ("VT FPR"), and the town of Waterbury, Vermont. On October 19, 2016, and supplemented January 6, 2017, GMP filed a Recreation Plan pursuant to Article 404 of the project license. On March 1, 2017 FERC issued an Order approving the Recreation Plan and specifying that all work regarding the Recreation Plan must be completed by December 31, 2019. GMP has worked with VT FPR, VT DEC, VT ANR and the town of Waterbury, VT and determined that it would be advantageous for all parties and the common good to have these recreational resources constructed and in place for the beginning of the 2019 recreational season. Therefore, construction is scheduled to occur in the fall of 2018.
153324: Rec Project #3_Blush Hill	Project Type: Production In-Service Month: 1 In-Service Year: 2019 Primary Purpose: Regulatory Compliance Secondary Purpose: State Energy Policy Priority: Required Total Project Spending: $215,284	The primary purpose for this project is regulatory compliance. This project is in response to receiving a new License to Operate the Waterbury Hydroelectric site. A requirement of that license has been the installation of recreational improvements for the public. This project includes the improvement of the Blush Hill parking area and the boat launch, which is owned and operated by the Town of Waterbury. GMP will perform the following site upgrades: construct a new concrete boat ramp, construct a ditch to improve drainage in the parking area, stabilize the embankment with biomat material and plantings, constructed an access ramp along the embankment to provide foot traffic/small motor-less watercraft access to the water, improve traffic flow with designating parking spaces, and stabilize the parking area with crusher run gravel.	This project is a component of the new license granted by FERC to the Waterbury Hydroelectric Project on February 19, 2016. Article 404 of the FERC license, as well as Condition K of the Vermont Department of Environmental Conservation's ("VT DEC") Water Quality Certification ("WQC"), require GMP to file a Recreation Plan detailing measures to be implemented for the new licensing period in consultation with the United States Fish and Wildlife Service ("USFWS"), VT DEC, Vermont Department of Forests, Parks, and Recreation ("VT FPR"), and the town of Waterbury, Vermont. On October 19, 2016, and supplemented January 6, 2017, GMP filed a Recreation Plan pursuant to Article 404 of the project license. On March 1, 2017 FERC issued an Order approving the Recreation Plan and specified that all work regarding the Recreation Plan must be completed by December 31, 2019. GMP has worked with VT FPR, VT DEC, VT ANR and the town of Waterbury, VT and determined that it would be advantageous for all parties and the common good to have these recreational resources constructed and in place for the beginning of the 2019 recreational season. Therefore, construction is scheduled to occur in the fall of 2018.
148899: Lamoille FERC	Project Type: Production In-Service Month: 3 In-Service Year: 2019 Primary Purpose: Regulatory Compliance Secondary Purpose: n/a Priority: Required Total Project Spending: $646,645	This project involves historic and archaeological site work required under GMP's Lamoille license (FERC #2205), which covers GMP's Fairfax, Clark's Falls, Milton and Peterson hydroelectric projects. These projects operate on and affect the lower section of the Lamoille River. A prolonged relicensing process included the development of a Historic Properties Management Plan ("HPMP") which established a process to identify the nature and significance of historic properties possibly affected by project maintenance or operation, proposed improvements to project facilities, and public access. The HPMP also established procedures for consulting with the Vermont Division for Historic Preservation ("VDHP") and the public concerning the potential effects of the projects on historic properties.	The HPMP requires GMP to monitor and preserve archaeological sites associated with or affected by the Lamoille projects. In 2018, GMP is obligated to monitor the Lamoille reach for any river changes including erosion especially at identified archaeological sites. GMP is scheduled to complete archaeological fieldwork, both Phase II and Phase III assessments, in 2018. The HPMP itself is also due for its five-year periodic update.

Project Number and Title	Additional Information	Project Description	Project Justification
153327: Rec Project #5_LR Site Improv	Project Type: Production In-Service Month: 5 In-Service Year: 2019 Priority: Required Total Project Spending: $418,527	This project is in response to receiving a new License to Operate the Waterbury Hydroelectric site. A requirement of that license has been the installation of recreational improvements for the public. This project includes improvements to the Waterbury Reservoir boat launch, which is owned and operated by VT FPR, by performing minor grading and adding/removing gravel where necessary, improving storm-water management, adding signage to discourage swimming at the site, adding a two-unit waterless restroom, among other minor improvements. In addition, GMP will meet on-site with VT FPR to discuss improvements for better traffic flow and parking. The plan for the Little River Site Improvements includes regrading and paving of the parking area, improvements to traffic flow, improvements to an existing drainage ditch along the western side of the site, the addition of appropriate signage and the installation of a two–unit waterless restroom (the Clivus multrum M54 Trailhead Series) run on solar power. The Vermont State Parks standard building design will be incorporated into the final design for this facility. Enhancements to provide ADA compliance will be a major consideration for the site improvements including at least one ADA-compliant parking space.	This project is a component of the new license granted by FERC to the Waterbury Hydroelectric Project on February 19, 2016. Article 404 of the FERC license, as well as Condition K of the Vermont Department of Environmental Conservation's ("VT DEC") Water Quality Certification ("WQC"), require GMP to file a Recreation Plan detailing measures to be implemented for the new licensing period in consultation with the United States Fish and Wildlife Service ("USFWS"), VT DEC, Vermont Department of Forests, Parks, and Recreation ("VT FPR"), and the town of Waterbury, Vermont. On October 19, 2016, and supplemented January 6, 2017, GMP filed a Recreation Plan pursuant to Article 404 of the project license. On March 1, 2017 FERC issued an Order approving the Recreation Plan and specified that all work regarding the Recreation Plan must be completed by December 31, 2019. GMP has worked with VT FPR, VT DEC, VT ANR and the town of Waterbury, VT and determined that it would be advantageous for all parties and the common good to have these recreational resources constructed and in place for the beginning of the 2019 recreational season. Therefore, construction is scheduled to occur in the fall of 2018.
153296: Gorge GT Control Upgrades	Project Type: Production In-Service Month: 7 In-Service Year: 2019 Primary Purpose: Reliability Secondary Purpose: Operational Efficiency Priority: Required Total Project Spending: $594,805	This is a project to replace the gas turbine system programmable logic controller ("PLC") and software at the Gorge #16 gas turbine. The current PLC is obsolete. Spare parts are no longer manufactured. Additionally, the PLC software is proprietary to a company that is no longer in business, and password protected. The Gorge GT is included in various capacity markets for ISO NE, and can provide an estimated value of $17,700 per week or $849,000 per year. A failure to start can result in partial loss of daily and monthly value due to ISO penalties and a cumulative loss of revenue until capacity of the unit is re-established.	The project is required at this time to replace the PLC before it fails as the current system is past the end of its expected service life. A failure of the PLC and an unplanned outage of the Gorge GT would leave the gas turbine out of service for an extended duration, while the new system is developed and installed. As with other recent modernizations, this project will improve the Control Center's ability to remotely operate and diagnose issues at the Gorge GT, which will help maintain the production of energy from the site.
159591: Lake Dunmore Outlet	Project Type: Production In-Service Month: 7 In-Service Year: 2019 Primary Purpose: Safety Secondary Purpose: n/a Priority: Required Total Project Spending: $391,038	Lake Dunmore lies between and connects GMP's Silver Lake and Salisbury hydroelectric projects. GMP's Lake Dunmore infrastructure is a small, concrete outlet structure with gates that release lake water that flows downstream to the Salisbury project. GMP's Silver Lake project, a high-hazard project, is just upstream and consists of a complex series of three dams that largely control inflow to Lake Dunmore. GMP adjusts inflow to and outflow from Lake Dunmore to maintain Silver Lake FERC license obligations, safe operating levels and operation of both hydroelectric projects. Lake Dunmore is heavily developed and GMP operates its two projects in consideration of the lakefront property owners and works frequently with the Lake Dunmore-Fern Lake Association. GMP's flow management plan includes seasonal operating levels for Lake Dunmore. If the lake gets too high, docks and then low lying cottages are quickly flooded. If the lake gets too low, property owners quickly complain. Extreme weather can quickly make this ongoing balance a challenge. Additionally, despite warning signs and fencing, the outlet structure has become an increasing safety concern as lake users tend to encroach on the structure especially when outflow is high and dangerous. This construction project consists of improvements to the outlet's stability, flow capacity and safety features. Raising and making the soil adjacent to the structure less resistant to saturation and erosion will improve the stability of the structure and its surroundings during a high-water event. Evaluating and improving the flow capacity of the outlet and downstream open channel will optimize the volume of water that can be released from the outlet without causing acute or chronic damage, which could alleviate high-water challenges on Lake Dunmore. Finally, improving and expanding safety devices will reduce risk associated with the facility.	A significant rain event in July 2017 revealed vulnerabilities in the structural, water flow and public safety capacities of the Lake Dunmore outlet structure. Similar weather events have occurred in the past and it appears extreme weather events are occurring more frequently and they repeatedly stress the existing Lake Dunmore outlet infrastructure. Completing the project in 2018 will reduce the existing risks identified above that have significant public safety, private property and operational consequences. Delaying the project will likely create exposure during future extreme weather events and the possibility of measurable damage.
150163: KCW ADLS	Project Type: Production In-Service Month: 9 In-Service Year: 2019 Primary Purpose: Regulatory Compliance Secondary Purpose: n/a Priority: Required Total Project Spending: $1,138,909	This project is the installation of an Aircraft Detection Lighting System (ADLS) for GMP's Kingdom Community Wind (KCW) project. KCW includes 21 3MW Vestas V112 wind turbines. GMP executed a long-term maintenance contract with Vestas for support in maintaining the turbines. The project was placed into service in December 2012. ADLS is a Doppler-radar-based technology that allows Federal Aviation Administration (FAA) lights to remain off at wind generation facilities during evening 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 turbines / obstructions. When an aircraft enters the 3NM airspace during non-daylight hours, the FAA lights will illuminate. The lights will remain off during all other night time hours. ADLS is a regulatory requirement for KCW, as it was included in the project's CPG. Vestas is the vender of choice and has provided a turnkey solution for KCW (which still requires final FAA approval). The proposed system will incorporate three Doppler radars to ensure the entire area within the 3NM area has adequate airspace coverage. Two radars will be mounted on existing turbines and use the communications infrastructure in place for the turbines, and the third off-site radar will utilize radio frequency to communicate back to the controller.	It has been GMP's focus to implement the ADLS technology at KCW as soon as engineering is complete and regulatory approval is obtained. KCWs' CPG requires GMP to apply to the FAA for approval of an ADLS system. This project is necessary at this time because the technology is now available and the FAA has approved GMP's application to install a system. As described in this work order, GMP is pursuing the least-cost option to meet the regulatory requirement.

Project Number and Title	Additional Information	Project Description	Project Justification
157330: 2019 Generation Small Blanket	Project Type: Production In-Service Month: 9 In-Service Year: 2019 Primary Purpose: Operational Efficiency Secondary Purpose: Safety Priority: Required Total Project Spending: $595,331	This work order is for the Generation Blanket, which is an overall budget for small expected and unplanned capital generation projects. The Generation Blanket includes Hydro, Wind, Fuel and Hydro & Solar. The generation blanket is estimated using the historical average of five years' data, which is provided as supporting documentation in this work order. The historical average includes actuals from 2017. The actuals for 2017 represent a spike in spending which is directly connected to the purchase of 12 additional plants. GMP uses the blanket budget to manage planned an unplanned projects under $25,000.	When operating a fleet of generation facilities, some over 100 years old and in rural, often isolated places, it is expected that small, unplanned and unforeseen repairs and improvements will be required throughout the year. In addition, GMP uses the blanket budget to address small capital projects. These repairs may be necessary to get a plant back on line, or to address safety issues that crop up over the year. This includes minor component failures, site or building issues (in some cases due to severe weather), or the need to acquire small tools needed for specific jobs in the plants. The amount allocated to blanket capital spending for these sites is normally based on a historical average for similar unplanned work. If a planned or unplanned project is estimated to exceed $25K, it is rolled into the Generation Large Capital plan and the budget is adjusted accordingly.
159584: Essex Unit Seal	Project Type: Production In-Service Month: 9 In-Service Year: 2019 Primary Purpose: Reliability Secondary Purpose: n/a Priority: Recommended Total Project Spending: $51,005	This project is a reliability project to replace the shaft seals on two of the four large hydro turbines at the Essex plant and was completed in December 2017. The two large turbines have been in service for over 100 years. Because of shaft wear, the original packing shaft seals were replaced with mechanical seals several years ago. These mechanical seals have undergone many revisions over the years. GMP has experienced difficulties with the seals since their installation, as they are complex, difficult to install and align, and do not maintain a positive seal.	The project is necessary to reduce the number of hours associated with maintaining the current seals. Each turbine has two seals. GMP PPW workers will replace the existing seals on two hydro units per year for two years. It is estimated that three man-weeks per year are consumed maintaining and adjusting the current seals.
Vermont Marble Hydro - Interim Period (Oct. 2017 - Dec. 2018)			
148898: Otter Creek FERC	Project Type: Vermont Marble - Hydro In-Service Month: 3 In-Service Year: 2018 Primary Purpose: Regulatory Compliance Secondary Purpose: n/a Priority: Required Total Project Spending: $335,407	This project addresses archaeological work required under the Otter Creek license (FERC #2558), which covers GMP's Proctor, Beldens and Huntington Falls hydroelectric projects. These projects collectively bracket a significant portion of the entire Otter Creek. The relicensing process included the development of a Historic Properties Management Plan ("HPMP") which established a process to identify the nature and significance of historic properties possibly affected by project maintenance or operation, proposed improvements to project facilities, and public access. The HPMP also established procedures for consulting with the Vermont Division for Historic Preservation ("VDHP") and the public concerning the potential effects of the projects on historic properties. GMP has and continues to meet its license and HPMP obligations for both archaeological sites along Otter Creek and for GMP buildings and components that are designated as historic.	The HPMP requires GMP to monitor and preserve archaeological sites associated with or affected by the Otter Creek projects.
Joint Ownership - Interim Period (Oct. 2017 - Dec. 2018)			
159881: 2019 Millstone Capital	Project Type: Jt Ownership In-Service Month: 9 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: Operational Efficiency Priority: Required Total Project Spending: $975,531	This project is related to GMP's 1.7303% joint–ownership interest in the Millstone Nuclear Plant Unit # 3 located in Waterford, CT. The amount included here represents the 5-year average of the amount Green Mountain Power is responsible for related to capital improvements. The unit began operation in 1986 and generates roughly 1,258 MW of energy capacity. As a joint owner, GMP is entitled to our ownership share of the energy capacity (roughly 21.4 MW) and is also required to share in all direct and indirect costs of operation, maintenance and capital cost to keep the plant running reliably and efficiently. Dominion Energy Nuclear Connecticut, Inc. ("Dominion") is the principal owner and operator of the facility with a 93.47% ownership interest.	Dominion, as the principal owner and operator of the facility, determines the annual capital projects and spending based on prudent and reasonable utility practice and provides this information to all the joint owners in the facility. As a joint owner of the facility, GMP is committed to ensuring that the facility is available and efficiently generating power for our customers. This project is necessary to ensure that Millstone Unit # 3 generating facility receives its important and critical upgrades and that GMP meets our obligation as a joint owner.
159882: 2019 Wyman Capital	Project Type: Jt Ownership In-Service Month: 9 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: Operational Efficiency Priority: Required Total Project Spending: $26,833	This project is related to the 2.9207% joint–ownership interest in the Wyman Unit No. 4 oil-fired generating plant located in Yarmouth, Maine. The amount included here represents the 5-year average of the amount Green Mountain Power is responsible for related to capital improvements. The Unit began operation in 1978 and generates 610 megawatts of energy capacity. As a joint owner, Green Mountain Power is entitled to our ownership percentage of the energy capacity (roughly 17.6 megawatts) and is also required to share in all direct and indirect costs of operation, maintenance and capital costs to keep the plant running reliably and efficiently. NextEra Energy Resources, LLC ("NextEra") is the principal owner and operator of the facility with a 84.3% ownership interest.	NextEra, as the principal owner and operator of the facility, determines the annual capital projects and spending based on prudent and reasonable utility practice and provides this information to all the joint owners in the facility. As a joint owner of the facility, GMP is committed to ensuring that the facility is available and efficiently generating power for our customers. This project is necessary to ensure that the Wyman generating facility receives its important and critical upgrades and that GMP meets our obligation as a joint owner.
159883: 2019 McNeil Capital	Project Type: Jt Ownership In-Service Month: 9 In-Service Year: 2018 Primary Purpose: Regulatory Compliance Secondary Purpose: Reliability Priority: Required Total Project Spending: $627,199	This project is related to GMP's 31% joint–ownership interest in the Joseph C. McNeil Generating station which is a wood-fired plant located in Burlington, Vermont. The amount included here represents the 5-year average of the amount Green Mountain Power is responsible for related to capital improvements. The plant began operation in 1984, and generates roughly 50 megawatts of electricity. As a joint owner, Green Mountain Power is entitled to our ownership percentage of the energy capacity (roughly 16 megawatts) and is also required to share in all direct and indirect costs of operation, maintenance and capital costs to keep the plant running reliably and efficiently. Burlington Electric Department ("BED") is the principal owner and operator of the facility with a 50% ownership interest.	BED, as the principal owner and operator of the facility, determines the annual capital projects and spending based on prudent and reasonable utility practice and provides this information to all the joint owners in the facility. As a joint owner of the facility, GMP is committed to ensuring that the facility is available and efficiently generating power for our customers. This project is necessary to ensure that McNeil generating facility receives its important and critical upgrades and that GMP meets our obligation as a joint owner.
159884: 2019 Stoneybrook Capital	Project Type: Jt Ownership In-Service Month: 9 In-Service Year: 2018 Primary Purpose: Reliability Secondary Purpose: Operational Efficiency Priority: Required Total Project Spending: $225,199	GMP owns a small 8.8% joint ownership interest in the 354-megawatt "Stony Brook Intermediate Unit" combined-cycle power plant in Ludlow, MA. Massachusetts Municipal Wholesale Electric Company (MMWEC) is the principal owner with a 90.75% interest and the Village of Lyndonville has a small interest of 0.44%. MMWEC is the operator of the facility. This project is related to GMP's 8.8% share in the capital improvements at the Stony Brook facility and represents the 5-year average of historical costs.	MMWEC, as the lead owner and sole operator of the facility, determines the annual capital projects and spending based on prudent and reasonable utility practice and provides this information to GMP and Lyndonville. As a joint owner of the facility, GMP is committed to ensuring that the facility is available and efficiently generating power for our customers. This project is necessary to ensure that the Stony Brook facility receives its important and critical upgrades and that GMP meets our obligation as a joint owner.

Project Number and Title	Additional Information	Project Description	Project Justification
Joint Ownership - Rate Period (Jan. - Sept. 2019)			
159881: 2019 Millstone Capital	Project Type: Jt Ownership In-Service Month: 9 In-Service Year: 2019 Primary Purpose: Reliability Secondary Purpose: Operational Efficiency Priority: Required Total Project Spending: $988,213	This project is related to GMP's 1.7303% joint–ownership interest in the Millstone Nuclear Plant Unit # 3 located in Waterford, CT. The amount included here represents the 5-year average of the amount Green Mountain Power is responsible for related to capital improvements. The unit began operation in 1986 and generates roughly 1,258 MW of energy capacity. As a joint owner, GMP is entitled to our ownership share of the energy capacity(roughly 21.4 MW) and is also required to share in all direct and indirect costs of operation, maintenance and capital cost to keep the plant running reliably and efficiently. Dominion Energy Nuclear Connecticut, Inc. ("Dominion") is the principal owner and operator of the facility with a 93.47% ownership interest.	Dominion, as the principal owner and operator of the facility, determines the annual capital projects and spending based on prudent and reasonable utility practice and provides this information to all the joint owners in the facility. As a joint owner of the facility, GMP is committed to ensuring that the facility is available and efficiently generating power for our customers. This project is necessary to ensure that Millstone Unit # 3 generating facility receives its important and critical upgrades and that GMP meets our obligation as a joint owner.
159882: 2019 Wyman Capital	Project Type: Jt Ownership In-Service Month: 9 In-Service Year: 2019 Primary Purpose: Reliability Secondary Purpose: Operational Efficiency Priority: Required Total Project Spending: $27,182	This project is related to the 2.9207% joint–ownership interest in the Wyman Unit No. 4 oil-fired generating plant located in Yarmouth, Maine. The amount included here represents the 5-year average of the amount Green Mountain Power is responsible for related to capital improvements. Green Mountain Power has a 2.9207% Joint Ownership interest in the Wyman generating facility . The Unit began operation in 1978 and generates 610 megawatts of energy capacity. As a joint owner, Green Mountain Power is entitled to our ownership percentage of the energy capacity (roughly 17.6 megawatts) and is also required to share in all direct and indirect costs of operation, maintenance and capital costs to keep the plant running reliably and efficiently. NextEra Energy Resources, LLC ("NextEra") is the principal owner and operator of the facility with a 84.3% ownership interest.	NextEra, as the principal owner and operator of the facility, determines the annual capital projects and spending based on prudent and reasonable utility practice and provides this information to all the joint owners in the facility. As a joint owner of the facility, GMP is committed to ensuring that the facility is available and efficiently generating power for our customers. This project is necessary to ensure that the Wyman generating facility receives its important and critical upgrades and that GMP meets our obligation as a joint owner.
159883: 2019 McNeil Capital	Project Type: Jt Ownership In-Service Month: 9 In-Service Year: 2019 Primary Purpose: Reliability Secondary Purpose: Operational Efficiency Priority: Required Total Project Spending: $635,353	This project is related to GMP's 31% joint–ownership interest in the Joseph C. McNeil Generating station which is a wood-fired plant located in Burlington, Vermont. The amount included here represents the 5-year average of the amount Green Mountain Power is responsible for related to capital improvements. The plant began operation in 1984, and generates roughly 50 megawatts of electricity. As a joint owner, Green Mountain Power is entitled to our ownership percentage of the energy capacity (roughly 16 megawatts) and is also required to share in all direct and indirect costs of operation, maintenance and capital costs to keep the plant running reliably and efficiently. Burlington Electric Department ("BED") is the principal owner and operator of the facility with a 50% ownership interest.	BED, as the principal owner and operator of the facility, determines the annual capital projects and spending based on prudent and reasonable utility practice and provides this information to all the joint owners in the facility. As a joint owner of the facility, GMP is committed to ensuring that the facility is available and efficiently generating power for our customers. This project is necessary to ensure that McNeil generating facility receives its important and critical upgrades and that GMP meets our obligation as a joint owner.
159884: 2019 Stoneybrook Capital	Project Type: Jt Ownership In-Service Month: 9 In-Service Year: 2019 Primary Purpose: Reliability Secondary Purpose: Operational Efficiency Priority: Required Total Project Spending: $228,126	GMP owns a small 8.8% joint ownership interest in the 354-megawatt "Stony Brook Intermediate Unit" combined-cycle power plant in Ludlow, MA. Massachusetts Municipal Wholesale Electric Company (MMWEC) is the principal owner with a 90.75% interest and the Village of Lyndonville has a small interest of 0.44%. MMWEC is the operator of the facility. This project is related to GMP's 8.8% share in the capital improvements at the Stony Brook facility and represents the 5-year average of historical costs.	MMWEC, as the lead owner and sole operator of the facility, determines the annual capital projects and spending based on prudent and reasonable utility practice and provides this information to GMP and Lyndonville. As a joint owner of the facility, GMP is committed to ensuring that the facility is available and efficiently generating power for our customers. This project is necessary to ensure that the Stony Brook facility receives its important and critical upgrades and that GMP meets our obligation as a joint owner.