GREEN MOUNTAIN POWER
Generating Possibilities Together

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Ms. Judith C. Whitney, Clerk
Vermont Public Utility Commission
112 State Street
Montpelier, VT 05620-2701

Re: GMP – Resilient Home Innovative Pilot – 12 Month Status Update

Dear Ms. Whitney:

Please accept this as Green Mountain Power's ("GMP") twelve-month status update regarding our Resilient Home Innovative Pilot ("Pilot"), which commenced after notice to the Public Utility Commission ("Commission") and Department of Public Service ("Department"). The Pilot provides customers with an opportunity to install a whole-home battery backup system directly through GMP or through a certified 3rd party installer, while giving GMP the opportunity to test the data accuracy of the battery system's metering capabilities, as well as using the batteries to help reduce costs for all GMP customers.

Explanation of Resilient Home Innovative Pilot and Why it is Important

The Resilient Home Pilot provides 500 customers with a whole-home backup battery solution directly through GMP or another certified installer. Each system installed consists of two Tesla Powerwalls that are added to GMP's overall fleet of batteries, and are used to reduce GMP's total peak demand, which directly reduces costs for all GMP customers. 450 of the 500 customer slots are for customers entering into GMP Direct Lease or GMP Indirect Lease option, who make monthly payments of $30 for ten years, or a one-time up-front payment of $3,000. The remaining 50 open spots are for customers who will participate through the Bring Your Own Device ("BYOD") program that was included in the original filing as an extension of the now concluded BYOD Pilot. In all cases, GMP is testing the technology's capabilities by utilizing the data from the Tesla Energy Gateway to provide the necessary information to accurately track energy usage and serve as the meter. There is also an option for customers to participate in an innovative billing structure comprised of convenient fixed rate monthly bills for both the storage and power use, which places customers into tiers based on their historical consumption and those customers pay a set price each month. Tiers are re-evaluated every 12 months, with customer placed in a new tier only if their power use exceeds or falls below the kilowatt hour allotment for their tier. Tier re-evaluation for customers signed up for that aspect of the Pilot will begin no earlier than October 2021.

This Pilot is important to GMP and its customers for multiple reasons. First, the battery systems provide a greater level of metering data than the traditional utility AMI meter system. While GMP will still rely on the AMI system for years to come, it is important that we do not miss an opportunity to test and consider new technologies that can provide the same function, while providing more granular data. Second, GMP is transitioning to a much more distributed grid, which includes an aggregated fleet of energy storage systems. Batteries provide resiliency and peace of mind during outages for the host customer, while also serving as a grid resource to help drive down costs for all customers. With an already significant, and growing amount of distributed generation, storage will provide the flexibility needed to manage this distributed grid. Finally, this Pilot offers customers the opportunity to fix their monthly electric payments in a subscription model that moves toward the convenience and stability offered by other consumer services today, such as cell phone plans or music/video streaming. Providing customers with choices for this type of payment plan will inform GMP, and the electric utility industry generally, whether consumers are interested in this type of billing.

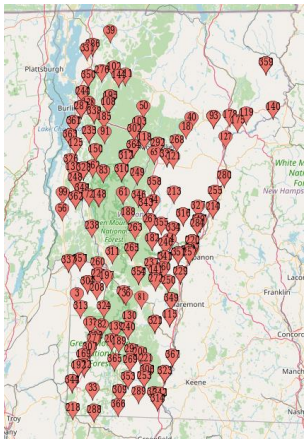
Participation in Pilot

As of June 22, 2020, there are 369 customers with completed installations through both GMP Direct and Indirect Lease options (see table below for breakdown). The remaining 85 lease spots are reserved by customers who either have a signed contract and are awaiting installation or are proceeding through the sales process. It is reasonable to expect some level of attrition, which is why GMP is keeping a waitlist of customers who can fill a spot as it becomes open. This waitlist has been built on a first come, first served basis. As third-party installers notify GMP of customers dropping out, GMP backfills the open spot by informing the appropriate installer that another customer is now able to move forward, taking a one-out, one-in approach to manage the size of the program.

GMP Direct Lease Completed Installs	221
GMP Indirect Lease Completed Installs	148

The 50 BYOD spots are all reserved, and the BYOD program also utilizes the GMP waitlist process. Four of the 50 BYOD slots have already been installed, as the third-party installers have first focused on finalizing the lease installations before moving onto the BYOD installations.

Customers are participating from all around GMP's service territory as seen in the map below:



We had originally anticipated that the full 500 customers would be installed by mid-2020, however the COVID-19 pandemic has delayed installations for several months. The majority of the remaining installs will be completed by the three certified installers that are participating in this Pilot: SunCommon, Power Guru, and Catamount Solar. The table below shows the breakdown of contracted or already installed Indirect Lease customers between the three installers. The remaining 50 BYOD spots remain to be allocated as installers focus on lease installations first.

Installer	**Contracted and/or Installed**
Catamount	4
Power Guru	22
SunCommon	174

There are currently 18 customers participating in fixed rate tier billing. More details are provided below.

Goals & Measurement

As originally filed, GMP laid out several specific questions to ask and learn 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.*

Appendix A provides a detailed breakdown of data accuracy since billing with the battery system data started in September. GMP is consistently seeing around 80-85% of systems reporting data within an acceptable error tolerance compared to the AMI meter. Compared to the success rate in the 6-month update, this is a 5-10% improvement in reporting accuracy, showing that the factors below are indeed contributing to this success rate.

First, there is a lag between the time systems are installed and in the GMP system and when the system is fully commissioned on the manufacturer's side to begin providing data via API. This results in customers with completed installs appearing in the "No Data Returned" category for a period of time. Removing these systems from the overall calculation will provide an improvement of approximately 2-3%.

Second, there are a number of systems that need, or have needed, onsite attention or a deeper troubleshooting to resolve outstanding issues in order to allow this level of data usage. While some issues that are identified are resolved promptly, others remain open and in need of a resolution. GMP works directly with Tesla to identify specific data issues in order to improve the success rate of billing using the battery data. We are confident that we can further improve the 80%-85% number over the course of the Pilot and are actually pleased that the data has been as useful as it has been at this early stage of deployment.

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.*

There are currently 18 customers who decided to participate in fixed rate tier billing. While this uptake is lower than we might have thought it would be at this point, there are a couple of reasons for it. As was the case at the time of the 6-month report, over half of the customers enrolled in the pilot are ineligible for tier pricing, either because of an existing solar array, enrollment in Rate 3 (which requires a separate meter), or lack of sufficient usage history to confidently assign a tier. Second, we have learned that there is a need for significant up-front conversation to determine whether this option is appealing to customers. GMP had many conversations with customers who ultimately decided not to opt for this aspect of the Pilot. In some cases, those customers were concerned about exceeding their tier limit and being locked into a high monthly price for the subsequent 12-month period. In other instances, customers did not look favorably on the possibility that they would pay more than they would have otherwise under a volumetric rate, despite the benefit of price stability. These have been extremely valuable lessons as we consider how to increase the desirability of a tiered pricing offering for customers. We recognize that the Pilot pricing has not been widely embraced; we are thinking through other offer models to explore as we move forward while learning from the data provided by the Pilot.

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.

Each customer's initial tier was calculated using the historical average consumption from up to three previous years. Table 1 below shows the consumption for each customer since enrolling in the tiered pricing, compared with the adjusted upper and lower limits of their current tier. The adjustments here reflect the customer's historical usage pattern. Table 1 also shows the resulting billing difference (between the amount paid to GMP compared to amount the customer would have paid under Rate 1).

Customer Number	Tier	Number of Months of Data	Actual Consumption	Tier Minimum (Adjusted)	Tier Maximum (Adjusted)	Over/Under Tier	Percent Over/Under Tier Limit	Billing Difference (vs Rate 1)
1	2	10	5,093	3,300	4,949	Over	3%	-$106
2	6	10	9,481	10,140	11,829	Under	-6%	$304
3	3	9	5,705	5,016	6,687	None	-	$91
4	1	10	4,737	-	3,392	Over	40%	-$396
5	7	11	14,157	12,673	14,482	None	-	$36
6	1	11	4,682	-	3,691	Over	27%	-$347
7	4	11	7,280	7,305	9,130	Under	0%	$205
8	5	11	8,725	9,016	10,818	Under	-3%	$292
9	2	11	6,627	3,691	5,536	Over	20%	-$290
10	3	10	6,212	5,299	7,065	None	-	$5
11	5	10	7,866	8,099	9,717	Under	-3%	$276
12	3	10	6,435	5,140	6,853	None	-	-$32
13	7	10	11,585	11,302	12,915	None	-	$249
14	1	11	3,009	-	3,692	None	-	-$65
15	4	11	6,531	7,467	9,333	Under	-13%	$332
16	1	8	4,021	-	3,526	Over	14%	-$356
17	1	6	1,940	-	2,145	None	-	-$86
18	1	6	20,943	-	2,771	Over	656%	-$3,289

Total	**-$3,177**
Average per participant	**-$177**
Total (excluding errant)	**$112**
Average (excluding errant)	**$7**

Table 1

After the 6-month pilot update, GMP reached out to all customers on the tier pricing plan to provide an update on how their usage compared to their tier limits. After these updates, Customers 4 and 6 (who were outliers in the 6-month report) have continued to exceed their upper tier limits by appreciable margins. If these customers continue on their current trajectories, they will move into higher tiers when tiers are due to be reassigned, starting in the fall of 2021.

Customer 18 is an extreme outlier and we are working through the reasons. We believe that our process for tier assignment did not properly account for this customer's usage – we think the customer's initial tier should have been higher. To remedy this issue for other customers going forward, we have automated the tier enrollment process in our billing software and implemented a monthly report to flag customers whose usage deviates significantly from their tier limit. We are also reaching out to this particular customer to discuss their participation and ensure we have a smooth transition to another tier or out of the program, if preferable. We also plan to reach out to all tier customers ahead of their one-year anniversary date to provide an update on where they stand and which tier they can expect to be assigned for the next 12-month period.

It is interesting to note that, when removing the extreme outlier, participants have paid an average of $7 more on the tier pricing plan than they would have paid under Rate 1. There is natural variation among the participants, with some slightly ahead or behind, but on balance, the novel structure of tier pricing has not significantly altered consumption behavior. We believe overall that the tier reassignment process (with tiers recalculated based on the previous 12 months) is enough of a disincentive against overconsumption, which a truly unlimited subscription plan might encourage.

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.*

GMP is still anticipating that two installs will be completed by a modular home manufacturer that will install the system as the sole point of metering. Again, for safety the COVID-19 pandemic has delayed this work, and we are hopeful that we can still use this as an example to provide beneficial information and strategy to assist in moving forward with other builders in the future. We will use this as an opportunity to learn best practices as well as a path to lessons learned that can be applied in the future.

Updated Pilot Financials

Through the end of May 2020, the Resilient Home Pilot is experiencing a net gain of over $250,000. In addition to the Power Supply value as described below, the Technical Advisory Group recently characterized each Tesla Powerwall as a prescribed Tier III measure. With a total of 369 installs completed, there are 738 Powerwalls eligible for Tier III credit. Conservatively, GMP is calculating the Tier III value of the Resilient Home Powerwalls by multiplying $25, which is below the cost of a REC that

could otherwise be purchased and retired to count toward Tier III, by the total number of Tier III MWh in the program. See table below for calculations based on 2019 and 2020 TIII Values prescribed to Powerwalls.

	2019	**2020**
Total Powerwalls	492	246
Cost per MWH	$25	$25
TIII MWH	8.79	9.7
TIII Value	$108,117	$59,655
Total TIII Value		**$167,772**

It should be noted that this is a one-time benefit for each unit.

Resilient Home Pilot	**CY19 Actuals**
Cumulative Installs	369
Equipment Revenue	$380,400
Power Supply Value	$273,879
T3 Value	$167,772
Depreciation	($294,345)
Return on Rate Base	($274,534)
Net Gain/Loss	**$253,172**

Because all Powerwalls installed as part of the Resilient Home Pilot are aggregated with GMP's total Powerwall fleet for customers, a calculation was used to determine the value of Power Supply savings provided from these systems alone. The table below shows the proportion of GMP's total fleet that belongs to Resilient Home systems, as well as the total power supply value provided by GMP's total fleet. To determine the Resilient Home power supply value, the total fleet power supply value was multiplied by the proportion of total fleet installs that belong to Resilient Home.

	Resilient Home % of Total Fleet Installs	**Total Fleet Power Supply Value**	**Resilient Home Power Supply Value**
May 2019	1%	$65,822	$594
June 2019	9%	$49,025	$4,296
July 2019	14%	674655	$95,636
August 2019	16%	13122	$2,138
September 2019	18%	$88,456	$15,586
October 2019	18%	$315	$5
November 2019	19%	$111,698	$20,919
December 2019	20%	$102,098	$19,970
January 2020	22%	$104,710	$23,389
February 2020	26%	$108,040	$27,796
March 2020	28%	$106,244	$30,098
April 2020*	29%	$204	$59
May 2020	29%	$114,341	$33,394
			$273,879

*Did not dispatch any systems from March 18 to May 4 due to COVID-19.

Next Status Update

GMP will provide another status update to the Commission regarding the Resilient Home Pilot progress upon completion after 18 months. In the event GMP decides to terminate the Pilot prior to the passage of 18 months or to tariff the program if strong customer interest remains, it will provide prompt notice to the Commission, the Department, Renewable Energy Vermont, and Efficiency Vermont.

If you should have any questions, please contact me at 802-747-6818.

Sincerely,

Craig Ferreira
Craig Ferreira
Innovation Development

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

Appendix A

	Dec-19			Jan-20			Feb-20		
	Net/House Meter		Solar Meter	Net/House Meter		Solar Meter	Net/House Meter		Solar Meter
Performance	**Consumed**	**Returned**	**Generated**	**Consumed**	**Returned**	**Generated**	**Consumed**	**Returned**	**Generated**
Within 4% Tolerance	**80.79%**	**82.97%**	**74.51%**	**77.33%**	**81.38%**	**67.23%**	**74.10%**	**79.86%**	**66.23%**
Outside 4% Tolerance	**11.79%**	**9.61%**	**12.75%**	**22.67%**	**18.62%**	**32.77%**	**18.71%**	**15.11%**	**17.22%**
No Data being returned	**7.42%**	**7.42%**	**12.75%**	**4.86%**	**2.43%**	**10.08%**	**7.19%**	**5.04%**	**16.56%**
Total Not billed w/ Battery	**19.21%**	**17.03%**	**25.49%**	**27.53%**	**21.05%**	**42.86%**	**25.90%**	**20.14%**	**33.77%**

	Mar-20			Apr-20			May-20		
	Net/House Meter		Solar Meter	Net/House Meter		Solar Meter	Net/House Meter		Solar Meter
Performance	**Consumed**	**Returned**	**Generated**	Consumed	Returned	Generated	Consumed	Returned	Generated
Within 4% Tolerance	**76.54%**	**80.25%**	**69.07%**	74.22%	78.75%	72.32%	84.59%	83.75%	82.53%
Outside 4% Tolerance	**18.83%**	**15.74%**	**19.59%**	19.26%	16.43%	16.07%	12.89%	14.29%	10.04%
No Data being returned	**4.63%**	**4.01%**	**11.34%**	6.52%	4.82%	11.61%	2.52%	1.96%	7.42%
Total Not billed w/ Battery	**23.46%**	**19.75%**	**30.93%**	25.78%	21.25%	27.68%	15.41%	16.25%	17.47%