

**STATE OF NEW HAMPSHIRE
BEFORE THE
PUBLIC UTILITIES COMMISSION**

Docket No. DE 17-189

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty Utilities
Request for Approval of Battery Storage Pilot

SUPPLEMENTAL TESTIMONY

OF

HEATHER M. TEBBETTS

February 9, 2018

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1 **I. INTRODUCTION AND QUALIFICATIONS**

2 **Q. Please state your full name, business address, and position.**

3 A. My name is Heather M. Tebbetts and my business address is 15 Buttrick Road,
4 Londonderry, New Hampshire. I am a Senior Analyst for Liberty Utilities Service Corp.,
5 which provides services to Liberty Utilities (Granite State Electric) Corp. (“Liberty” or
6 “the Company”) and, in this capacity, am responsible for providing rate-related services
7 for the Company.

8 **Q. Did you previously submit testimony in this proceeding?**

9 A. Yes. On November 30, 2017, I submitted testimony that included details about the
10 battery storage pilot, its benefits to customers, and a recommendation from our
11 consultant, Alectra Energy, for a battery manufacturer.

12 **II. PURPOSE OF TESTIMONY**

13 **Q. What is the purpose of your testimony?**

14 A. The purpose of my testimony is to: (i) update the parties and the Commission on the
15 selection of a battery manufacturer and the software platform used to communicate with
16 the batteries; (ii) address RSA 374-G in the context of this filing; (iii) provide a cost
17 benefit analysis; and (iv) address questions and comments received from the parties
18 during the technical session that took place on January 4, 2018.

1 **III. BATTERY MANUFACTURER SELECTION**

2 **Q. Please explain the details of the selection of the battery manufacturer.**

3 A. The Company has chosen Tesla, Inc. (“Tesla”) as the battery manufacturer and software
4 platform provider for the pilot. The decision to select Tesla was based on the work and
5 recommendation provided by Company’s consultant, Alectra Energy, which helped
6 provide prerequisites for technological compatibility and proprietary fit that allowed us to
7 compare Tesla’s batteries and systems with those of other potential vendors.

8 The chosen vendor had to be able to provide a proven residential-scale battery storage
9 system that is capable of interacting with the grid, safely and reliably, as it charges from
10 and discharges to the Company’s distribution system. The vendor had to have the
11 required supply chain and manufacturing infrastructure to deliver 1,000 batteries within
12 12 to 18 months from the November 30, 2017, filing date. The vendor had to provide an
13 end-to-end, turnkey solution, with a fixed price for deployment per house. Lastly, the
14 Company wanted to align itself with an organization that has a similar level of brand
15 awareness and consumer trust to ensure the highest level of customer engagement
16 throughout the pilot period.

17 After reviewing the information provided by the different vendors, we concluded that
18 Tesla is the best, most cost effective vendor to satisfy these prerequisites. I will discuss
19 in further detail the Tesla battery and GridLogic system in this supplemental testimony.

1 **IV. COMPLIANCE WITH RSA 374-G**

2 **Q. Please explain the purpose of RSA 374-G.**

3 A. The Legislature enacted RSA 374-G in 2008 to “stimulate investment in distributed
4 energy resources,” and “to encourag[e] New Hampshire electric public utilities to invest
5 in renewable and clean distributed energy resources at the lowest reasonable cost,” with
6 the goal of “benefiting the transmission and distribution system under state regulatory
7 oversight.” RSA 374-G:1. RSA 374-G:2, I(b) includes “energy storage” in its definition
8 of “distributed energy resources” for installations of five megawatts or less
9 interconnected with the local electric distribution system or through a customer’s wiring.
10 With the statute’s specific reference to storage, this supplemental testimony will provide
11 further detail demonstrating how the pilot meets the requirements of RSA 374-G.

12 **Q. Does RSA 374-G:5 provide instructions for utilities to follow for authorization of a
13 rate filing for storage and other distributed energy resources?**

14 A. Yes. In this section, I will describe how the pilot satisfies the requirements of RSA 374-
15 G:5.

16 ***RSA 374-G:5, I(a)***

17 RSA 374-G:5, I(a) requires, “A detailed description and economic and environmental
18 evaluation of the proposed investment.” I provided a detailed description of the pilot in
19 my direct testimony filed on November 30, 2017, which I incorporate here. The
20 economic evaluation of the pilot is provided in the cost/benefit analysis in Attachment A
21 to this testimony, at pages 1 and 2.

1 As for the “environmental evaluation,” the installation of battery storage, charging from
2 the Company’s distribution system or from customer-sited renewable generating
3 installations, would not result in any increased air emissions. Customers enrolled in the
4 pilot will be able to utilize the Tesla batteries for backup power. These customers will
5 receive backup generation at their home without relying on traditional fossil-fueled
6 backup generators for at least the ten-year life of the pilot. Looking at the Company’s
7 2016 System Average Interruption Frequency Index (“SAIFI”),¹ customers’ electric
8 service was interrupted 1.31 times, with a 5-year rolling average of 1.35 times. The
9 System Average Interruption Duration Index (“SAIDI”) was 118.14 minutes for 2016,
10 with a 5-year rolling average of 130.73 minutes. The Tesla batteries provide 5KW and
11 13.5 kWh of power, about two and a half hours of backup power, which is more than the
12 SAIDI for the rolling 5-year average. This means, on average, pilot customers will not
13 rely on fossil-fueled backup generators during outages, which will result in a reduction in
14 air emissions. According to the U.S. Energy Information Administration,² burning a
15 gallon of E10 gasoline produces 18.9 pounds of CO2.

16 ***RSA 374-G:5, I(b)***

17 This subsection requires:

18 A discussion of the costs, benefits, and risks of the proposal with
19 specific reference to the factors listed in paragraph II,³ including an
20 analysis of the costs, benefits, and rate implications to the

¹ See Docket No. DE 17-043, the Company’s Reliability Enhancement Plan and Vegetation Management Plan Report.

² See <https://www.eia.gov/tools/faqs/faq.php?id=307&t=11>

³ Paragraph II, discussed below, lists the factors the Commission must consider in determining whether the pilot is in the public interest.

1 participating customers, to the company's default service customers,
2 and to the utility's distribution customers.

3 The benefits of the pilot program include transmission cost savings and distribution
4 upgrade savings. Costs associated with the pilot include the cost of the batteries and
5 meters. Attachment A, Pages 1 and 2, provides a detailed analysis of those costs and
6 benefits.

7 Purchasing and installing 1,000 batteries will cost approximately \$7,300,000. As part of
8 the process in developing our pilot, I have worked closely with Green Mountain Power⁴
9 (GMP) to gather information about how many customers have adopted the batteries and
10 of those, how many have requested two batteries. As of the end of January, GMP had
11 about 42% of customers opting for two batteries. We thus estimate approximately 40%,
12 or 400 customers will install two batteries, so we estimate the need for 600 meters. GMP
13 also provided that about 10% of participating customers paid their upfront contribution,
14 so we are using the same estimate. Their upfront cost was \$1,500; Liberty's is \$1,000.
15 We anticipate the rest of the participants will choose to pay the monthly charge of \$10 for
16 ten years. That reduces the capital cost for the batteries to \$7,192,000. The monthly
17 payments by customers will be used to offset the operation and maintenance costs
18 associated with reading the meters. The cost for the meters is approximately \$255,600,
19 and the cost to upgrade the billing and metering systems to take in the data from the

⁴ Green Mountain Power recently launched a battery storage program that similarly provides customers with the option of paying an up-front cost or monthly charge for the batteries. GMP's experience to date has been that 10 percent of the customers choose the up-front payment.

1 meters is about \$100,000. There is a cost to read the meters each month through the 4G
2 Verizon network, which we have priced at \$7 per meter per month.

3 The monetary benefits associated with the pilot include reduced annual Regional
4 Network System (RNS) costs, calculated for 2019 based on the estimated RNS Rate
5 forecast for rates effective June 1, 2019, through May 31, 2022. The table below
6 provides the price per kilowatt-year:

Year	2019	2020	2021
Estimated RNS Rate Forecast (\$/kW-Yr)	\$128	\$133	\$137

7
8 The annual reduction in Local Network System charges for transmission is calculated at
9 \$122,473, based on actual bills received from National Grid for the period December
10 2016 through November 2017. To calculate potential savings in the future years, I
11 escalated RNS and LNS costs by three percent each year based on the increases
12 forecasted for 2018-2021. To accommodate the fact that the batteries may have some
13 degradation after ten years, I have kept the RNS and LNS rates flat for years ten through
14 fifteen, and reduced the savings by three percent each year to account for degradation.

15 As part of the pilot, Liberty will target customers on two circuits in Lebanon with the
16 goal of having at least 300 batteries installed. If we meet that goal, the Company's
17 Engineering Department believes that reducing the peak load on these circuits may allow
18 the Company to avoid the installation of distribution upgrades to the Craft Hill substation.
19 The cost savings would be about \$640,000.

1 The overall monetary savings to customers over the life of the batteries is \$1,817,896,
2 compared with, at a minimum, installing new feeders for \$640,000, as shown in
3 Attachment A, page 2 of 9. Customers will also benefit from the data collection of the
4 pilot, which may inform decisions in future investments in grid modernization such as
5 metering, customer engagement platforms, and increased reliability.

6 ***RSA 374-G:5, I(c)***

7 This subsection requires, “A description of any equipment or installation specifications,
8 solicitations, and procurements it has or intends to implement.” Please see Attachment B,
9 Tesla Powerwall 2 Welcome Guide, Tesla Powerwall 2 Datasheet, and the Tesla
10 Powerwall 2 AC Owner’s Manual. The manual provides general information about the
11 batteries such as the warranty, maintenance, and installation specifications.

12 A description of solicitations and procurements is in the section RSA 374-G:5, I(d)
13 below.

14 ***RSA 374-G:5, I(d)***

15 Subsection (d) requires, “A showing that the utility has used a competitive bidding
16 process to reasonably minimize the costs of the project to its customers.” As described in
17 Attachment A, Alectra Energy requested pricing and datasheets from multiple battery
18 vendors as provided in confidential Appendix 1 to my direct testimony, and received
19 responses from four. Of those four, the pricing from Tesla was the lowest, and its
20 batteries and related GridLogic software platform that allows communication with the
21 batteries best met the goals of the pilot. During the technical session on January 4, 2018,

1 SunRun noted that it has a battery aggregation program that may be of interest for this
2 pilot. After the session, on behalf of Liberty, Alectra requested pricing and specifications
3 from SunRun. SunRun quickly provided the specifications for the batteries they would
4 procure and pricing for this pilot. The Company appreciates SunRun's interest in the
5 program and responsiveness, however the proposal from Tesla satisfied all the technical
6 objectives of the pilot and did so at the lowest cost of any of the vendors. The Company
7 intends to issue a request for proposals (RFP) for installation of the battery systems for
8 authorized Tesla Powerwall 2 installers.

9 We believe that this combination of soliciting vendor pricing for the batteries and a
10 planned solicitation for local authorized installers provides the lowest costs of the pilot to
11 customers and meets the statutory requirements. Please see Attachment C, which
12 describes the criteria by which Liberty and Alectra used to determine that Tesla was the
13 most prudent vendor. Alectra provided the single sourcing criteria and justification of
14 selecting a battery storage manufacturer and software platform on January 12, 2018. At
15 the time we received the document from Alectra, we were waiting for SunRun to provide
16 pricing and capabilities of their product. Had the response from SunRun been more
17 favorable to Tesla's, the Company would have requested Alectra review their
18 recommendation and provide an updated version of the document.

19 ***RSA 374-G:5, I(e)***

20 This subsection requires, "A showing that it has made reasonable efforts to involve local
21 businesses in its program." Local businesses are the backbone of New Hampshire's
22 economy and, as such, part of the Company's evaluation of Tesla's product was that it

1 provided the opportunity for local, authorized Tesla installers in New Hampshire to
2 participate in the pilot. As mentioned above, the Company intends to issue an RFP for
3 installation of the battery systems with authorized Tesla Powerwall 2 installers. For
4 example, ReVision Energy, one of the intervenors in this docket, is an authorized installer
5 of the Tesla Powerwall 2. Liberty has confirmed with Tesla that ReVision would be
6 authorized to install the batteries in the pilot, if it chooses to respond to the RFP and
7 submitted a winning bid for that work. The Company looks forward to a potential
8 working relationship with local installers as part of the pilot.

9 ***RSA 374-G:5, I(f)***

10 Subsection (f) requires, “Evidence of compliance with any applicable emission
11 limitations.” As previously stated, the batteries themselves do not create emissions
12 because they are electrically charged through the grid or through solar generation owned
13 by the customer.

14 ***RSA 374-G:5, I(g)***

15 This subsection seeks, “A copy of any customer contracts or agreements to be executed
16 as part of the program.” Please see Attachment D for the agreement between the
17 Company and the Customer.

18 ***RSA 374-G:5, II(a) through (i)***

19 As stated above, RSA 374-G:5, II sets the Commission’s standard for determining
20 whether “the utility’s investment and its recovery in rates, as proposed, are in the public
21 interest.” That standard “include[s] giving a balanced consideration and proportional

1 weight to each of the following factors,” listed as subsections (a) through (i). I will
2 address each one, demonstrating why the Commission should grant this petition.

3 ***RSA 374-G:5, II(a): “The effect on the reliability, safety, and efficiency of electric***
4 ***service.”***

5 As noted in the section discussing RSA 374-G:5, I(a) above, reliability is a large part of
6 the customer experience under the pilot. The batteries have the ability to provide backup
7 power to customers, replacing fossil-fueled generators, or providing standby energy for
8 the first time. On a system-wide basis, the batteries installed under the pilot will have no
9 adverse effects on system reliability, safety, and efficiency, as they simply reduce the
10 peak load of each customer. Liberty intends to study, through this pilot, if the batteries
11 have positive system benefits beyond the transmission and distribution cost savings.
12 These benefits could include regulating frequency and voltage support.

13 ***RSA 374-G:5, II(b): “The efficient and cost-effective realization of the purposes of***
14 ***the renewable portfolio standards of RSA 362-F and the restructuring policy***
15 ***principles of RSA 374-F:3.”***

16 Energy storage does not qualify for renewable energy certificates (“RECs”) and whether
17 RECs for storage may be included in the future is a policy decision that goes beyond this
18 filing. Liberty will not utilize the batteries to offset any RPS requirements. The batteries,
19 in fact, do not generate power, and RSA 362-F:2,III defines “certificates” as “the record
20 that identifies and represents each megawatt-hour generated by a renewable energy
21 generating source under RSA 362-F:6.” Since the batteries do not produce power, but are

1 merely charged by another source to be used at a later time, they would not be eligible to
2 create certificates to later be sold into the RPS market.

3 Under RSA 374-F:3, the principles of restructuring are not conflicted by the pilot
4 program. In fact, RSA 374-F:3,III provides that, “distribution service companies should
5 not be absolutely precluded from owning small scale distributed generation resources as
6 part of a strategy for minimizing transmission and distribution costs.” This pilot is part of
7 the Company’s strategy to minimize transmission and distribution costs, and therefore
8 supported by the restructuring policy principles of 374-F:3. Batteries have the unique
9 benefit to customers and the environment where they can be charged by renewable
10 generation, such as rooftop solar, and provide a power source that does not produce any
11 emissions when discharged.

12 ***RSA 374-G:5, II(c): “The energy security benefits of the investment to the state of***
13 ***New Hampshire.”***

14 Energy security in New Hampshire has been a topic of debate since the advent of
15 deregulation. With Eversource recently completing the auction of its power plants, New
16 Hampshire electric distribution utilities no longer have the refuge of generating power if
17 the grid suffers an attack, or natural resources become scarce, or if for some other reason
18 merchant generators are unable to maintain and fuel their plants to provide energy
19 security. While batteries alone are likely not the complete solution, in the short-term they
20 will play a role in providing energy security for the customers who participate in the
21 program, and as we increase our understanding of their broader benefits, they will serve
22 an important function in supporting energy security to the grid as a whole. This pilot will

1 present the first opportunity in New Hampshire to study the potential battery storage and
2 may yield solutions not understood or anticipated.

3 ***RSA 374-G:5, II(d): “The environmental benefits of the investment to the state of***
4 ***New Hampshire.”***

5 Lowering the demand for gas- and coal-generated power at peak periods lowers the
6 generation needed for the grid. Although the pilot only provides for 5MW of storage, the
7 impact of lower emissions is important and the pilot will provide data to inform future
8 decisions.

9 ***RSA 374-G:5, II(e): “The economic development benefits and liabilities of the***
10 ***investment to the state of New Hampshire.”***

11 Participating in this pilot with Tesla will allow Liberty to utilize local installers, which
12 provides economic opportunity for those companies. Liberty looks forward to working
13 with local vendors on battery installations, as previously mentioned in my testimony.

14 ***RSA 374-G:5, II(f): “The effect on competition within the region’s electricity***
15 ***markets and the state’s energy services market.”***

16 Liberty provides default service to its customers through a competitive bidding process
17 approved semi-annually by the Commission. The installation of batteries at customers’
18 homes will not impede the competitive market for energy supply. For customers that do
19 not have solar installations, the batteries will actually be charged by the grid, so customer
20 usage will likely not be reduced, only shifted to off-peak periods, which may in turn

1 benefit competitive suppliers as 5MW of power will be displaced during the most
2 expensive periods.

3 ***RSA 374-G:5, II(g), (h), and (i):***

4 The factors listed in subsection (g) are: “The costs and benefits to the utility’s customers,
5 including but not limited to a demonstration that the company has exercised competitive
6 processes to reasonably minimize costs of the project to ratepayers and to maximize
7 private investment in the project.” Subsection (h) requires consideration of, “Whether the
8 expected value of the economic benefits of the investment to the utility’s ratepayers over
9 the life of the investment outweigh the economic costs to the utility’s ratepayers.”

10 Subsection (i) directs a review of, “The costs and benefits to any participating customer
11 or customers.” As noted previously, the costs and benefits of the pilot program are
12 outlined in Attachment A. As for using a competitive bid process, the Company selected
13 the battery manufacturer with the best pricing, whose product could meet the technical
14 requirements of the pilot. Liberty will conduct an RFP for the installation of the battery
15 systems in customers’ homes with authorized Tesla Powerwall 2 installers.

16 **V. GOALS AND STRATEGIES OF THE PILOT**

17 **Q. What are the goals of the proposed pilot?**

18 A. The goals that have been identified by the Company are:

19 A ten-year pilot that will provide sufficient time for data collection necessary to answer
20 the following questions:

- 1 • What are the behavioral changes of customers taking service under the time of use
2 (“TOU”) pricing?
 - 3 ○ What types of behaviors changed, such as doing chores later in the day or
4 weekend that require the use of the batteries to avoid utilizing power from
5 the grid?
 - 6 ○ If the customer’s behavior did not change, why not?
- 7 • How accurate were the predicted peaks from ISO-NE versus actual peak periods?
- 8 • How are the batteries affecting the distribution system, either positively or
9 negatively?
- 10 • Has customer satisfaction with reliability increased?
- 11 • Do the benefits of battery installations at customer locations with on-site
12 generation differ from those without on-site generation? If so, in what ways?

13 In order for information to be gathered, customers who participate in the pilot will be
14 asked to take a survey about their behavior, reliability, and customer satisfaction prior to
15 the install of the batteries. Once the batteries are installed, periodic surveys will be
16 provided to the customer.

17 **Q. How will the Company find customers to participate?**

18 A. Liberty has a business development team that will contact potential participants whose
19 residences are located on the circuits that will be part of the non-wires alternatives
20 (“NWA”) part of the pilot. For the pilot to meet the needs of the NWA plan, we need
21 approximately 300 batteries installed on those circuits. Once we have reached this

1 threshold, we will open the program to all residential customers throughout the
2 Company's service territory, on a first-come, first-served basis until the remaining
3 batteries are distributed, with a waiting list in the event that a customer's premises is not
4 viable for a battery installation, in which the next customer waiting to enter the program
5 will have their premises evaluated. Customers outside of the NWA circuits will not be
6 targeted, but the Company will provide information on its website, social media, and bill
7 inserts about the pilot program. Customers will receive information about the TOU rates,
8 battery capabilities, specifications, and literature about why the Company is conducting
9 this pilot.

10 As part of the research for how we will market the battery storage pilot to our customers,
11 the experience of Green Mountain Power (GMP) has been integral in understanding how
12 much marketing may be needed. According to its Energy Innovation Center, GMP has
13 not done any marketing to promote their program to install 2,000 batteries, as of the
14 middle of January 2018. GMP put out a press release in the summer of 2017 and
15 customers have flocked to take advantage of the opportunity to get a battery.

16 **Q. Please describe whether a control group will be included.**

17 A. For the purposes of this pilot, a control group will not be included for two reasons. First,
18 the NWA purpose of the pilot cannot be achieved if we provide a control group of
19 customers with batteries, but without TOU rates. There would be no incentive for
20 behavior changes. Similarly, if we provided that same group of customers with TOU
21 rates but without a battery, the customers would not have a way to balance their usage
22 against a backstop, which in this case is the battery. Second, the test to reduce the

1 transmission costs will have the same issues because the customer would have no
2 incentive to change behavior during peak periods and no backstop to reduce the exposure
3 to the high rates during the critical peak period.

4 For the reasons noted above, we will not include a formal control group. To analyze
5 customer behavior changes, Liberty will choose a random sample of 30 pilot customers
6 one year after implementation of the pilot and compare the bill amounts for the period
7 against the rates in effect for customers outside of the pilot to determine if there were
8 monetary savings to the customer with the TOU rate. To analyze usage pattern changes,
9 Liberty will analyze the data from the previous period prior to the installation of the
10 batteries against the usage pattern with the batteries. There are nuances to this method, as
11 situations change at home, such as family members moving in or out or customers
12 purchasing electric cars now that they have a battery. We intend to survey those
13 customers and ask what changes they have made to try to capture the nuances that may
14 occur behind the scenes in the data.

15 **VI. BATTERY, GRIDLOGIC SOFTWARE, AND METERING**

16 **Q. Please describe the Tesla battery and its functions that will be utilized in this pilot.**

17 A. The Tesla Powerwall 2 is a battery system that is designed for residential and light
18 commercial use. It can be charged through the grid or from solar power, and can be used
19 as a backup generator as needed. The battery includes a DC/AC converter and an
20 integrated AC inverter. For safety, the battery cells are physically and electrically
21 isolated from contact by maintenance personnel and homeowners. To utilize the backup
22 application, the system uses a backup gateway to isolate the Powerwall from the grid and

1 facilitate powering of backup loads. The gateway provides control and monitoring
2 capabilities through the Tesla app on a smart phone. During normal operation, the
3 Powerwall is controlled by the Gateway, and the Powerwall On/Off switch should remain
4 in the ON position. When troubleshooting Powerwall operation, it may be necessary to
5 turn off the Powerwall or refer to its LED indicator to confirm that it is operating
6 properly. Attachment B provides the specific data points on the battery system.

7 The customer will have use of full the battery daily, outside of potential system peaks, to
8 allow them to utilize the battery as a backstop to the high critical peak TOU rates. The
9 customer will be able to monitor the battery through the app and Liberty will provide
10 reports to the customer showing their usage with the battery. The frequency of those
11 reports has not yet been determined.

12 **Q. Is there a planned maintenance procedure for the batteries?**

13 A. The Powerwall 2 does not need planned maintenance.

14 **Q. What is the battery removal procedure?**

15 A. If the customer terminates the program prior to the expiration of 10 years, the customer
16 will be charged a \$450 fee, which will cover the costs of removal. The removal will be
17 performed by a Tesla authorized installer (chosen through an RFP process) and will be
18 coordinated by Tesla and Liberty. At the end of the 10-year period, the customer can
19 keep the battery (although Liberty always own it) at no further charge. Alternatively, if
20 the customer wants the battery removed after 10 years, the removal will again be done by

1 an authorized contractor at no charge to the customer. These terms are described in the
2 Customer Agreement, Attachment D.

3 **Q. Will the fact that Liberty owns the batteries behind the meter have any effect on**
4 **homeowner's insurance for the customer?**

5 A. It may, as the customer agreement requires the customer to be liable for damage to the
6 battery and recommends that customers get specific insurance for the battery system.

7 **Q. Are there other potential costs to customers who choose to participate in this pilot,**
8 **such as homeowner's insurance policy cost effects?**

9 A. There may be. In speaking with the underwriters at The Concord Group Insurance
10 Company, there is no additional premium for having the batteries in the home as Liberty
11 will own them. The amendment to that statement is that the customer agreement
12 provides that the customer is responsible for any damages to the battery, which according
13 to the insurance underwriters, may increase the insurance costs of the homeowner. The
14 Concord Group indicated that the potential impact to a customer's homeowner's
15 insurance would be similar to the impact resulting from leased solar panels, located on a
16 customer's home, which are owned by a third party. In those cases, an increase in
17 premium may occur once the customer notifies the insurance carrier of the installation of
18 the panels.

1 **Q. Please describe how Liberty will utilize its systems to communicate with the**
2 **batteries.**

3 A. Tesla has developed its GridLogic system, which provides a software platform for the
4 batteries to communicate outside the home. This software platform works independently
5 of our SCADA and other grid-monitoring systems so there is no need for any integration
6 between the two. Tesla and Liberty have worked together to develop cyber-security
7 protocols to prevent tampering.

8 The GridLogic system is designed to allow the user, either the utility, homeowner, or
9 both, to control the batteries as needed. The customers in this pilot will have access to
10 the power in the battery and see what the battery is doing at any time, unless a peak
11 demand period has been predicted. In that case, Liberty will notify the customer through
12 email at least 24 hours prior to the event that their access to the battery will be terminated
13 at midnight to ensure the battery is charged for the predicted event, but the customer will
14 continue to see what the battery is doing through the app. The interface is user-friendly
15 for the customer and easy to use from the utility's side.

16 **Q. How will Liberty prevent the customer from exporting the power in the batteries?**

17 A. The Tesla batteries have the capability for Liberty and Tesla to turn off the ability of the
18 customer to export power. This was an important factor in choosing to work with Tesla.
19 As part of this pilot, customers will receive the net metering credit when kWh are
20 exported to the grid from the battery when called on by Liberty. We are offering this
21 incentive as a way for customers to benefit from the fact that they will have to make an
22 upfront payment or pay over time for the batteries. While the customer is free to

1 participate in net metering through a solar installation, we did not believe it was prudent
2 to allow a customer to discharge the batteries and earn the net metering credit at their
3 option.

4 As noted in my initial testimony, residential customers wanting to participate in this pilot
5 will also need to participate in the alternative net metering program. If they are in the
6 grandfathered net metering program, they will need to switch to the alternative net
7 metering program. This program will not be offered to commercial and industrial
8 customers. Our billing system cannot accommodate banking kWh for TOU periods. At
9 this time, our tariff only provides this option for our largest customer class, Rate G-1, but
10 it is a manual billing process and it is impractical and cost prohibitive to manually bill up
11 to 1,000 customers.

12 **Q. Please describe the metering needed to implement the pilot.**

13 A. The Company proposed to utilize automatic meter reading, also known as AMR meters,
14 which are in place today, and program those meters to have six registers to allow for the
15 three TOU periods and bidirectional metering. During the technical session on January 4,
16 2018, parties asked for more information on costs associated with utilizing the current
17 metering, along with providing a more technical solution that will lessen the cost of
18 probing meters.

19 Liberty has researched using 4G wireless cellular service-based meters that can be read
20 over the Verizon network. These meters have the capability of being read daily,
21 providing hourly interval data, and remove the need to send a meter technician to the

1 premises to download the data each month. The cost for these meters, with installation, is
2 approximately \$426 each, and the Company has calculated a revenue requirement for
3 them as part of the cost benefit analysis.

4 **VII. CONDITIONS OF THE PILOT**

5 **Q. What does the customer have to contribute to participate in the pilot?**

6 A. While the Company will own the batteries, the batteries will not wholly be rate base
7 items. As part of the pilot, customers who enroll will be asked to pay an upfront
8 contribution in aid of construction (CIAC) of \$1,000, or \$10 per month for ten years, the
9 life of the warranty of the battery. This is approximately fifteen percent of the cost of the
10 battery and installation.

11 Even though customers will contribute to the upfront cost of the battery, they will have
12 the opportunity to lower their usage during peak periods, which may lower their overall
13 bill. The illustrative rates provided in my initial testimony provide that the off-peak
14 period would start at 7:00 p.m. Those rates are a fraction of the rate these customers are
15 paying now under Rate D. If customers choose to change their behavior by, for example,
16 running their clothes dryer and dish washer during off-peak periods and avoid these
17 chores during on-peak and critical peak periods, their bill should go down, even if their
18 overall usage does not. Customers will be able to utilize the batteries in such a way that
19 they can make the most out of reducing their monthly bill.

1 **Q. How does a customer exit the pilot?**

2 A. Customers in the program may simply withdraw from the program, sell their homes, or
3 be removed from the program if they default in the obligations under the Customer
4 Agreement. These various situations, and the implications of each, are described in the
5 customer agreement, Attachment D.

6 **VIII. TIME OF USE AND NON-WIRES ALTERNATIVES**

7 **Q. Will the Company treat customers participating in the pilot differently if they are**
8 **located on the NWA circuits?**

9 A. No. Although the customers are located on circuits targeted for the NWA, their batteries
10 will be controlled in the same manner as those located outside of the chosen NWA
11 circuits. Since the Company will be able to gather data about how the batteries are
12 benefiting the grid on those circuits, treating those customers differently would not
13 necessarily benefit the circuit.

14 **Q. Did Liberty examine other circuits to include as part of the NWA portion of the**
15 **pilot?**

16 A. Yes. The Craft Hill substation feeders were chosen to be the most likely candidates for
17 the NWA based on the Company's screening criteria. The Baron Ave substation 10L4
18 feeder was also reviewed for NWA consideration, but it is not considered as amenable to
19 this type of alternative as compared to the Craft Hill 11L1 and 11L2 feeders.

1 **Q. Could the distribution and transmission peaks occur at different times?**

2 A. Possibly. The 2016 ISO-NE peak occurred at 2 p.m. on August 2, while Liberty's
3 distribution peak occurred at 3 p.m. on August 2. The possibility of the two peaks
4 occurring at different times is another reason we chose the Tesla batteries. They have
5 sufficient capacity, more than the batteries from the other vendors, to discharge 5MW for
6 the hours of peak if the peaks do not occur at the same hour. The critical peak period for
7 rates was designed to include both of those hours.

8 **Q. Did Liberty intend this pilot program to constitute its entry in the TOU pilot
9 programs in Docket No. DE 16-576?**

10 A. No. As part of the Order in that docket, Liberty and the City of Lebanon are looking for
11 ways to work together on a real-time pricing TOU pilot. This pilot is different from the
12 pilot with the City of Lebanon, which is part of a larger municipal aggregation program
13 that will be administered by the City of Lebanon.

14 **IX. OTHER CONSIDERATIONS**

15 **Q. Has Liberty notified the local cities and towns that may have batteries in their
16 jurisdictions about the pilot?**

17 A. We have not. Once the pilot is approved, the Company will be reaching out to cities and
18 towns to explain the pilot and let them know customers may sign up.

19 **Q. Will this pilot be coordinated with any other efforts such as Energy Efficiency?**

20 A. It is not. The Energy Efficiency Resource Standard has a set of goals for 2018-2020 and
21 this pilot is not included in those goals.

1 **Q. Did Liberty explore solar plus storage as part of this pilot?**

2 A. As part of the discussion of the pilot, some parties asked if the Company considered
3 exploring ownership of solar and storage. Liberty did not explore solar plus storage for
4 this pilot as we were focused only on the storage aspect of the pilot.

5 **X. CONCLUSION**

6 **Q. Does this conclude your testimony?**

7 A. Yes, it does.