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Judith Whitney, Clerk
Vermont Public Utility Commission
Peoples United Bank Building, 4th Floor
112 State Street
Montpelier, VT 05620-2701

Re: GMP – Resilient Home Innovative Pilot

Dear Ms. Whitney:

Please accept this as Green Mountain Power's ("GMP") initial Pilot filing for the Resilient Home Innovative Pilot ("Pilot"). We submit this filing in regular course pursuant to Attachment 1 of GMP's Temporary Limited Interim Regulation Plan.

General Overview

In the face of climate change and the urgent need to continue the transformation of GMP's energy delivery system to one that is much more home, business and community based, GMP will be working with customers and residential builders to provide an innovative approach to home energy consumption through the Resilient Home Innovation Pilot. This Pilot will transform how energy is delivered and measured at the home by eliminating the need for the traditional utility meter on the house, instead combining the intelligent metering built directly into a third-party Energy Storage System, and providing customers with an optional tiered structure for fixed rate electricity pricing. We also will work to include other opportunities that exist to manage distributed energy resources ("DERs") in the home, such as electric water heaters, electric vehicle car chargers, and other DERs that are available to benefit customers. Initially, there will be an opportunity for up to 500 customers to enroll in the pilot, which is expected to be comprised of 250 customers enrolled directly with GMP, and another 250 customers enrolled through third parties utilizing GMP's current Bring Your Own Device (BYOD) Pilot. In addition, mindful of the tremendous interest GMP has experienced in past home energy storage offerings and the promotion we are coordinating regarding the BYOD Pilot, we will enroll up to double the number of customers initially targeted if we once again experience such demand within the first six months of the Pilot.

GMP envisions an energy future that is highly distributed, requiring a much tighter choreography of sources and loads all while improving reliability and reducing cost and carbon. This requires a transition in how we think about generation resources and load resources. We need to shift from treating them as two completely separate resources, to considering them as one and the same resource. Increasing a kilowatt of generation resource or turning down a kilowatt of load resource has the same effect on the system. It is for this reason that we see more and more homes and businesses becoming integral components of the transformed grid with storage (and sometimes solar and storage combined); looking ahead, we can imagine a time when every GMP customer has at least a battery storage system in their home.

One of the many benefits of a battery storage system is that it provides a greater level of metering data information than the utility AMI meter system. Although the utility AMI metering system will continue to be a critical tool for GMP for many years to come, we anticipate more and more battery storage installed in homes throughout Vermont and do not want to miss an opportunity to leverage the data that is provided from these devices. Because this data can be obtained through the battery system, it exposes a potentially unnecessary redundancy in equipment being installed in each home. Today, customers may have a traditional AMI meter, a solar inverter, and a battery system installed, all of which can provide some level of data. Through this Pilot, we will leverage the integrated metering of the battery system and attempt to eliminate the need to use the traditional house utility meter at the same time, thereby reducing costs for both GMP and the customer.

We will also work with home builders to plan out and install the battery storage system in new homes during the Pilot period, and make the home ‘Grid Ready’ by building in the necessary infrastructure in the home up front. An example of this will be to ensure there is a 240V outlet in the garage at an accessible location for an electric vehicle charger to be installed, providing for a seamless transition to electric transportation in each home. Additionally, GMP will work with builders to incorporate water and space heaters that provide thermal storage for the home and are compatible with GMP’s distributed energy platform, allowing GMP to manage and make the best use of the available renewable energy from the home or surrounding grid area. Enabling these resources will also provide the customer and GMP with easy access to valuable information about energy consumption that can be used not only to reduce the ongoing costs of the home, but also to help GMP successfully choreograph the needs of the grid in real time.

Finally, taking our cue from popular consumer pricing models for other on-demand services, we will take this Pilot opportunity to explore a different method of pricing: customers may choose a fixed price option in conjunction with the battery system metering. Providing our customers a new pricing option, similar to that of a GMP Budget Payment Plan, will provide insight as to whether or not this type of billing is appropriate and feasible in the electric utility industry.

The Pilot

GMP will work with home developers/builders along with other third parties to include a battery storage system in new home construction as well as to create grid-ready homes with equipment that is compatible with GMP's distributed energy platform wherever possible. The Pilot will require a battery storage system in new homes or a battery storage system to be retrofitted in existing homes. The battery storage system will provide energy storage for backup power during grid outages and a GMP resource to manage the grid and reduce peak- and energy-related costs. GMP will utilize the battery as the house meter and eliminate the need for the traditional smart meter at the home. The cost of the system is outlined in the section below titled *Storage and System Charges*.

While other DER devices are not required as a part of the pilot, we will help enable builders and customers choose to install other devices in the home that will cut carbon, help meet state energy goals and provide new resources to manage the grid. GMP will not be including any of these devices as part of the GMP portion of the offer, however we will assist customers and home builders in specifying equipment from third parties that can also be managed as grid resources. Examples of grid-ready DERs are:

- *Heat Pump Systems* – Can be air to air, air to water or even ground source depending on the needs of the home and can be integrated via smart thermostat controls into the GMP platform
- *Grid-enabled hot water heater* – Whether it is a heat pump water heater or a traditional resistance water heater, the right models can provide GMP a dispatchable distributed resource to be used for demand response/peak shaving
- *Smart Thermostat* – Provides efficiency savings on any backup heating source by learning preferences and lifestyle
- *Electric Vehicle Charging* – GMP will ensure that home builders include an available outlet or wiring termination for an EV charger, to enable quick installation when applicable. GMP would provide a L2 charger free of charge to customers who have purchased a new EV
- *Smart Home Device* – Smart home assistant with the ability to communicate with customers about their monthly consumption and GMP bill. An example is the Amazon Alexa unit.

GMP views the Resilient Home Pilot as an important step toward the lower carbon, distributed energy future that we must achieve. Additionally, the Pilot will provide several benefits to the participating customer as well as the rest of GMP's customer base:

- (1) *Carbon Offset* – By ensuring that highly efficient heating and cooling systems are easily made an integral part of every new home, GMP and our developer partners will be reducing the amount of fossil fuels that will be needed to provide climate comfort within each home. In addition, the use of the smart thermostats will ensure that if any fossil fuel system is installed, it is being used as efficiently as

possible. This supports the goal of Vermont's Comprehensive Energy Plan to reduce total energy consumption per capita by 15%, meet 90% of the remaining energy need from renewable sources by 2050, and helps GMP meet its Tier III obligations. The option to easily install EV charging is an additional incentive for customers to purchase electric vehicles, which supports the Comprehensive Energy Plan's goal of powering 10% of Vermont vehicles by electricity in 2025.

- (2) *Load Shifting/Peak Reduction* – Each home will provide additional financial benefit for all GMP customers as they enable GMP to take advantage of “off-peak” periods when the wholesale cost of electricity is lower and, to the greatest extent feasible without sacrificing customer comfort, avoiding “peak” periods when demand for energy is greater.
- (3) *Reliability* - The battery system provides a backup power source for many hours in the event of a grid outage, giving customers peace of mind during storms and other unforeseen grid issues.
- (4) *Simplicity* - The fixed bill pricing option provides a customer with certainty for the energy costs. With the ability for customers to stay up to date on their consumption with a smart home device, they will have a higher level of information and confidence to keep them on track within the limit of their tier.

Pricing

Electricity Charges

GMP will provide two options for monthly electric charges. These offers will be distinct depending upon the systems a customer installs as a part of the Pilot.

With Solar – Customers installing an energy storage system that is paired with solar will remain on volumetric pricing for their electricity consumption. In a new-build scenario, the battery meters will provide the only source of metering for the home as well as the solar. GMP will provide one-line diagrams that detail the necessary wiring for the electrical panel(s), solar, and all related pre-wiring to ensure a complete, effective and efficient installation of the battery system. This will certify that the homes are set up properly for accurate consumption data, and will enable GMP to provide proper billing and credits for net-metering customers.

In a retrofit situation, where the metered components may be physically challenging for optimal wiring and metering, GMP will leave the existing smart meter on the home. GMP will rely on the energy storage system for billing purposes, however during the Pilot, if the energy storage meter data varies more than a 4% margin on either side, GMP will utilize the data from the AMI meter for that given month. This is to ensure accuracy of billing in uncontrolled wiring situations, and will provide a point of measurement and verification for the pilot.

Without Solar – Customers installing a battery system as a standalone backup system who are not part of a group net meter rate will have two options to pay for monthly electric consumption. The first is simply to continue volumetric billing as described above, again applying a monthly correction if the energy storage meter data varies more than a 4% margin on either side when installed as a retrofit where the AMI meter will remain in place. The second option is a fixed monthly energy price, in which all monthly electricity consumption will be included for a fixed amount based on the Tiers displayed in Table 1. The fixed rate aims to offer the convenience of one monthly cost that does not fluctuate throughout the year in order to give customers the benefit of knowing their expenses in advance. Again, the battery system will provide the sole metering in a new construction, while in retrofit installations, the existing smart meter will remain in place as a point of measurement and verification.

Tier	Annual kWh	Monthly kWh	Monthly Price
1	0-3999	0-333	\$55.00
2	4000-5999	334-500	\$90.00
3	6000-7999	501-667	\$120.00
4	8000-9999	668-833	\$145.00
5	10000-11999	834-1000	\$175.00
6	12000-13999	1001-1167	\$205.00
7	14000-15999	1168-1333	\$235.00
8	16000-17999	1334-1500	\$265.00
9	18000-20000	1501-1667	\$290.00

Table 1 – The monthly price is for the electric portion of the bill only. It does not include the monthly cost of the battery system.

Customers will be placed into a fixed rate tier based on the home’s historical – or in the case of new builds, expected – consumption, and locked into that tier for 1 year. Tiers will be re-established after every 12th month in the program. Other billing criteria include:

- There will not be a ‘true-up’ for past usage at the end of each 12-month period. Adjustments to Tier placement will only apply to future bills.
- If the customer averaged higher or lower than their assigned tier during the previous 12-month period, they will be automatically placed into the appropriate tier for the following 12 months.
- If over-consumption is within 5% of the assigned tier, the customer will remain in the current tier for 1 additional year.
- Customers may opt out of Tier pricing at any time, subject to a true up calculated based on a comparison of the last 12-months of actual kWh and what was paid during the same period through Tier billing.
- Tier pricing will adjust with annual rate changes as approved by the PUC and rounded to the nearest whole dollar.

- The monthly price for each tier includes the customer charge and the energy consumption only. Other items collected on the GMP bill such as the Energy Efficiency Charge, the Power Adjustor, or any other line item charge will remain separate.

Storage and System Charges

In order to be eligible for the Resilient Home pilot, BYOD participants must have a whole-home, two Powerwall system installed. There are two methods by which this can be accomplished.

1. Customers may enroll directly through GMP and pay \$30.00 per month for ten years. Customers may also choose to make a one-time, upfront payment of \$3,000 for the system in place of the \$30.00 per month.
2. Customers may choose to enroll via a third party. With this option, customers will enroll their two Powerwall, whole-home system into GMP's BYOD pilot, and must offer the full capacity of the system to GMP. Customers will be paid the incentive as described in the BYOD Pilot, but will also earn the additional \$5 per month incentive credit for cooperation and understanding of this Pilot.

GMP is beginning this Pilot with the Tesla Powerwall because we currently have the most experience with their hardware, software, and integration into GMP's systems. We are open to expanding the types of battery systems that are able to provide quality metering data, and will provide our data API requirements to anyone requesting such. We will then review proposals to integrate additional systems during the pilot period.

Goals & Measurement

GMP will answer several questions as part of this pilot.

1. Determine whether the consumption data provided by the battery systems is as accurate or within a reasonable margin of error compared to the existing AMI meter data.
 - a. GMP will compare the data from both sources in retrofit installations to determine the accuracy of the battery metering data.
2. Determine customer interest for Fixed Priced Billing and the impact, if any, on customer behavior as it relates to usage.
 - a. Because the rate will be optional, GMP will quickly determine the level of interest and engagement from customers.
 - b. Over time, GMP will be able to look at the consumption behavior of customers who have elected this billing option to understand where they fall within their assigned tiers and if usage behavior has changed and how much variation exists within the tier.

3. Assess the value of connecting with the home builder market and create grid ready homes from the ground up including a battery storage system
 - a. This will be reflected in GMP's ability to successfully help builders integrate technology and resources into new homes that provide value to both the homeowner and all GMP customers.
 - b. The ability to repeat this process with multiple partners will also be a measure of success.

Timing and Scope

GMP intends to begin providing this Pilot to customers in Spring 2019. The Pilot will be available to customers who purchase newly constructed homes as well as customers with existing homes that meet the criteria in the section below: *Customer Eligibility and Terms*.

The Pilot will be open initially to 500 customers during the 18-month enrollment period. This will include a mix of new builds, retrofits, GMP installs, and third party installs. GMP anticipates 250 customers participating directly through GMP, and another 250 participating through third party installers. GMP will work with new construction builders to ensure systems are installed properly and ready for participation upon the customer's move-in date. Given the tremendous demand GMP saw with its earlier home energy storage offerings, GMP is planning this Pilot with expansion in mind. If interest outstrips demand in the first six months GMP will double customer participation.

Customer Eligibility and Terms

Participating customers must meet the following requirements:

1. Must be currently on, or must change to, residential Rate 01. If currently participating in a residential time-of-use rate such as Rate 9 or Rate 14 customer has option to switch back to Rate 01 to participate in the program. Cannot have a separately metered rate such as Rate 03 or Rate 13.
2. Must be in good standing with GMP, and not have received a disconnect notice within the past two years. (New customers moving into GMP territory who do not have a history with GMP will be eligible for participation using our standard reference requirements for new customers from a bank or other utility.)
3. Cannot simultaneously be on a Budget Payment Plan and participate in the Tiered Pricing option. Customers can transition from their current budget plan into the Tiered pricing option if they choose.
4. Customer must have a smart meter or allow for one to be installed (retrofit customers only)
5. Existing Powerwall installations are not eligible to participate at this time.

Participating customers will enter into a Customer Agreement setting forth the rules and terms of the Pilot at enrollment.

The Resilient Home Advances State Energy Goals

The Resilient Home Pilot will help advance state energy goals. First, the battery system provides a clean alternative backup power solution for customers who would otherwise likely rely on a fossil-fuel generator. Second, the battery system represents an innovative, dispatchable resource that can be used during peak periods to help reduce GMP's power supply costs, which lowers costs for all customers. Third, the battery system can aid in the development of distributed energy resources called for under Act 56, the Vermont Renewable Energy Standard ("RES") enacted in 2015. Specifically, dispatch control of the battery system can be used to help smooth grid impacts caused by a high penetration of solar energy, potentially avoiding more expensive, traditional grid upgrades. By making these homes 'grid-ready' GMP will be working to ensure new homes are built in a way that increases, and maximizes, the use of renewable energy by strategic electrification of such resources like water heaters and electric vehicle chargers. And lastly, GMP continues to discuss, with the DPS and PUC, the quantification of Tier 3 value for Powerwalls as it relates to the reduction of fossil fuel that would otherwise be needed to provide peaking energy in New England. GMP is confident that a value will be assigned for the amount of fossil fuel avoided as a result of dispatching clean, stored energy, during peak times. Because GMP will be working with builder partners to encourage homes be built with compatible distributed resources, GMP will also have the ability to reduce our overall peak demand with the other devices in the home, compounding the Tier 3 value just described.

Summary of Projected Costs and Revenues

Assuming 500 customers installed over an 18-month period, the Resilient Home Pilot will reflect a net present value of revenues of over \$1.4 million for the fifteen-year term. The grid benefits provided by the battery systems will last for up to fifteen years; however, the revenue projection assumes a mix of systems coming to the end of their useful lives starting in year ten, and continuing through year fifteen. Additionally, due to an expected mix of participating homes with and without a solar installation, GMP has assumed, based on actual data from the Grid Transformation Pilot, that just over half of participants will have solar installed alongside the battery system. As such, there will be an expected Federal Investment Tax Credit ("ITC") value for the systems paired with solar. With the expected 250 customers enrolling directly through GMP, the GMP capital investment will total approximately \$4.5 million which includes an 8% allocator of administrative and general costs of the program only allocated to the systems offered directly through GMP. GMP will only expand beyond this number if demand outstrips the 250 customer initial allocation in the first six months in which case it will double the allocation to permit additional customer signups (both for GMP-led slots and BYOD).

	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	New Build	25	25													
	Retrofit - GMP	100	100													
	Retrofit - 3rd Party	125	125													
	Cumulative Quantities	250	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Revenues																
Battery System Payment (monthly)		\$31,500	\$63,000	\$63,000	\$63,000	\$63,000	\$63,000	\$63,000	\$63,000	\$63,000	\$63,000	\$31,500				
Battery System Payment (Upfront)		\$112,500	\$112,500													
Avoided A&G		\$163,000	\$163,000													
Battery System Power Supply Benefit		\$243,185	\$702,955	\$826,375	\$838,795	\$863,280	\$930,070	\$966,885	\$1,023,085	\$1,082,105	\$1,144,560	\$500,775	\$478,503	\$417,123	\$319,928	\$189,723
Avoided Smart Meters		\$4,075	\$4,075													
Total Revenues		\$554,260	\$1,045,530	\$889,375	\$901,795	\$926,280	\$993,070	\$1,029,885	\$1,086,085	\$1,145,105	\$1,207,560	\$532,275	\$478,503	\$417,123	\$319,928	\$189,723
Costs																
Equipment and Installation Costs*		(\$485,730)	(\$840,599)	(\$684,973)	(\$638,204)	(\$596,500)	(\$557,655)	(\$519,550)	(\$482,751)	(\$449,028)	(\$418,426)	(\$201,854)				
BYOD Monthly Credit		(\$7,500)	(\$15,000)	(\$15,000)	(\$15,000)	(\$15,000)	(\$15,000)	(\$15,000)	(\$15,000)	(\$15,000)	(\$15,000)	(\$15,000)	(\$15,000)	(\$15,000)	(\$15,000)	(\$15,000)
BYOD Incentive		(\$1,040,625)	(\$1,040,625)													
Software Fees		(\$3,000)	(\$6,000)	(\$6,000)	(\$6,000)	(\$6,000)	(\$6,000)	(\$6,000)	(\$6,000)	(\$6,000)	(\$6,000)	(\$6,000)	(\$6,000)	(\$6,000)	(\$6,000)	(\$6,000)
Total Costs		(\$1,536,855)	(\$1,902,224)	(\$705,973)	(\$659,204)	(\$617,500)	(\$578,655)	(\$540,550)	(\$503,751)	(\$470,028)	(\$439,426)	(\$222,854)	(\$6,000)	(\$6,000)	(\$6,000)	(\$6,000)
Net Benefit to Non-Participating Customers		(\$982,595)	(\$856,694)	\$183,402	\$242,591	\$308,780	\$414,415	\$489,335	\$582,334	\$675,077	\$768,134	\$309,421	\$472,503	\$411,123	\$313,928	\$183,723
*Includes 8% A&G allocation for GMP Powerwalls only																NPV: \$1,423,867

Efficiency Vermont Non-Conflict Explanation and Collaboration Certification

By this filing, GMP certifies that the Resilient Home Pilot does not conflict with work being performed by Efficiency Vermont. GMP has discussed the scope and objectives of this pilot with Efficiency Vermont, and Efficiency Vermont has confirmed that a conflict does not exist. Additionally, GMP provided a copy of the draft filing to Renewable Energy Vermont three weeks prior to the filing for review.

Status Updates

GMP proposes to provide status updates to the Commission regarding the Resilient Home Pilot’s progress on a six-month basis until the pilot expires in 18 months. GMP will collect data for an additional year beyond the 18-month enrollment period of the Pilot in order to obtain a substantial-enough amount of data to make the best decision on whether or not to move forward. GMP will provide an 18-month update, but will provide a Final Report for the Resilient Home Pilot 14 months after the 18-month period has ended. In the event that the Pilot does not warrant being advanced to a tariff, GMP will work with customers to transition billing of electrical charges back to traditional methods. In the event GMP decides to terminate the Pilot prior to the passage of 18 months, it will provide prompt notice to the Commission, the Department, Efficiency Vermont, and REV.

If you should have any questions, please contact me at 802-655-8754.

Very truly yours,



Craig Ferreira
Energy Transformation

Enclosure: Customer Agreement

cc: Daniel Burke, Vermont Department of Public Service
Rebecca Foster, Efficiency Vermont
Olivia Campbell Andersen, Renewable Energy Vermont