

**STATE OF NEW HAMPSHIRE  
PUBLIC UTILITIES COMMISSION**

**DE 17-189**

**LIBERTY UTILITIES (GRANITE STATE ELECTRIC) CORP.  
d/b/a LIBERTY UTILITIES**

**Petition to Approve Battery Storage Pilot Program**

**Order Approving Settlement Agreement and Implementation of Pilot Program  
and Granting Motions for Confidential Treatment**

**O R D E R N O. 26,209**

**January 17, 2019**

In this order, the Commission approves Liberty Utilities' implementation of a battery storage pilot program intended to achieve customer savings through peak load reductions. The program will be implemented in two phases, the second of which is conditional on the success of the first. As part of the pilot, under certain conditions, Liberty will be authorized to install up to 500 Tesla Powerwall 2 batteries behind the meter at customers' premises. The approved program also provides an opportunity for development of a "bring your own device" component that would involve participation by third-party aggregators under contract with Liberty. The approved pilot program is the result of a settlement agreement that modified Liberty's initial battery storage proposal, which was too big, too complex, and too expensive; and which would have subjected ratepayers to too much risk, with total estimated costs of almost \$8,000,000. The parties recognized that the size and scope of that original proposal were beyond the reasonable range of what would be appropriate for a pilot program, and would present significant risks of cost-shifting from participating customers to non-participating customers. As explained further below, approval of the pilot program is subject to certain conditions and limitations.

## **I. PROCEDURAL HISTORY**

On December 1, 2017, Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty Utilities (Liberty) filed a petition requesting Commission approval of a pilot program in which Liberty would buy and install batteries and related equipment for up to 1,000 residential customers with the goal of reducing transmission costs and studying other potential system benefits. Liberty's petition was supported by the direct testimony of Heather M. Tebbetts, Senior Analyst for Liberty Utilities Service Group, which provides services to Liberty.

The Commission issued an order of notice scheduling a prehearing conference, which was held on January 4, 2018. The Office of Consumer Advocate (OCA) entered an appearance on behalf of residential utility customers pursuant to RSA 363:28, and intervenor status was granted to the City of Lebanon (Lebanon); ReVision Energy, Inc. (ReVision); Sunrun, Inc. (Sunrun); New Hampshire Sustainable Energy Association (NHSEA); Conservation Law Foundation (CLF); and the Acadia Center (Acadia). The Commission granted Liberty's motion for confidential treatment of certain proprietary and financially sensitive information, subject to a directive that Liberty attempt to reduce the scope of the information redacted in Appendix 1 to its direct testimony.

Pursuant to the approved procedural schedule, on February 9, 2018, Liberty filed supplemental testimony of Ms. Tebbetts and direct testimony of Vikram Singh, as well as another motion for confidential treatment. On April 9, 2018, Liberty filed a technical statement of Ms. Tebbetts, updating the benefit-cost analysis submitted with her supplemental testimony. In May 2018, the OCA filed the direct testimony of Lon Huber; Lebanon filed the direct testimony of Clifton C. Below, a member of the Lebanon City Council; Sunrun and ReVision jointly filed the direct testimony of Justin R. Barnes; NHSEA filed the direct testimony of Kate

Bashford Epsen; and Commission Staff (Staff) filed the direct testimony of Elizabeth R. Nixon and Kurt Demmer.<sup>1</sup>

Following discovery and related technical sessions, the parties engaged in settlement discussions over a period of several months. On November 19, 2018, Liberty filed a Settlement Agreement executed by Liberty, Lebanon, NHSEA, CLF, Acadia, the OCA, and Staff (Settlement Agreement). The Settlement Agreement was submitted with technical statements describing the terms of the settlement and explaining the time-of-use (TOU) rate modeling that was part of the agreement. On November 29, 2018, Liberty filed a motion for protective treatment related to certain discovery responses, and also a revised Appendix 1 to its original filing containing fewer redactions.

A hearing on the merits of the Settlement Agreement was held on November 29, 2018. The written closing statement of Sunrun and ReVision was submitted on December 6, 2018, and memoranda of law were submitted by Liberty, CLF, and the OCA on December 13, 2018.

Liberty's petition, direct and supplemental testimony, the testimony submitted by parties and Staff, the Settlement Agreement, hearing exhibits, post-hearing submissions, and other filings and documents related to this matter, can be found on the Commission's website at <http://puc.nh.gov/Regulatory/Docketbk/2017/17-189.html>.

## **II. POSITIONS OF THE PARTIES AND STAFF ON INITIAL PROPOSAL**

### **A. Liberty**

Under Liberty's initial proposal, as described in its petition and its direct and supplemental testimony, it would own up to 1,000 Tesla Powerwall 2 batteries to be installed in up to 1,000 residential customers' homes. *See* Direct Testimony of Heather M. Tebbetts,

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<sup>1</sup> In lieu of testimony, CLF and Acadia filed comments on May 2 and May 3, 2018, respectively.

Hearing Exhibit 2 (Exh. 2) at Bates Page<sup>2</sup> 11; Supplemental Testimony of Heather M. Tebbetts, Hearing Exhibit 5 (Exh. 5) at 6, 12. Ms. Tebbetts testified that the proposed Liberty program was based on a similar pilot conducted in Vermont by Green Mountain Power (GMP). *See* Exh. 5 at 9, 19. Each customer would pay either an upfront contribution in aid of construction of \$1,000, or \$10 per month for ten years, the life of the battery warranty. *Id.* at 25. Participating customers also would be required to take service under TOU rates for transmission and distribution charges with three pricing periods for each weekday as well as a weekend and holiday off-peak period. Exh. 2 at 18-19; Direct Testimony of Heather M. Tebbetts, Revised Bates 18, Hearing Exhibit 3. The batteries would be programmed to charge at night (during off-peak hours) and discharge during the next day's critical peak periods. *See* Exh. 2 at 11, 20; Exh. 5 at 23. According to Liberty, the batteries would provide backup power for the participating customers, reduce peak demand, and potentially provide voltage and other support services as needed. Exh. 2 at 11.

The batteries would not discharge to the electric distribution system except when Liberty has forecasted a peak event will occur and has taken control of the batteries at midnight the night before the predicted peak event day. Exh. 5 at 23. Under those circumstances, Liberty would ensure that the batteries were fully charged during the off-peak period and then discharged during the hours of predicted peak. *See id.* The primary near-term goal of that discharge would be to reduce transmission charges for both Regional Network Service (RNS) and Local Network Service (LNS), which are assessed based on monthly system coincident peaks as determined by ISO New England, Inc. (ISO-NE), the entity that operates the regional electric system.

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<sup>2</sup> Unless otherwise noted, all exhibit page references will be to Bates pages.

*See* Exh. 2 at 8-12. Long-term goals of the program would include study of the effects of the batteries on the distribution system and the effects on transmission costs. *Id.* Liberty proposed to study such effects over a five-year period to determine the extent of the resulting deferral or avoidance of future upgrades to its distribution system. *Id.*

In addition, Liberty proposed to install a number of the batteries at targeted locations on two distribution circuits in West Lebanon. *Id.* at 16-17. Those batteries would serve to defer distribution system upgrades otherwise required to resolve planning criteria violations on those circuits. *Id.* Liberty characterized that component of the pilot program as a “non-wires alternative” (NWA). *Id.* at 17. Liberty would first market the program to customers on those two circuits, with the option to open the pilot to all customers once the sufficient number of batteries was installed on the targeted circuits. *Id.*

The pilot program would be open to customers both with and without solar photovoltaic (PV) systems. *Id.* at 20. Participating customers without PV or other distributed generation (DG) would be compensated for electricity exported from their batteries to the grid through monetary credits on their electric bills determined at the rate applicable under the alternative net metering tariff that became effective on September 1, 2017. *Id.* at 20-21.<sup>3</sup> Participating customers with solar PV or other DG systems would be required “to move to the new [alternative] net metering tariff and [would] receive monetary credit for their exports.” *Id.* at 21. Those customers would also be credited for kilowatt hours (kWh) discharged to the grid when Liberty “dispatch[ed] the batteries on its own to reduce load at peak.” *Id.* at 21-22.

Liberty explained that it selected the Tesla Powerwall 2 batteries and associated Tesla GridLogic software based on the recommendation of its consultant, Alectra Energy Solutions,

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<sup>3</sup> *See* Order No. 26,029, Docket No. DE 16-576 (June 23, 2017).

Inc., using “prerequisites for technological compatibility and proprietary fit” and comparing information available from Tesla and other potential battery system vendors. Exh. 5 at 6, 12. According to Liberty, after reviewing the information provided by the different vendors, it concluded that “Tesla [was] the best, most cost effective vendor to satisfy these prerequisites.” *Id.* at 6. Liberty estimated the total cost of purchasing and installing 1,000 batteries to be \$7,192,000. *Id.* at 9. Other related costs would include the purchase and programming of meters, billing system modification, and monthly charges for wireless network access to read meters. *Id.* at 9-10.

In its Supplemental Testimony, Liberty analyzed the criteria for approval of utility investment in distributed energy resources (DERs), including energy storage such as batteries, under RSA 374-G:5, II. *See id.* at 13-17. Those criteria include: effects on the reliability, safety, and efficiency of electric service; energy security benefits; environmental benefits; economic development benefits; competitive impacts; and relative costs and benefits to participating customers and to customers as a whole. *Id.* Liberty included a benefit-cost analysis that showed total nominal benefits to all customers of \$1,817,896 over the assumed 15-year useful life of the installed batteries. *Id.* at 11; *see also* Technical Statement of Heather M. Tebbetts at 2, and Revised Attachment A, Hearing Exhibit 10. According to Liberty, its customers would also benefit from data collected through the pilot program, which “may inform decisions in future investments in grid modernization such as metering, customer engagement platforms, and increased reliability.” Exh. 5 at 11.

## **B. OCA**

The OCA's witness, Lon Huber, Director of Private Sector Consulting Practice, Strategen Consulting,<sup>4</sup> recognized the Liberty battery storage pilot program's benefits of providing backup power service to residential customers and savings from TOU energy-shifting, while making recommendations for how the initial proposal should be modified in a number of areas, as described below. *See* Direct Prefiled Testimony of Lon Huber, Hearing Exhibit 11 (Exh. 11) at 5.

### 1. Customer Education and Support

The OCA recommended that, given the unique nature of the proposed pilot program, Liberty obtain assistance with customer education and customer support by issuing a request for information (RFI) to third parties specializing in customer education, outreach, and support. *Id.* at 5-6. Mr. Huber suggested that Liberty consult the OCA and Staff regarding the scope of the RFI. *Id.* at 6. The OCA recommended that Liberty, the OCA, and Staff review the results of the RFI to determine whether the benefits of hiring a third-party expert would justify the cost to the program. *Id.* at 6-7. The OCA also recommended that Liberty should consult with the OCA and Staff before it implemented the customer education and support component of the pilot program. *Id.* at 7.

### 2. Federal Investment Tax Credit (ITC) for Solar Customers

According to the OCA, the proposed pilot program should have been modified to allow participants with solar PV to take advantage of the 30 percent ITC for which they could qualify if 75 to 100 percent of the energy used to charge their batteries is produced by their PV systems.

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<sup>4</sup> Mr. Huber subsequently became affiliated with Navigant Consulting.

*Id.* at 7-8. According to Mr. Huber, the ITC could result in a tax credit of \$3,000 from the approximate \$10,000 installed cost of a battery. *Id.* at 7.

### 3. Pilot Program Benefit-Cost Analysis

The OCA critiqued Liberty's various benefit-cost analyses and recommended that the Commission consider the costs and benefits of the battery storage pilot program using the total resource cost (TRC) test, in addition to a "business case" analysis based on the utility cost test (UCT), to determine what portion of the program costs should be paid for by participating customers and how much should be distributed across Liberty's customer rate base. *Id.* at 8-15. Mr. Huber determined that the program would present opportunities for participating customers to achieve significant benefits resulting in a short payback period. *Id.* at 16-17. In view of that potential "generous payback," the OCA recommended that participating customers be required to pay an increased upfront amount of \$2,950 or an increased monthly amount of \$37. *Id.* at 17-18. The OCA also recommended that the Commission consider in its evaluation of the pilot program indirect benefits, such as fuel savings and incremental avoided CO<sub>2</sub> attributable to battery displacement of gasoline-powered generators during grid outages. *Id.* at 18-19. Mr. Huber submitted his own benefit-cost analyses of the proposed pilot program using the TRC test as well as a business case analysis, and found that both approaches demonstrated a modest positive net present value. *Id.* at 18. Notwithstanding those findings, the OCA maintained that the pilot would be unique and therefore a positive net present value should not be deemed a prerequisite for Commission approval or for Liberty to recover its related investments. *Id.* at 9.

### 4. NWA Proposal

The OCA suggested that, in connection with the NWA component of the program, Liberty adopt targeted energy efficiency investments, such as commercial and industrial lighting



projects, on the 11L1 circuit in Lebanon. *Id.* at 20-23. According to Mr. Huber, targeted energy efficiency would diversify the NWA solution in a cost-effective manner, while freeing up “substantial amounts of the capacity associated with the 300 batteries in the NWA footprint to instead primarily target transmission peaks.” *Id.* at 21-22. The OCA recommended that the Commission allow Liberty the flexibility to deploy batteries in strategic locations that serve as public gathering places during power outages or emergencies, such as hospitals, police stations, schools, or city halls, thereby providing a resiliency benefit to communities. *Id.* at 23-24.

#### 5. Pilot Evaluation, Measurement, and Verification

In order to evaluate, measure, and verify the direct and indirect benefits of the proposed battery storage pilot program, the OCA recommended that Liberty be directed to work with Staff, the OCA, and other interested parties to develop a plan including an independent third-party evaluator managed by a working group. *Id.* at 24-25. The working group would consist of representatives from Staff, the OCA, Liberty, and the technical consultant. *Id.* at 25.

#### 6. Statewide Docket to Design Third-Party Battery Program and Tariff

The OCA urged the Commission to open an investigatory docket with a specific timeline to develop a “bring your own battery,” rate mechanism. *Id.* at 25-26. The goal of that investigation would be a rate mechanism for residential and commercial customers that would send accurate price signals to guide battery dispatch rather than relying on the utility to control battery dispatch. *Id.* at 26. Such a program would provide a platform for utilities, third-party providers, and aggregators to communicate with each other so that installed batteries could be used “to respond to system cost drivers” and achieve costs savings from capacity, transmission, and distribution perspectives. *Id.*

### **C. Lebanon**

Clifton C. Below, a Lebanon city councilor, testified that Lebanon disputed aspects of Liberty's benefit-cost analysis, but had determined that the economic benefits of the battery storage pilot program likely outweighed its costs. *See* Testimony of Clifton C. Below, Hearing Exhibit 12 (Exh. 12) at 6-9. Mr. Below recommended approval of the pilot program subject to a number of specific conditions as described below. *Id.* at 3-6.

First, Liberty should have proposed opening the pilot program to small commercial customers on the G3 rate if not enough residential customers agreed to participate in the program in a timely manner, allowing commercial customers to deploy up to five batteries behind one meter and Gateway and to pay the same transmission and distribution rates as residential customers. *Id.* at 3, 9-12. Liberty should also have coordinated with Lebanon to simultaneously promote the battery storage pilot program and solar power with storage initiatives targeted to the 11L1 circuit area. *Id.* at 4, 12. Once Liberty had achieved its battery deployment goal for the 11L1 circuit area and other identified NWA target circuit areas, it should have used an auction mechanism to give preference to other customers wanting to participate in the pilot program who were willing to pay more than the \$1,000 upfront or \$10 monthly amounts. *Id.* at 4, 12-13.

In addition, under Lebanon's view of how the program should have been structured, within one year after approval of the pilot program, Liberty should offer TOU rates to customers in all customer classes who are also willing to opt in to the Lebanon Community Power (LCP) municipal aggregation pilot program with real-time pricing (RTP). *Id.* at 4, 13-17. The TOU rates should be similar to those offered to residential customers under the pilot program. *Id.* at 4. Liberty should also incorporate into its pilot program tariffs a revenue decoupling mechanism that would enable it to adjust all distribution rates, including pilot program TOU rates, on an

annual basis to ensure that it is made whole in the event the pilot program TOU rates result in a loss of revenue. *Id.* at 4, 17-18. Liberty should be required to work with Lebanon toward adopting alternative metering solutions to serve both the LCP RTP municipal aggregation pilot program and the battery storage pilot program for meter locations where the two pilot programs overlap. *Id.* at 5, 18. In addition, Liberty, in conjunction with Tesla, should be required to determine whether customers could have more control over the timing of battery charging and discharging to optimize customer value, such as discharging power from storage onto the grid at times other than projected coincident peaks. *Id.* at 5, 19.

Customers with DG who are grandfathered under the original net metering tariff should be permitted to participate in the battery storage pilot program under the alternative net metering tariff, with a one-time election to return to the original net metering tariff upon termination of their pilot participation and payment of all related charges. *Id.* at 5, 19-20. Liberty should also be required to provide public notice of its forecasted monthly or annual coincident system peaks and its intent to take control of program batteries, because all customers would be paying for that forecasting work through their distribution rates. *Id.* at 5, 20. In addition, Liberty should include in its reporting and analysis of the battery storage pilot program details regarding the amount of power the batteries discharge, the resulting avoided transmission charges, and, if knowable, capacity market charges, as well as metrics demonstrating the extent to which the pilot program serves as an NWA. *Id.* at 6, 20.

#### **D. Sunrun and ReVision**

Sunrun and ReVision jointly submitted the direct testimony of Justin R. Barnes, Director of Research with EQ Research LLC. *See* Testimony of Justin R. Barnes, Hearing Exhibit 15

(Exh. 15) at 1-2.<sup>5</sup> Mr. Barnes testified regarding suggested modifications to the proposed battery storage pilot program based on other states' regulation of similar customer-sited DER programs. *Id.* at 3-4. He maintained that other states, such as Arizona and New York, have limited utility ownership of customer-sited DERs, approving programs that are relatively small in relation to the overall market. *Id.* at 5-8. Those approved programs have been designed to test the utility ownership model with minimal risk, serve an unmet need such as services for low-income customers, and avoid the creation of an unnecessary monopoly service, instead expanding competition by providing more options to customers. *Id.* In particular, it is uncommon and inappropriate for a utility-owned DER program to include an NWA component. *Id.* at 8-9.

Mr. Barnes testified that New York, California, and Hawaii have developed, or are developing, programs that maximize the benefits of energy storage by “the ‘stacking’ of value streams at the customer, distribution, and bulk system or wholesale level.” *Id.* at 9. That “value-stacking” requires coordination of the operation and control of storage devices so that they can provide multiple services. *Id.* at 9-11. According to Mr. Barnes, the focus of other state programs on preserving or enhancing competition and customer options, as well as the use of private capital to promote greater storage and DER deployment, is consistent with New Hampshire law governing DER ownership by utilities under RSA 374-G. *Id.* at 11-14.

Mr. Barnes also criticized Liberty's benefit-cost analysis, noting a number of flaws and errors in assumptions and methodology. *Id.* at 17-22. Although he opined that Liberty's original proposal for its battery storage pilot program could nonetheless produce net benefits, he recommended an alternative design to improve the pilot program so there would be greater certainty of achieving net benefits. *Id.* at 22. His alternative approach would address a number

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<sup>5</sup> Page references to Exhibit 15 are to the page numbers contained in this exhibit, which was not Bates-stamped.

of design flaws and unwarranted complexities in the Liberty proposal. *Id.* at 23-31. The alternative program design would: allow participants to use non-utility-owned energy storage assets and still be eligible for TOU tariffs; permit the system owner, aggregator, or other designated party to maintain direct control of the asset; permit customers with solar-paired energy storage to participate without additional restrictions; permit the distribution of program participation payments directly to an aggregator or other third-party entity; establish payment rates under a standardized minimum fixed rate system during participation, subject to performance rules consistent with the use case, punitive measures for non-performance, and potential enhanced payments for performance; share program benefits and risks in a systematic, equitable manner between participants and non-participants; limit utility-owned storage assets to no more than 25 percent of the total program size; and permit customers to opt-out of the program at any time in coordination with any aggregator they have designated as the system operator. *Id.* at 32-43.

Sunrun and ReVision recommended approval of the battery storage pilot program with the modifications described by Mr. Barnes. *Id.* at 44. In the alternative, were the Commission to approve the pilot program based on Liberty's ownership of 100 percent of the energy storage systems, Mr. Barnes recommended that Liberty be required to reduce the size of the program by at least 75 percent, use competitive RFPs to select providers of hardware and service solutions, and develop an equivalent program at least three times the size of the Liberty pilot program that permits customers to furnish their own devices. *Id.* at 4, 44.

#### **E. NHSEA**

On May 2, 2018, NHSEA filed the testimony of its then-Executive Director, Kate Bashford Epsen, recommending approval of Liberty's battery storage pilot proposal, with

suggested modifications intended to ensure competition at the retail level in the non-utility owned, operated, and deployed battery storage market. *See* Testimony of Kate Bashford Epsen, Hearing Exhibit 16 (Exh. 16) at 2-4.<sup>6</sup> NHSEA proposed opening the pilot program to other battery technologies and ownership models, so that Liberty customers who supplied their own devices could take advantage of the program's TOU rates. *Id.* at 4.

In NHSEA's view, Liberty's use of GridLogic software could preclude customers from using other technologies. *Id.* at 5. In addition, Liberty's proposed upgrades to participant customer meters, which would remove the Zigbee chip, could result in a loss of important customer data. *Id.* NHSEA criticized Liberty's benefit-cost analysis, because it did not reflect the pilot's energy and capacity benefits, the quantification of which is essential to the promotion of retail competition and greater use of DERs. *Id.* at 5-6. According to NHSEA, such an accounting of capacity savings would be consistent with the peak time and peak load reduction goals of Docket Nos. IR 16-714, DE 15-137, and IR 15-296. *Id.* at 6. NHSEA recommended that Liberty, upon notification to the Commission and customers, be allowed reasonable flexibility to make changes to the pilot program in order to take advantage of future changes in technology and the regulatory environment. *Id.* at 6-7.

NHSEA criticized a provision in the proposed pilot program customer agreement which states that, with the exception of claims covered under the limited warranty, neither Liberty nor Tesla may be held liable for any damages resulting from the use of Tesla's Powerwall batteries. *Id.* at 7. In NHSEA's opinion, this provision "seems extreme and unenforceable," and "could

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<sup>6</sup> At hearing, Madeleine Mineau, the current Executive Director of NHSEA, adopted Ms. Epsen's prefiled testimony as her own testimony. Page references to Exhibit 16 are to the page numbers contained in this exhibit, which was not Bates-stamped.

create consumer mistrust and skepticism in the program and Liberty's willingness to protect its own customers." *Id.* NHSEA also suggested that Liberty provide customers enrolled in the pilot with a user-friendly manual and an orientation meeting, because "aggressive education on the technology, the associated TOU rates, the operability of the battery and the software, etc. is essential to success." *Id.* at 7-8.

#### **F. Staff**

Staff's position on Liberty's original battery storage pilot program proposal was set out in the direct testimony of Elizabeth R. Nixon and Kurt Demmer, utility analysts in the Commission's Electric Division. Ms. Nixon stated that Staff had a number of concerns regarding Liberty's proposed pilot, including the scale and scope of the program, and she compared it to the GMP pilot program implemented in Vermont. *See* Direct Testimony of Elizabeth R. Nixon, Hearing Exhibit 13 (Exh. 13) at 2-5. In contrast with GMP's 18-month pilot program with 0.7 percent of its customers participating, Liberty proposed a 10-year pilot enrolling over two percent of its customer base. *Id.* at 5. Further, GMP will provide status reports on certain metrics to measure program effectiveness, while Liberty did not specify any metrics or propose a reporting schedule. *Id.* Liberty also contemplated testing multiple variables at the same time, including a new TOU rate design, whereas the GMP program focuses only on peak load reductions and on grid stability in areas with high DG penetration. *Id.* According to Staff, Liberty had neither prepared a sufficiently detailed plan for implementation and administration of the pilot nor developed a methodology to forecast the peak hours during which the installed batteries would be discharged in order to achieve the assumed benefits. *Id.* at 15-16.

Ms. Nixon identified a number of flaws in Liberty's benefit-cost analysis of the proposed pilot program, which had concluded the program would result in a net present value of \$1.1 million over a 15-year period. *Id.* at 2-3. She noted that Liberty had submitted benefit-cost analyses conducted using only the utility cost test, analyzing the benefits and costs to the utility, rather than the total resource cost test, which would consider the benefits and costs both to Liberty and to its customers. *Id.* at 7. According to Ms. Nixon, the TRC is the test most often used to analyze energy efficiency programs and utility investments in DERs.

*Id.* She also questioned assumptions underlying Liberty's benefit-cost analysis and contrasted that analysis with the benefit-cost analyses conducted separately by Staff. *Id.* at 7-11. Staff's analysis of the net present value of the proposed pilot program benefits and costs, performed using the UCT, demonstrated a net cost of \$2.8 million. *Id.* at 3, 11. Using the TRC test, Staff calculated the net present value of the pilot proposal to be a cost of \$1.8 million. *Id.* at 3, 14.

Mr. Demmer disputed many of the technical and operational assumptions underlying Liberty's benefit-cost analysis, with a focus on the proposed NWA application on the 11L1 circuit in Lebanon. *See, e.g.,* Exh. 13 at 10-11; Direct Testimony of Kurt Demmer (Demmer Testimony) at 3, 8-9, 16-18.<sup>7</sup> Among other things, he maintained that the actual battery discharge rate of 1.5 kilowatts (kW) per hour for the NWA application was not accurately reflected in Liberty's benefit-cost analysis. Demmer Testimony at 8-9. During the summer months, the NWA batteries would have to be discharged at that lower rate to cover the multiple times that criteria violations may occur and the hours when they are most likely. *Id.* The lower discharge rate for the 300 batteries proposed for the NWA application would result in an aggregate output of only 450 kW available to reduce monthly coincident system peaks and lower

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<sup>7</sup> Mr. Demmer's testimony was not admitted as an exhibit because he was unavailable to adopt it at hearing. His testimony is discussed here to explain Staff's position on Liberty's original pilot program proposal.



RNS and LNS transmission charges during those times. *Id.* Mr. Demmer maintained that, prior to selecting a circuit for an NWA, Liberty needed to “address system deficiencies, including the lack of real time data.” *Id.* at 15. He concluded that the NWA component of Liberty’s proposed pilot “may not create a significant benefit under the benefit-cost analysis and may delay the implementation of the permanent distribution investment.” *Id.* At most, the NWA application would defer the 11L1 circuit distribution investment until 2023, for a distribution investment deferral period of only three years rather than 10 years, as assumed by Liberty. *Id.* at 18.

Staff concluded its benefit-cost analyses showed that Liberty’s proposed pilot program was not in the public interest, as required for approval under RSA 374-G:5, II. Exh. 13 at 3, 6, 16. Staff recommended that the pilot program not be implemented as proposed. *Id.* at 16. Ms. Nixon suggested that Liberty consider developing an alternative battery pilot program on a smaller scale, after first developing and testing a methodology for forecasting ISO-NE system peaks and feeder violation periods. *Id.* at 3, 16-17.

### **III. SETTLEMENT AGREEMENT**

Under the Settlement Agreement, Liberty ultimately may purchase and include in the pilot program up to 500 Tesla Powerwall 2 batteries, which would be owned by Liberty and installed on its customers’ premises. Hearing Exhibit (Exh.) 18 at 5-6. Liberty plans to use the Tesla GridLogic software platform, or an equivalent software program, configured to allow the customer and/or Liberty to control the battery and its output according to the program requirements. *Id.* at 6. Liberty would also purchase and install cellular-based metering systems capable of recording three different TOU registers at each customer’s premises where a battery is installed under the program. *Id.*

The Liberty-owned components of the pilot program would proceed in two phases, with Phase 1 implemented upon Commission approval of the Settlement Agreement. *Id.* Phase 2 would be deferred and conditional on the demonstrated success of Phase 1 and the completion of a new benefit-cost analysis using updated assumptions and projections, as well as actual data gathered during Phase 1. *Id.* at 6, 9-10. During Phase 1, Liberty would deploy no fewer than 100 and no more than 200 batteries, to be installed and available for Liberty to dispatch by specified deadlines. *Id.* at 6-7. Phase 1 is intended to serve as a “test of program concept and execution, benefit-cost analysis parameter assumptions, and incurred actual costs, as well as customer acceptance and engagement.” *Id.* at 6.

The Settlement Agreement also provides for the development of a potential “bring your own device” (BYOD) program component that would include up to 500 additional batteries (or the number of batteries with the equivalent capacity of 2,500 kW) not owned by Liberty and deployed by one or more third-party aggregators. *Id.* The potential BYOD component would be developed pursuant to a multi-step working group process conducted over a specified time period, and then submitted for Commission review and approval. *Id.* at 6, 14-16.

Implementation of a BYOD component of the pilot program would be conditioned on Liberty seeking approval of Phase 2 only if the proposed BYOD third party aggregator intends to utilize Liberty’s peak event forecasting. *Id.* at 6, 15-16.

Each customer participating in the Liberty-owned component of the pilot would be required to have two batteries and one Gateway installed at the customer’s premises. *Id.* at 7, 10. The participating customers would receive batteries in exchange for either an upfront contribution for each battery of \$2,433 or a charge of \$25 per month for each battery on the customer’s monthly electric bill for ten years, with an option to extend to 15 years with no

additional payments due during the extension years. *Id.* Customers who decide to terminate their participation in the program prior to the tenth anniversary of battery installation would be charged \$450 for removal of each installed battery. *Id.* Participating customers would have access to the output of the batteries as a source of stored electricity and backup power, except when Liberty is charging the batteries the night before, or discharging the batteries during, forecasted peak demand conditions. *Id.* at 7.

Participating customers without PV or other on-site DG would not be permitted to export battery power to the grid except when the batteries are under Liberty's control. *Id.* Those customers would receive a monetary credit for all such energy exported to the grid equivalent to the monetary credit provided under the alternative net metering tariff based on the applicable TOU rates. *Id.* at 13. Net-metered customers with on-site DG would not be permitted to charge their batteries from the grid except when the batteries are under Liberty's control. *Id.* at 7-8. Those customers would receive credit for all energy exported to the grid, whether from their batteries or from their DG, according to the terms of the alternative net metering tariff with credits determined based on the applicable TOU rates. *Id.* at 8. Net-metered customers would be required to be on the alternative net metering tariff during their battery pilot participation, but following expiration or termination of their participation, customers who were grandfathered under the original net metering tariff could return to service under that tariff. *Id.* at 13.

On any day when Liberty takes control of the batteries to meet forecasted peak demand, Liberty would dispatch the battery output so as to maximize savings to Liberty and its customers by reducing ISO-NE coincident system peak load. *Id.* at 8. Those savings would result from lower RNS and LNS transmission charges assessed by ISO-NE, as well as lower ISO-NE Forward Capacity Market (FCM) costs. *Id.* Phase 1 would be subject to an initial test period of

18 months, beginning on the date that Liberty has installed at least 100 batteries and caused them to become fully operational and available for Liberty to control and dispatch. *Id.*

Following the initial 18-month Phase 1 test period, Liberty may request permission from the Commission to commence Phase 2 of the pilot program, subject to certain terms and conditions. *Id.* at 9. Phase 2, if approved, would authorize Liberty to purchase and deploy additional Tesla Powerwall 2 batteries up to a quantity such that the total number of Liberty-owned batteries in both phases of the program does not exceed 500 batteries. *Id.* at 10.

Liberty may not commence Phase 2 unless the following have occurred:

- (a) it has dispatched the Phase 1 batteries coincident with the monthly ISO-NE system coincident peak on average with an accuracy of at least 75 percent or greater determined with reference to expected peak hour kWh reduction achieved during actual peak hours in connection with either the full 18-month Phase 1 period or the most recent 12-month period during Phase 1;
- (b) it has realized RNS and LNS and FCM cost savings during Phase 1 that are not less than projected in the submitted benefit-cost analyses, taking into account and adjusting for changes in actual rates or clearing prices;
- (c) it demonstrates to the Commission that the investments and costs necessary to implement Phase 2, when considered in conjunction with those incurred or anticipated to be incurred in connection with Phase 1, have a forecasted net present value that is positive after incorporating historical Phase 1 average peak forecasting accuracy as described in (a) above, updated information about applicable RNS and LNS transmission rates, and other updated assumptions for relevant benefits and costs ...; and
- (d) there has been no material adverse change in any relevant circumstances or criteria.

*Id.* at 9-10. Participation in Phase 2 would not be limited to residential customers, but may also include “single phase General Service Rate G-3 customers at strategic municipal facilities that may provide additional benefits to their host communities during power outages or emergencies

for deployment of not more than 50 batteries (with a maximum of 4 batteries per Rate G-3 customer location).” *Id.* at 11.

In connection with Phase 2, Liberty may propose for Commission consideration and approval a “symmetrical mechanism” through which it would share with its customers the financial benefits and risks associated with the need to predict monthly ISO-NE coincident system peak hourly load. *Id.* The potential risk-sharing mechanism may apply to batteries installed during both Phase 1 and Phase 2, and “may consist of upward and downward adjustments to the return on equity (ROE) associated with Liberty’s investment in the batteries and related equipment, including meters, based on Liberty’s ability to accurately forecast ISO-NE coincident system peak hours and dispatch installed battery output to reduce that peak hour load.” *Id.* The Settlement Agreement provides that such a risk-sharing mechanism may be considered by the Commission consistent with RSA 374-G:5, IV. *Id.* at 11-12.

Liberty would be authorized to proceed with Phase 2 only with Commission approval following an “expedited adjudicative process.” *Id.* at 11. If Phase 2 is not approved, the Commission “may examine the prudence of continuing Phase 1, based on a revised and updated benefit-cost analysis of alternatives regarding the batteries installed during Phase 1.” *Id.* at 10. Based on that examination, and following an adjudicative proceeding, the Commission may determine that the Phase 1 program should be terminated. *Id.*

Customers participating in either phase of the pilot program, with the exception of those on competitive supply, would be required to take retail energy, transmission, and distribution service from Liberty according to a TOU rate design with seasonal differentiation. *Id.* at 12. The TOU rates would have three separate periods on non-holiday weekdays (critical peak,

mid-peak, and off-peak), and two separate periods on weekends and holidays (mid-peak and off-peak).<sup>8</sup> *Id.* at 12-13. The TOU rates are designed to be revenue-neutral and are based on Liberty's applicable default energy service rates in effect during the relevant period. *Id.* at 9, 13. Although the TOU rates would change as the underlying cost components change over time, Liberty would commit to "keeping the TOU rates revenue-neutral with regard to customer class average load shapes and each component's underlying methodology as similar as possible to the illustrative rate design and model as described herein and in the Technical Statement Regarding TOU Model." *Id.* Any participating customer may take competitive energy supply in lieu of default energy service according to the terms agreed upon between the customer and its supplier, but would take transmission and distribution service from Liberty at the applicable TOU rates. *Id.* at 12. The purposes of the proposed seasonal TOU rates are "to deliver appropriate price signals to participating customers so as to encourage them to shift load away from peak hours," and to allow customers to save money by charging their batteries during off-peak hours and discharging the batteries during peak periods. *Id.* at 13.

The settlement does not include a NWA component, in contrast to Liberty's initial proposal. *Id.* at 17. Instead, the settling parties acknowledge that "the optimal venue for analyzing an electric distribution utility's planned capital investments for NWA candidates would be the review of its least cost integrated resource or similar plan ("LCIRP")." *Id.* Under the Settlement Agreement, Liberty would provide a "detailed grid needs assessment" covering a number of specific topics within its next LCIRP. *Id.*

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<sup>8</sup> On non-holiday weekdays, the critical peak period runs from 3:00 p.m. through 8:00 p.m., the mid-peak period runs from 8:00 a.m. through 3:00 p.m., and the off-peak period runs from 8:00 p.m. through 8:00 a.m. *Id.* at 12-13. On holidays and weekend days, the mid-peak period runs from 8:00 a.m. through 8:00 p.m. and the off-peak period runs from 8:00 p.m. through 8:00 a.m. *Id.* at 12.

Liberty and aggregators participating in any approved BYOD program would develop detailed customer marketing and disclosure information, focused on potential benefits, costs, and risks of program participation (including additional customer costs such as the potential need for in-home electrical work and the possibility of increases in insurance premiums). *Id.* Liberty would also develop customer education materials and programs to inform participating customers of the most effective strategies to maximize program benefits and overall savings. *Id.* at 17-18. Liberty would provide copies of all customer marketing and disclosure materials and information to Staff upon request. *Id.* at 18. Liberty's form of contract to be used with participating customers for Phase 1 must be submitted for Commission approval prior to implementation of the program. *Id.* at 8.

Liberty would solicit and engage an evaluation, monitoring, and verification (EM&V) consultant following approval of the Settlement Agreement, so that the consultant may help inform pilot program evaluation and related program design features. *Id.* at 18. The EM&V consultant would be managed by Liberty, in consultation with Staff and the OCA, and would analyze a broad range of information produced by Liberty or collected from customers obtaining batteries from Liberty and customers acquiring batteries through the BYOD program component. *Id.* at 18-19. Liberty would make available to the other parties all such data and information collected, subject to appropriate aggregation or redaction to ensure the protection of confidential customer information. *Id.* at 19. The EM&V consultant would issue quarterly reports, an initial report and analysis on Phase 1, and a full impact and process evaluation of the pilot program, including the BYOD component, to be completed within three years of the initial 100 batteries becoming operational and available for Liberty to control and dispatch. *Id.*

The Settlement Agreement filing included two benefit-cost analyses, based on (a) an initial Phase 1 installation of 200 batteries and 15-year time horizon, and (b) a full Phase 1 and Phase 2 installation of 500 batteries and 17-year time horizon (i.e., 15 years for each of Phase 1 and Phase 2, assuming that Phase 2 begins two years after Phase 1). *Id.* at 19-20. The analyses assume a 75 percent success rate for dispatch of the batteries during the ISO-NE coincident system peak demand hour each month for the first ten years of each relevant phase. *Id.* at 20.

The Settlement Agreement provides that, although the benefit-cost analyses reflect only a minimally positive net present value for Phases 1 and 2 considered together, the program “offers value and warrants deployment due to the qualitative benefits it will provide by informing future battery storage or TOU proposals brought before the Commission,” and that “a finding of positive net present value is not a prerequisite to Commission approval under RSA 374-G:5 for a pilot program.” *Id.*

#### **IV. POSITIONS OF PARTIES AND STAFF ON SETTLEMENT AGREEMENT**

Two technical statements were submitted with the Settlement Agreement. *See* Technical Statement of Heather M. Tebbetts, Hearing Exhibit 19 (Exh. 19); Technical Statement Regarding Time-of-Use Model of Heather Tebbetts, Lon Huber, and Clifton Below, Hearing Exhibit 20 (Exh. 20). Ms. Tebbetts described the benefit-cost analyses performed with respect to the proposed settlement. *See* Exh. 19 at 4-5. She noted the settling parties’ agreement that the UCT is the most appropriate test for the proposed pilot “because this test most accurately represents the costs and benefits of a distribution system investment from the perspective of the utility and its customers.” *Id.* at 4. The results of the UCT are presented as a net present value calculation of the proposed program’s “lifetime savings and costs,” where the benefits include avoided regional and local transmission charges and capacity market charges, and the costs include



program implementation, administration, marketing, system upgrades and programming, and plant investment. *Id.* at 4-5. According to Ms. Tebbetts, the settling parties agreed that the costs associated with the net metering-equivalent monetary credits received by participating customers for energy exported to the grid from program batteries would be included in the analyses. *Id.* at 5. The analysis assumed that Liberty would dispatch the batteries four times each month, and further that Liberty will successfully forecast peak hours at the rate of 75 percent until year 10, decreasing to 60 percent in year 11 and by 10 percent annually thereafter “to account for the fact that some batteries may degrade at a greater or lesser rate than 5% after year 10.” *Id.*

In their technical statement addressing development of the proposed TOU rates, Ms. Tebbetts, Mr. Huber, and Mr. Below emphasized as a “core principle” of any rate design that “the rates being charged to customers reflect cost causation.” *See* Exh. 20 at 1. Each of three main components of the TOU rates: generation (which is default energy service in the model, although customers may take competitive energy supply of their choice), transmission, and distribution; “were designed to reflect underlying cost causation allocated among logical break points in time-of-use. *Id.* The resulting rates were intended to “send a time-differentiated price signal to customers to encourage peak demand reduction,” and “ensure rates for each TOU period reflect the costs of the underlying assets used to meet demand at those times (i.e. cost causation).” *Id.* at 3. The proposed TOU rate model was developed with reference to recent historical experience with default energy service rate-setting, transmission charges, and distribution system costs. *Id.* at 2-7. Based on analysis of historic load and cost duration curves, the use of a 3 p.m. to 8 p.m. critical-peak period on non-holiday weekdays results in an appropriate allocation of costs. *Id.* at 4-6. The decision to adopt time-varying rate periods on weekends and holidays is justified because daytime and early evening hours on weekends and

holidays “more closely resemble weekday mid-peak hours (8 a.m. to 3 p.m.) than off-peak in terms of overall cost causation particularly in the winter (due to loads and energy [locational marginal prices] rather than coincident peaks).” *Id.* at 6-7.

At hearing, witnesses representing Liberty, the OCA, Lebanon, and Staff testified regarding the selection of Tesla Powerwall 2 batteries, competitive effects of the proposed pilot, and satisfaction of the statutory criteria for approval under RSA 374-G. *See* Transcript of Hearing on November 29, 2018 (Tr.) at 92-102. Ms. Tebbetts explained that Tesla recently decided that each customer would be required to have two batteries because “one battery only provides partial home backup for a lot of customers” who may have well pumps, air conditioning, and other high-usage electrical appliances. *Id.* at 104-105. If only a single battery is initially installed, it is more difficult to later “reconfigure” the customer’s storage system to add another battery; therefore, it is more efficient to install two batteries from the outset. *See id.* at 105. Ms. Tebbetts also clarified that Liberty had not yet signed a battery procurement contract with Tesla, and the contract under negotiation would provide for battery purchases at the Tesla retail price. *Id.* at 108.

With respect to coincident system peak load forecasting, Ms. Tebbetts explained that Liberty would use internal planning data as well as ISO-NE peak load projections in a manual rather than an automated process. *Id.* at 112-116. She admitted that Liberty had not yet conducted any test runs of its peak forecasting capability because it was still focused on data collection and planning. *Id.* at 114-115. Because ISO-NE predicts only daily and not hourly peak loads, Liberty’s forecasting would have “two pieces,” involving both “picking the day and then picking the hour.” *Id.* at 116-117.

Liberty addressed a number of questions regarding cybersecurity related to the proposed battery storage pilot program. *Id.* at 150-160; *see also* Record Request Response of Shawn Eck, Senior Manager, IT Security, Risk and Compliance, Hearing Exhibit 21 (Exh. 21). Ms. Tebbetts testified that Tesla's GridLogic system is "cloud-based" with a log-in requirement and "does not talk to [Liberty's Supervisory Control and Data Acquisition] or any systems at all." Tr. at 151. She emphasized that, while "hacking is possible," there is separate access and log-in required for the battery control and dispatch systems. *Id.* at 156-157.

In response to a hearing record request, Liberty's internal cybersecurity specialist confirmed that the National Electric Reliability Corporation (NERC) Critical Infrastructure Protection Standards (CIPS) apply only to components of the "Bulk Electric System" and therefore are inapplicable to Liberty's electric system assets in New Hampshire. Exh. 21 at 1-2.

Mr. Eck stated, however, that Liberty and its affiliates nation-wide have "a comprehensive cybersecurity plan which covers the security objectives identified in the CIPS standards, but which [objectives] are not specific to electrical transmission, generation, and control center assets." *Id.* at 2. According to Mr. Eck, that plan "leverages the same standard security frameworks which were the sources of identifying the NERC CIPS requirements ... but the [plan] allows for additional security considerations not addressed by the limited scope of NERC CIPS." *Id.* He described his "risk advisory role" in the review and evaluation of potential cybersecurity issues and the steps taken to date to review Liberty's proposed battery storage pilot program. *Id.* He clarified that "[t]he process is not yet finished," and he and his "team will conduct another security review of the overall solution and program to identify any risk that ... still needs to be addressed before [they] give authority for the program to go live." *Id.* at 2-3. That review would include the final contracts and any additional security reports from

Tesla to determine if the security controls and objectives are adequate. *Id.* at 3. Mr. Eck indicated his understanding that Liberty would “only need to have access to the Tesla-managed web-based [software] solution and thus the security of that environment will rely on the security controls implemented by Tesla” and that Tesla would “not have access to any of [Liberty’s] systems.” *Id.* He noted that he has the “authority to prevent the program from going forward unless and until [his] team is satisfied.” *Id.*

With respect to the estimated costs of the pilot program, Ms. Tebbetts indicated that Tesla’s retail pricing of \$6,700 per battery and \$1,100 per Gateway should be considered firm, but other costs may vary from what has been estimated. *Tr.* at 167-174. Installation costs could be lower than estimated, based on the results of the installer RFP, but are not expected to be higher because Tesla would commit to complete installation of two batteries for each customer at a total average cost of \$1,800. *Id.* at 170-173. Other program costs are more likely to vary from the estimated amounts, including Cogsdale billing system modifications, meter programming, and the number and amount of net metering-based monetary credits for energy exports from participating customer batteries. *Id.* at 174-176. Ms. Tebbetts suggested there may be limited opportunities to share relevant costs with affiliate utilities in other areas. *Id.* at 191-194. She clarified that the actual costs associated with pilot program investments would be subject to prudence review during future rate cases, and would also be considered during the Phase 2 approval process. *Id.* at 194-195. She confirmed Liberty’s confidence that Tesla would be able to deliver batteries for the program when needed and that the batteries could be installed within the applicable timeframes. *Id.* at 179-180.

Witnesses described how the TOU rate design model would be used to update TOU rates on a periodic basis when there are changes in the underlying rate components for default energy

service, transmission, and distribution, as well as to reflect differences in annual load shape data and coincident peak hours. *See id.* at 202-205, 207-209. Ms. Tebbetts confirmed that the Commission was not being asked to approve specific TOU rates, but rather the methodology and model for calculating those rates for future periods. *Id.* at 202-203. Mr. Huber and Mr. Below described their roles in developing and implementing that model and indicated their willingness to play a continuing role in helping Liberty use the model to determine future TOU rates. *Id.* at 203-206. Ms. Tebbetts confirmed that, following her first run of the model for Liberty, she would send it to Mr. Below and Mr. Huber for review prior to completing the rate design process. *Id.* at 206.

With respect to customer marketing and disclosure materials, Ms. Tebbetts clarified that Liberty's obligations would be "two-fold," focused first on development of materials to be used with potential participants in the Liberty-owned battery component of the pilot program, and then later in connection with any approved BYOD program component. *Id.* at 226-227. She indicated Liberty's intent was to work with Staff and the OCA and its consultant to ensure that the customer education and marketing materials would be sufficient. *Id.* at 227-228. Participating customers' experience and behavior would be important subjects of the EM&V consultant's evaluation of the pilot program. *Id.* at 200-201, 224-225.

A number of parties expressed strong support for the proposed pilot program described in the Settlement Agreement. *Id.* at 250-266. Lebanon expressed hope that the pilot program would be "complementary" to its development of "a real-time pricing pilot that can be used in conjunction with net metering and give access for customers to real-time pricing in conjunction with Time-of-Use rates for transmission and distribution." *Id.* at 254. The OCA emphasized its continued interest in the potential of NWAs and Liberty's commitment to include a detailed grid

needs assessment in its next LCIRP. *Id.* at 257-259. The OCA also expressed support for the program's limited size and scale, phased approach, data collection potential, customer TOU rate arbitrage<sup>9</sup> opportunity, potential risk-sharing mechanism, and proposed BYOD component. *Id.* at 259-261.

Staff recalled its original view that Liberty's initial pilot proposal "was too big, it was too complex, and it was too expensive." *Id.* at 262. Staff noted the significant perceived risks with that approach: that the projected ratepayer savings would not be realized, that the NWA component would not succeed, and that excess costs potentially would be shifted to non-participating customers. *Id.* According to Staff, the proposed settlement "goes a long way toward mitigating those risks and addressing those concerns," noting in particular the two-phase approach, with a Phase 1 test period and a conditional Phase 2 implementation, the potential for a third-party BYOD program, and the opportunity to collect data that may prove useful in a number of different contexts. *Id.* at 262-263.

Liberty emphasized the broad range of parties supporting the settlement, and urged the Commission to find that it meets the "public interest" standard set forth in RSA 374-G. *Id.* at 265. Liberty referenced the nine factors listed in that statute and the Commission's obligation to give "balanced consideration and proportional weight" to those factors. *Id.* at 264-265. According to Liberty, it is not necessary that "all nine of them are checked," although Liberty believes it "can meet all nine, some more strongly than others." *Id.* at 265.

Sunrun and ReVision filed a written closing statement following the hearing, in which they confirmed they support approval of the Settlement Agreement although they are not signatories to it. *See* Closing Statement of Sunrun Inc. and ReVision Energy, Inc. on Settlement

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<sup>9</sup> "Arbitrage" refers to the ability of a participating customer to benefit from charging the battery when rates are low and exporting electricity from the battery to the grid when rates are high.

Agreement at 9. They expressed concern, however, regarding utility ownership of behind-the-meter energy storage assets, characterizing that model as “out of step with national trends” as it potentially reduces competition while increasing utility ratepayer risks. *Id.* at 5-6. According to Sunrun and ReVision, the BYOD model also “facilitates customer choice and additional use-cases of the asset, stimulates innovation, and fosters the creation of a sustainable and scalable [behind-the-meter] storage market that the utility ownership model does not achieve.” *Id.* at 6. They criticized the Settlement Agreement restriction on BYOD participation in Phase 1, asserting that it would be more appropriate to permit the Liberty-owned and BYOD components “to proceed simultaneously, with both relying on Liberty’s peak forecasts for dispatch.” *Id.* at 7-8. They nonetheless maintained that inclusion of the BYOD component in the proposed pilot program “offers a cutting-edge opportunity to leverage utility core competencies in grid management, system operation, and dispatch coordination with those of private market participants in marketing, installation, and management of [behind-the-meter] storage assets.” *Id.* at 9.

Legal memoranda addressing the statutory criteria for approval under RSA 374-G were filed by Liberty, the OCA, and CLF, in which the relevant factors were reviewed and analyzed with specific reference to the evidentiary record in this proceeding.

## **V. COMMISSION ANALYSIS**

Unless precluded by law, a contested case is subject to informal disposition by stipulation or agreed settlement at any time prior to the entry of a final decision or order. RSA 541-A:31, V(a). Pursuant to N.H. Code Admin. Rules Puc 203.20(b), the Commission shall approve the disposition of any contested case by stipulation or settlement “if it determines that the result is just and reasonable and serves the public interest.” The Commission encourages parties to settle

disagreements through negotiation and compromise because it is an opportunity for creative problem solving, allows parties to reach a result in line with their expectations, and is often a better alternative to litigation. *Pennichuck East Utility, Inc.*, Order No. 26,179 at 13 (October 4, 2018). Nonetheless, the Commission cannot approve a settlement, even when all parties agree, without independently determining that the result comports with applicable standards. *Id.* at 13-14.

In this proceeding, the applicable standards are set forth in RSA 374-G governing electric utility investment in “distributed energy resources,” which include the following:

energy storage, ... load reduction or control programs, and technologies or devices located on or interconnected to the local electric distribution system for purposes including but not limited to reducing line losses, supporting voltage regulation, or peak load shaving, as part of a strategy for minimizing transmission and distribution costs as provided in RSA 374-F:3, III.

RSA 374-G:2, I(b). Under RSA 374-G:5, II, the Commission, prior to authorizing a utility's recovery of investments made in DERs, must determine that the utility's proposed investment and recovery in rates are in the “public interest,” having given “balanced consideration and proportional weight” to each of the following nine factors:

- (a) The effect on the reliability, safety, and efficiency of electric service;
- (b) The efficient and cost-effective realization of the purposes of the renewable portfolio standards of RSA 362-F and the restructuring policy principles of RSA 374-F:3;
- (c) The energy security benefits of the investment to the state of New Hampshire;
- (d) The environmental benefits of the investment to the state of New Hampshire;
- (e) The economic development benefits and liabilities of the investment to the state of New Hampshire;
- (f) The effect on competition within the region's electricity markets and the state's energy services market;



- (g) The costs and benefits to the utility's customers, including, but not limited to a demonstration that the company has exercised competitive processes to reasonably minimize costs of the project to ratepayers and to maximize private investment in the project;
- (h) Whether the expected value of the economic benefits of the investment to the utility's ratepayers over the life of the investment outweigh the economic costs to the utility's ratepayers; and
- (i) The costs and benefits to any participating customer or customers.

We have reviewed the Settlement Agreement in light of those specific factors and find that the proposed battery storage pilot program described therein is in the public interest and may be implemented by Liberty, subject to the conditions and limitations set forth below.

In particular, we find that the proposed pilot program serves to mitigate the substantial risks inherent in Liberty's original proposal. That initial proposal was large, complex, and expensive, with total estimated costs of almost \$8,000,000. The size and scope of that proposal are beyond the reasonable range of what is appropriate for a pilot program implemented by a relatively small utility, and would present significant risks of cost-shifting from participating customers to non-participating customers. Those risks are reduced to a great extent by the smaller, phased approach provided for in the Settlement Agreement.

Phase 1 functions as a "proof of concept" that will provide evidence of the potential for the battery storage program to achieve net savings for the benefit of all Liberty customers. Phase 2 will be conditional and proceed only if positive net benefits are demonstrated through a new benefit-cost analysis that incorporates updated assumptions as well as the actual experience of Liberty and its customers during Phase 1. The potential BYOD component of the program, to be developed through a well-defined process and timeline, holds the promise of leveraging private investment and utility peak forecasting capability to realize benefits for participating customers, third-party aggregators, and Liberty ratepayers as a whole. The TOU rate design is innovative

and provides the opportunity for beneficial customer behavioral changes. The data and information to be collected during the pilot by Liberty and its EM&V consultant should permit better understanding of peak load forecasting, DER integration issues, time-varying rate impacts, and customer experience. That data and information may also prove useful in other contexts, such as grid modernization, utility least-cost resource planning, retail rate design, and net metering tariff development.

#### **A. Statutory Factor Review**

We will now summarize our analysis of each of the specific factors listed in RSA 374-G, in the context of the record developed in this proceeding. We note there is some overlap and that certain of the factors are more directly relevant than others to the proposed pilot program. With recognition of that varying relevance, we are giving “balanced consideration and proportional weight” to each of the nine factors.

With respect to “the effect on the reliability, safety, and efficiency of electric service,” the battery systems are expected to be installed and operated safely and reliably using known technology. The batteries will be used as a source of backup power supply for participating customers during system outages. The discharge of batteries during coincident system peak events may also serve to marginally reduce the likelihood of system failure at times of maximum stress. Shifting demand from peak and critical peak hours, when marginal production costs are greatest, to off-peak hours when production costs are lower, should promote increased energy efficiency. The TOU rates should provide economically-efficient incentives for participating customers’ electricity usage.

The second factor is “[t]he efficient and cost-effective realization of the purposes of the renewable portfolio standards of RSA 362-F and the restructuring policy principles of

RSA 374-F:3.” Although the battery pilot program will not produce renewable energy certificates for compliance with the renewable portfolio standard adopted in RSA 362-F, the program is consistent with the purposes of that statute, which include the reduction of “regional dependence on fossil fuels” and exposure to “volatile fossil fuel prices,” as well as “improving air quality and public health.” *See* RSA 362-F:1. The battery systems will reduce peak loads by shifting demand from peak hours to off-peak hours, and that reduction should displace some fossil-fueled generation and the related air emissions of criteria pollutants and greenhouse gases. To the extent the batteries are used as a source of backup power during outages, they may also replace customer-sited generators fueled by diesel, gasoline, propane, or other fossil fuels, with similarly beneficial environmental and health impacts. With respect to the electric restructuring principles specified in RSA 374-F, a number of those principles would be advanced by the battery pilot program, including customer choice (RSA 374-F:3, II), benefits for all consumers (RSA 374-F:3, VI), full and fair competition (RSA 374-F:3, VII), environmental improvement (RSA 374-F:3, VIII), renewable energy resources (RSA 374-F:3, IX), energy efficiency (RSA 374-F:3, X), and near-term rate relief (RSA 374-F:3, XI). Other principles are not directly relevant to the pilot program, but we do not find that the program is inconsistent with any of the principles.

The third factor is “the energy security benefits of the investment to the State of New Hampshire.” To the extent state “energy security” means decreasing the exposure of New Hampshire customers to regional system risks, the deployment of behind-the-meter battery systems with the potential to export electric energy to the distribution grid should serve that purpose. In addition, the reduced reliance on fossil-fueled electricity production, resulting from

load-shifting from peak periods to off-peak periods, will also further the energy security objective.

The fourth factor is “the environmental benefits of the investment to the State of New Hampshire.” As noted above, the principal environmental benefits of the pilot program result from the reduction in fossil-fueled electric generation during peak hours and as a source of backup power supply. By lowering the demand for fossil fuel-generated power at peak periods, when that power is often the marginal resource, the battery deployment should reduce air emissions at those times. Assuming the batteries are charged with cleaner sources of energy from the grid during off-peak hours or from customer-sited renewable sources, the pilot will have direct environmental benefits. The use of batteries as backup power sources during outages should also provide environmental benefits by avoiding reliance by participating customers on traditional fossil-fueled backup generators.

The fifth factor, “the economic development benefits and liabilities of the investment to the State of New Hampshire,” is addressed in several ways by the pilot program. Liberty intends to use an RFP process to contract with local service providers to install the batteries at customer premises. The savings achieved by participating customers may have positive economic effects within the state. Moreover, the potential BYOD component may result in additional installations of battery systems and possibly also PV systems, some of which might not have occurred in the absence of the program. The primary economic “liabilities” of the program are its costs, which will be recovered from Liberty utility ratepayers to the extent prudently incurred. As noted below, the benefit-cost analyses submitted with the Settlement Agreement demonstrate a modest positive benefit for the full two-phase program on a net present value basis.

The sixth factor is “the effect on competition within the region’s electricity markets and the state’s energy services market.” As observed by Sunrun and ReVision, utility ownership of DERs, such as customer-sited battery storage systems, may affect the competitive market for such products and services. The inclusion in the pilot program of the potential BYOD component, however, serves to mitigate that impact. On balance, we do not believe the pilot program will have an adverse impact on the relevant competitive markets.

The seventh factor is “the costs and benefits to the utility’s customers, including, but not limited to, a demonstration that the utility has exercised competitive processes to reasonably minimize costs of the project to ratepayers and to maximize private investment in the project.” The Settlement Agreement was submitted together with two detailed benefit-cost analyses of the proposed pilot program, one covering both phases of the program and one covering only Phase 1 on a standalone basis. The financial benefits of the program include avoided regional and local transmission charges and reduced capacity market charges, while the program costs include expenditures for program administration, marketing, programming, and plant investment. The two-phase analysis shows net present value benefits over the full life of the program that are positive, although modest in amount. An analysis of market alternatives was used to select a cost-effective battery system vendor, and Liberty also considered a proposal later submitted by Sunrun but concluded that Tesla’s products remained the least-cost option. In addition, Liberty intends to competitively solicit battery installation services for the program.

The eighth factor is “whether the expected value of the economic benefits of the investment to the utility’s ratepayers over the life of the investment outweigh the economic costs to its ratepayers.” There appears to be a degree of overlap between this factor and the preceding one. We note, however, that Phase 2 of the program may be approved only if a new benefit-cost

analysis incorporating updated projections and assumptions and actual cost and performance data from Phase 1 demonstrates a positive net present value over the full life of the two-phase program. In connection with that updated benefit-cost analysis, there will be opportunities to reassess the level of participating customer financial contribution and to account for the potential effects of any proposed risk-sharing mechanism involving performance-based adjustments to Liberty's ROE.

The ninth factor is "the costs and benefits to any participating customer or customers." The costs of the program to participating customers for two installed batteries include either an upfront payment of \$4,866, or payments of \$50 each month for 10 years. There may also be additional customer-side expenses such as electrical panel upgrades or insurance premium increases. A customer electing to terminate participation within the first ten years will have to pay a \$900 charge for removal of the two batteries. Although Liberty did not attempt to quantify the benefits to participating customers, those benefits include potential TOU rate arbitrage, the net metering-equivalent monetary credits for energy exports during forecasted peak hours, and the availability of backup power supply during outages. The extent to which participating customers realize those benefits will be a subject of data collection and analysis during Phase 1 and will inform the Phase 2 proposal.

### **B. Approval Conditions and Limitations**

While we approve the Settlement Agreement and the implementation of the pilot program, we find it necessary to impose certain conditions and limitations on that approval and implementation. The three conditions and limitations described below are intended to provide additional protection for Liberty's customers in terms of the rates they will be required to pay and the reliability of electric service they will receive.

First, we are concerned that significant pilot program cost items are presented only as estimates and could actually be substantially greater than anticipated. Those costs include, but are not limited to, the battery price, installation costs, Cogsdale billing system upgrade costs, and meter programming expenses. The last two of those listed cost items are one-time upfront-costs that will be incurred even if Phase 2 is not implemented. If any of the estimated cost items were to be significantly more expensive than expected, it would further reduce the net benefits of the program determined on a net present value basis. We therefore require Liberty to promptly inform the Commission, Staff, and parties if any program cost items are expected to be materially greater than estimated. Such material cost increases might warrant a re-evaluation of the decision to authorize implementation of the pilot program.

Second, given the complexity of the TOU rate design model and methodology, we believe that Liberty should continue to consult with Mr. Huber and Mr. Below, to the extent they are available to do so, with respect to use of the model to determine future TOU rates. We appreciate the testimony of both Mr. Huber and Mr. Below that they would be willing to serve as a resource for Liberty, and we accept Ms. Tebbetts' offer to send Liberty's first independent run of the model to Mr. Huber and Mr. Below for review and validation prior to completing the TOU rate design process.

Third, we are concerned about the potential cybersecurity risks implicated by the integration of utility-owned equipment and systems installed behind-the-meter at customers' premises. Based on the record, we are not satisfied that Liberty has fully evaluated the potential cybersecurity risks. Liberty has not determined that any such potential risks can and will be adequately mitigated. Nor has Liberty confirmed that the utility-owned equipment, including vendor software and databases, do not incrementally increase customer risk or distribution

system risk for potential manipulation or exposure of data used for planning, operational, and maintenance purposes. We note the representations of Mr. Eck, Senior Manager of IT Security, Risk and Compliance, that his review and evaluation of the pilot program has not yet been completed and that he retains the authority to “prevent the program from going forward unless and until [his] team is satisfied.” Exh. 21 at 3.

We therefore require that, before Phase 1 of the pilot is implemented, Liberty complete a comprehensive evaluation of the cybersecurity risks raised by the battery storage pilot program, including both firmware and software elements, and confirm there are no cybersecurity risks for manipulation of electrical usage, access to customer personal protected information, or unauthorized alteration of equipment performance or settings. In addition, an evaluation of the relevant vendors’ practices must be completed by Liberty and deemed to be sufficient. Liberty’s Cybersecurity Plan must also clearly outline the measures, detection methods, and mitigation strategies that it plans to implement regarding integration of utility-owned equipment and systems installed behind-the-meter at customers’ premises prior to program implementation. Liberty must file a written certification signed by Mr. Eck, and also by a senior executive responsible for cybersecurity initiatives, confirming that such evaluations have been completed and conclusions reached, together with documentation describing in reasonable detail the supporting methodologies used in such determinations and include with a copy of its amended Cybersecurity Plan. The filing of Liberty’s Cybersecurity Plan may be submitted confidentially pursuant to Puc 201.06(a)(16). A similar certification and filing must be submitted each year during the full-term of the pilot program.



### C. Other Relevant Matters

We address two other matters relevant to approval of the Settlement Agreement and implementation of the battery storage pilot program. First, we believe that the complexity of the program, in particular with respect to the TOU rate structure, increases the importance of customer education and information. The pilot provides opportunities for participating customers to achieve meaningful cost savings while making beneficial behavioral changes. Those opportunities may not be optimized unless the customer education materials and information notices clearly and thoroughly describe the program and how its benefits can be maximized. We therefore direct Liberty to collaborate with Staff, the OCA, and other interested parties for review of and feedback on such materials and notices prior to their dissemination. With respect to the form of contract to be used by Liberty with participating customers, the Settlement Agreement requires that the contract form “be submitted for Commission approval prior to implementation of the Program.” Exh. 18 at 8. We interpret that provision to mean the contract form should be submitted to Staff for review and comment before it is presented to customers.

Second, we note that the Settlement Agreement provides that, “[f]ollowing the expiration or termination of their participation in the program, net-metered customers who were grandfathered under the original ... net metering tariff may return to service under that original ... [net metering] tariff.” *Id.* at 13. That option to return to grandfathered status under the original net metering tariff is inconsistent with our determination in Order No. 26,055 (September 18, 2017), issued in the alternative net metering tariff development proceeding, Docket DE 16-576. In that order, we found that “net-metered customer-generators should be able to voluntarily switch from their grandfathered status under the original net metering tariff to

the ... [alternative] net metering tariff ... but they should not be permitted to return to that original grandfathered status once they have switched.” Order No. 26,055 at 4. We find that a limited exception to the general prohibition on voluntary tariff-switching to permit former pilot program participants to return to the original net metering tariff is warranted in the context of the Liberty battery storage pilot program. We have therefore issued an order *nisi* in Docket No. DE 16-576, pursuant to our authority under RSA 365:28, to modify Order No. 26,055 to permit that limited exception.

#### **D. Motions for Confidential Treatment**

Liberty requested confidential treatment of Appendix 1 to Ms. Tebbetts’ testimony, a business case report prepared by its consultant, Alectra Energy Services, including comparisons of products, features, and prices from different potential battery system vendors. We granted that request while directing Liberty to attempt to reduce the scope of information redacted in the Appendix. Liberty filed a revised version of Appendix 1 on November 29, 2018, which contains substantially fewer redactions to the sections that compare and evaluate various battery systems and leaves unredacted all references to Tesla and its products, because Tesla was selected as the battery system vendor for the Liberty pilot. Liberty also seeks confidential treatment of two documents provided during discovery in this proceeding, Confidential Attachment Staff 1-44, the “Tesla API [Application Program Interface] Manual,” and Confidential Attachment OCA 1-12, pricing contained in a Sunrun proposal submitted to Liberty. *See* Liberty’s Motion for Protective Order Related to Discovery Responses filed on November 29, 2018 (November 29 Motion).

Under the “Right-to-Know” law, records of “confidential, commercial, or financial information” are exempt from public disclosure. *See* RSA 91-A:5, IV. New Hampshire Supreme Court and Commission precedent apply a three-step test to determine whether a document, or the

information contained within it, falls within the scope of that statutory exemption. *Lambert v. Belknap County Convention*, 157 N.H. 375, 382-83 (2008); *Liberty Utilities (EnergyNorth Natural Gas) Corp. d/b/a Liberty Utilities*, Order No. 26,159 at 2 (July 17, 2018). Under that test, the Commission first inquires whether the information involves a privacy interest and then asks if there is a public interest in disclosure. Order No. 26,159 at 2. Finally, the Commission balances those competing interests and decides whether disclosure is appropriate. *Id.* When the information involves a privacy interest, disclosure should inform the public of the conduct and activities of its government; if the information does not serve that purpose, then disclosure is not warranted. *Id.*

As noted above, we have already found that the Appendix 1 battery system procurement business case report warrants confidential treatment to the extent it contains third-party proprietary and commercially-sensitive non-public information. We now find that the revised version of that Appendix, containing substantially fewer redactions than the original filed version, satisfies our concerns regarding excess redactions. We therefore grant confidential treatment of revised Appendix 1 filed on November 29, 2018.

With respect to the two documents provided by Liberty during discovery, we find that both contain the type of third-party information that is properly considered “confidential, commercial, or financial information” exempt from disclosure under RSA 91-A:5, IV. The “Tesla API Manual,” provided through discovery as Confidential Attachment 1-44, contains detailed descriptions of how Tesla’s proprietary GridLogic platform operates. According to Liberty, Tesla considers that information to be “highly confidential,” its disclosure “could cause Tesla substantial economic and competitive harm,” and “Tesla allowed Liberty to produce the manual in discovery on the express condition that its confidentiality would be maintained.”

November 29 Motion at 2. Confidential Attachment OCA 1-12 is Sunrun's proposal to provide Liberty with a battery storage system for use in the pilot program, a proposal Sunrun made in the nature of an informal RFP response. The document contains Sunrun's proposed pricing for various components of its systems, software, and other services, and, according to Liberty, "Sunrun considers [that pricing information] to be highly confidential and competitively sensitive." *Id.* Only the pricing figures on page 5 of the Sunrun proposal have been redacted, and the remainder of the proposal is not claimed to be confidential.

While the public may have some interest in disclosure of the "Tesla API Manual" and the Sunrun pricing information, we find that public interest is outweighed by the interests of Tesla and Sunrun, respectively, in maintaining the confidentiality of this proprietary, commercially-sensitive, and non-public information. We therefore grant Liberty's motions for confidential treatment filed in this proceeding.

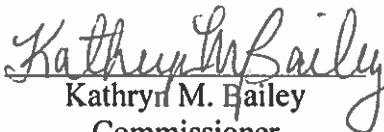
**Based upon the foregoing, it is hereby**


**ORDERED**, that the Settlement Agreement is approved and Liberty's battery storage pilot program may be implemented as described therein, subject to the conditions and limitations set forth in the body of this order; and it is

**FURTHER ORDERED**, that Liberty's motions for confidential treatment are  
GRANTED.


By order of the Public Utilities Commission of New Hampshire this seventeenth day of  
January, 2019.

  
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Martin P. Honigberg  
Chairman

  
\_\_\_\_\_  
Kathryn M. Bailey  
Commissioner

  
\_\_\_\_\_  
Michael S. Giaimo  
Commissioner

Attested by:

  
\_\_\_\_\_  
Debra A. Howland  
Executive Director

