STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Petition of Green Mountain Power for investment in its customer-driven Energy Storage System Program pursuant the Tariffed New Initiative provision of the Multi-Year Regulation Plan (MYRP).	))))	Case No. 25-____-PET

PREFILED TESTIMONY OF MADELINE MURRAY-CLASEN ON BEHALF OF GREEN MOUNTAIN POWER

May 12, 2025

Summary of Testimony

Ms. Murray-Clasen explains GMPs petition to continue investment in its customer-driven Energy Storage System Program as a Tariffed New Initiative under Section IV(A)(1)(iv) of GMP's Multi-Year Regulation Plan. Ms. Murray-Clasen also provides updated program cost benefit information demonstrating continued net positive benefit for all GMP customers.

Exhibit List

Exhibit GMP-MMC-1 Financial Model

PREFILED TESTIMONY OF MADELINE MURRAY-CLASEN

I. Introduction

Q1. Please state your name and occupation.

A1. My name is Madeline Murray-Clasen. I am employed by Green Mountain Power ("GMP") as innovation and resiliency project manager and have served in this role since 2023.

Q2. Have you previously testified before the Public Utility Commission ("Commission" or "PUC")?

A2. Yes, I have provided prefiled testimony on behalf of GMP in prior tariff cases including our prior request to treat investments in our Energy Storage System tariff program ("ESS program") as a Tariffed New Initiative under GMP's Multi-Year Regulation Plan ("MYRP"), which was approved by the Commission in Case No. 24-1715-PET ("2024 ESS Order").

Q3. Please describe your educational and business background.

A3. At GMP, I help deliver distributed energy resources programs for customers such as the ESS program and the Resilient Neighborhood Pilot, and I also lead GMP's implementation of the Department of Housing and Community Development's Vermont Community Electric Vehicle Chargers Incentive Program ("Charge Vermont") and other GMP grant opportunities, and am a part of the team working on implementation of GMP's Zero Outage Initiative ("ZOI"), approved by the Commission in Case No. 23-

3501-PET. Prior to joining GMP, I held several roles at SunCommon, where I administered the community solar array programs and led the residential customer support and project management teams. I have also worked in constituent services for the State of Vermont Governor's office. I received my Bachelor of Arts from the University of Vermont.

Q4. What is the purpose of your testimony in this proceeding?

A4. My testimony outlines GMP's request for continued investment in our customer-driven ESS program pursuant to 30 V.S.A. § 218d and Section IV(A)(iv) of GMP's MYRP, and consistent with the Commission's 2024 ESS Order, so that we can meet strong customer demand and deliver overall program benefits for all customers. As demonstrated in the attached updated cost benefit analysis (**Exhibit GMP-MMC-1**), each additional ESS program installation serves as a flexible grid asset and continues to deliver net benefits to all GMP customers even without accounting for the resilience benefits batteries provide to those who lease them.

GMP is requesting the Commission approve an additional $32 million in ESS capital investment through the remainder of the MYRP and the ESS tariff authorization. GMP requests to invest up to that amount based on actual completed installations and to use the regulatory accounting and rate treatment previously approved, as described below.

II. Proposed Additional Investments to Meet Customer Demand Since Approval of ESS Program as a Tariffed New Initiative

Q5. Can you please summarize the installation history and expectation for ESS program enrollment since the time the last MYRP was approved?

A5. After successful pilots, the ESS program was originally approved by the Commission on May 20, 2020, in Case No. 19-3167-TF, and the Commission extended the program through September 30, 2026, in Case No. 21-5254-TF. The ESS program was initially approved with a 5MW, or approximately 500 installations, annual limit. The current MYRP included an annual capital investment of $6.2M for the ESS program, based on approximately 350 annual installations in the years leading up to the approval of the MYRP. *See* April 26, 2023 GMP Tariff Filing Cover Letter at 4 (Case No. 23-1335-TF) ("Lift the Cap Filing"); *see also* August 31, 2022 PUC Order approving MYRP and FY23 Rate Case at 15 (Case Nos 21-3707-PET/22-0175-TF).

Driven by the unprecedented series of damaging storms during the 2022-23 winter, customer interest quickly outpaced both the budgeted investment and the overall 500-customer annual limit, leading to a 750-customer waitlist. Lift the Cap Filing at 1-2. Recognizing this demand, the Commission lifted the 5 MW installation cap in August of 2023. *See* Order of August 17, 2023, in Case No. 23-1355-TF ("Lift the Cap Order"). As contemplated in the Lift the Cap Order, GMP sought to treat the ESS program as a Tariffed New Initiative under Section IV(A)(iv) of GMP's MYRP and requested approval for up to $15M in additional capital investments beyond the existing MYRP capital limits to meet continuing customer interest in the program. The Commission

approved this request in the 2024 ESS Order subject to a specific regulatory accounting process and annual reporting requirements for these investments. The Commission also established a process for any further capital requests to support the ESS program, consistent with the Tariffed New Initiative requirements in the MYRP.

There are now more than 4,220 customers enrolled in the ESS program, including the approximate 1,500 who piloted the program before the tariff. Altogether, the program contributes over 40 MWs of residential storage to GMP's fleet of flexible stored energy resources, helping manage peak loads, supporting grid stability and management, participating in regional markets, and providing benefits for all customers—savings that are reported annually in GMP's MYRP and storage program reports[1]—all while adding individual resilience for leasing customers. Since 2019, ESS Program systems have responded to outage events over 45,000 times providing over 225,000 hours of backup power in total.

Q6. Can you update the Commission on the pace of ESS installations since the 2024 ESS Order?

A6. Customer demand for the program has remained strong since the 2024 ESS Order. In the period between September 2024 and March 2025, 610 customers signed up (87/month) and 578 ESS installations (83/month) were completed. This pace closely follows our forecast for this period submitted as part of the request leading to the 2024 ESS Order. *See* Exhibit GMP-MMC-7, filed July 31, 2024 in Case No. 24-1715-PET (forecasting

[1] Calendar Year 2024 annual reports were submitted January 30, 2025 in Case Nos. 25A-0220 and 25A-0222.

560 sign-ups and 575 installs over this same period). This pace also reflects a very low rate of attrition and little time between sign-up and installation.

Q7. How does the recent demand inform GMP's expectations for future customer interest and what is GMP requesting for additional investment to meet this customer demand?

A7. Based on the recent and consistent trend in overall customer demand since the 2024 ESS Order, we expect the monthly pace of signups and installations to remain steady over the remainder of the MYRP, averaging about 85 installs/month. At this pace, approximately 1,400 customer installations would be completed by September 2026.

Therefore, we request that the Commission approve an up to additional $32 million in ESS capital investment through September 30, 2026, which is the end date both for the current MYRP and the ESS tariff.

Q8. Can you summarize the regulatory accounting methodology that will be used to incorporate this additional investment in rates?

A8. Consistent with regulatory treatment provided in Section IV(A)(iv) of the Plan, and the PUC's 2024 ESS Order, GMP will only recover in rates expenses associated with installed systems, and will report annually after the projects have closed, to be incorporated into its Annual Base Rate filing and subsequent traditional rate case as follows:

- ESS amounts associated with this additional $32 million investment request closed through September 30, 2025 will be incorporated into GMP's traditional FY27 rate case, to be filed on or around January 15, 2026.
- ESS amounts closed to plant after September 30, 2025 will be incorporated annually into future annual base rate filings under any future regulation plan as set forth in the review of that plan.

In each case, all the benefits created by these systems, such as reduced power supply costs, will flow through to customers through MYRP adjuster mechanisms immediately after the systems are installed and are dispatched.

Q9. Please describe how the ESS program will work for customers?

A9. Each customer leases a whole-home energy storage system including integrated inverters, control equipment, and standard installation, for either $55/month or an up-front lump sum of $5,500. In each case, the initial lease term for payment is 10 years, with a 5-year cost-free renewal thereafter; GMP utilizes the storage systems for peak management and other grid services and the customer benefits from backup power in the event of an outage. We will continue to offer the Powerwall system that has been the lease equipment to date and will also make available equivalent systems that meet criteria for cost-competitiveness and compatibility with our grid-management.

Q10. Can you explain further what GMP expects regarding other equivalent energy storage systems?

A10. We expect to add more equivalent energy storage systems in the future potentially, and so far, we have been testing and/or piloting those offered by Franklin, Fortress, Emporia, and Enphase. For example, we successfully deployed Franklin Whole Home systems in our Grafton Resiliency Zone Pilot,[2] where they have been performing well for customers. These systems allow a variety of installation configurations including indoors or outdoors and with varying interconnection devices.

We continue to monitor and test residential energy storage system offerings to ensure customers can lease high-performing equipment that maximizes the lifetime benefits to all customers. While there are minor differences in the specifications and operation of each comparable system, GMP will only utilize models that perform well and are expected to remain NPV-positive for all customers over their useful life as discussed below. Offering multiple product options will allow the ESS program to evolve along with the market for these technologies and ultimately will allow us to better meet customers' various needs for space, interconnection, and energy so that the program is suitable for more customers.

[2] Case No. 22A-3112.

III. Updated Financial Analysis

Q11. The Commission asked that GMP update and further explain how it is quantifying the financial benefits generated by ESS installations for customers in any additional capital requests. Has GMP updated its financial analysis to address these requests?

A11. Yes. In the Commission's 2024 ESS Order, it requested that our analysis for further investments: (1) incorporate actual results from any peak reduction, forward capacity market, regional network service, or other revenue generating or cost-avoiding opportunities; (2) describe any changes to future assumptions about those revenue-generating or cost-avoiding opportunities; and (3) explain how uncertainty in the future of those revenue-generating or cost-avoiding effects is addressed. We have updated our cost benefit analysis to reflect these requests in **Exhibit GMP-MMC-1**, and I address these updates further below.

Q12. What are the updates you've made to the financial model since it was filed as part of the 2024 ESS Proceeding?

A12. The financial model has been updated to incorporate the actual performance of our energy storage systems to date and contains current assumptions regarding future benefits and costs associated with these systems.[3] Relative to prior ESS models, the most recent of which was filed in the 2024 ESS Proceeding, all assumptions have been reviewed and

[3] This model is consistent in the general methodology, assumptions, and presentation with the model submitted in support of the recent Zone 4 Energy Storage Tariff filing, which were both developed to incorporate our latest actual results and forecasts and to provide reasonable ranges for assumptions that are not fixed. The only material difference between these two models is inherent in the tariff design: the ESS model contains the customer lease payment and is based on the approved system installation cost.

updated as necessary. As in the Zone 4 Energy Storage Tariff model, all assumptions are now presented in the context of a reasonable range of expected values for that assumption. Further updates to our assumptions fall within the following general categories:

- We have reduced the peak shaving benefits over the modeled term, including for forward capacity market (FCM) and Regional Network Service (RNS) participation. This is based primarily on the assumption that the amount of peak shaving per MW of capacity will decline as more in-state and regional peak shaving resources result in flatter peaks and also assumes more monthly peak discharges may be needed. We have also revised these values based on actual results to date as included in annual metrics reports. These forecasts may be conservative because we expect continued electrification, load growth, and regional transmission growth to continue to drive peak costs. System performance assumptions have been updated based on experience and improving technology. The modeled useful life has extended from 15 to 20 years with updated assumptions for the rate at which systems cease operation over time.
- Added value for frequency regulation and energy arbitrage as additional value streams when battery availability permits.
- Adjustments to the Investment Tax Credit applied under the Inflation Reduction Act of 2022 to include a 10% increase in the credit for domestic manufacturing.
- Consistent with the Zone 4 Energy Storage Tariff, we have included a value for Vermont-based T&D system upgrade deferral. As described below, each

incremental storage system contributes to reduced peaks that could defer transmission projects at key locations in Vermont, and it is appropriate to include this value.

- Added end-of-life removal costs, which may be reduced by recycling proceeds.

Q13. Describe further how GMP has incorporated actual results from peak shaving, RNS, FCM, or other revenue sources, and how those results changed your assumptions.

A13. These value streams account for the majority of the program benefits and have been forecasted based on our extensive experience with residential energy storage programs and the latest market information and incorporate our reporting and analysis provided in GMP's Annual Energy Storage Program Report submitted[4] earlier this year pursuant to the Commission's 2024 ESS Order. In that annual reporting, RNS rate and monthly peak performance and FCM values were refreshed based on actual results, and those changes carry forward in this model. Overall, the existing systems are still expected to perform in line with the modeled performance on average over their lifetime.

With this model iteration, both the RNS and FCM hit rates have been adjusted downward, based primarily on the assumption that peak shaving resources will decline in effectiveness per MW of capacity as more resources capable of hitting these peaks come online and result in flatter peaks. Previous models provided an average peak hit rate over the lifetime of the systems. This refreshed model has a slightly lower initial hit rate and

[4] Report Case No. 25A-0222 (Jan. 30, 2025).

then applies a decreasing rate over time reflecting that assumption. The forecasted hit rate also reflects that operating profile of these systems prioritizes customer resilience, as we do not schedule a discharge for a peak during potential storms. In addition to arbitrage and regulation uses, the model also increases the discharge cycles per month to help ensure we hit these flatter peaks.

These value streams still represent substantial benefits going forward, and become even more valuable, for example, when the market rate increases as it has in recent years with the RNS rate. Indeed, these assumptions may be conservative based on expected load growth due to electrification. This would continue to support or drive up the peak even with increased peak shaving resources and is likely to require additional regional and local transmission infrastructure that would be reflected in higher power supply costs and therefore increase the per-MW value of these resources. Based on current regional transmission projections, we expect continued demand for these resources and for the modeled benefits to materialize.

Q14. How have you addressed potential uncertainty in the future expectations for the program's revenue-generating or cost-avoiding effects?

A14. As with GMP's recent Zone 4 Energy Storage Tariff submission, this model provides a reasonable range of variables and assumptions including those related to performance, rather than singular assumptions, allowing evaluation of a range of outcomes. With respect to peak-shaving values streams including RNS and FCM values, we have addressed uncertainty in the future through the degradation of the peak hit rate described

above, and the conservatism built into these expectations further mitigates uncertainty. We expect continued load growth from electrification and associated transmission demands that will continue to drive costs that can be deferred, curtailed, or avoided through storage capacity, and support the value provided by peak shaving. In addition, we are in frequent discussions with battery partners about how potential tariff and other price impacts could impact final product costs. To date, no pricing changes have been implemented, and it is unclear whether costs will change. In the event actual average system costs vary materially beyond assumptions included in the model, we will update the Department and Commission and request a tariff update, if needed.

Q15. The model reflects a 20-year useful life for most systems; can you describe why your experience supports this assumption?

A15. This assumption is based on what we have seen in our many years piloting and developing residential and other types of storage resources. The initial 15-year term for prior models was selected early in the deployment of these systems when there was less real-world experience with new energy storage technology and was informed in part by the length of warranties offered by manufacturers at the time. With almost ten years of experience with this use-case it is appropriate to update assumptions to reflect actual system performance. In addition, the ESS model remains NPV positive using the previous 15-year model.

Q16. The model contains a benefit for deferring T&D projects for load growth projections. Can you explain how that benefit flows to customers and why it is appropriate to include it in the model?

A16. This benefit was included in the recent Zone 4 Energy Storage Tariff model and is reasonable to include here for the same reasons. *See* Case No. 25-0719-TF, prefiled direct testimony of Josh Castonguay at 26-28 for more detail on how that benefit was quantified. The value calculated in that model was an average state-wide value expected for each incremental kW of storage available for peak-shaving and was developed based on independent studies of neighboring states. Because each storage system contributes equally to this deferral value in aggregate, it is appropriate to reflect this value in the ESS program as has been modeled in **Exh. GMP-MMC-1**.

Q17. Does the ESS model include any financial assumptions for the potential value of resilience?

A17. As with all our previous residential energy storage programs, the ESS Program continues to stand on its own as a financial benefit to all customers without accounting for the significant additional benefit of resilience. The Department of Public Service has separately petitioned to establish common standards for valuing resiliency,[5] and GMP looks forward to participating in this important discussion. If, as a result of that proceeding, it is determined a dollar value should be assigned for resilience benefits, that approach would further bolster the existing NPV benefits of this program.

[5] *See* Case No. 25-0339-PET.

Q18. How does the continuing ESS Program relate to the recently filed Zone 4 Energy Storage Tariff?

A18. Customers in the ESS program elect to participate voluntarily by paying for additional resilience above and beyond what other customers in the area receive, while the Zone 4 Energy Storage Tariff identifies geographic areas most in need of resiliency upgrades in order to provide customers in that area resilient, reliable service similar to what other GMP customers experience now in less-challenged areas. These two programs therefore serve different specific purposes and have different criteria for participation.

This request for additional investment in the ESS program responds to the current sustained interest in this customer-driven program, which continues to provide net positive benefits, however GMP is considering how to structure our storage programs in the future when the current programs have expired. GMP anticipates using the lessons from the Zone 4 Energy Storage request, if approved, along with what GMP is learning through the significant, sustained customer interest in the ESS lease, for its next set of storage programs that will be proposed to take effect after September 30, 2026.

Q19. Does that conclude your testimony at this time?

A19. Yes, it does.