

BEFORE THE
STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION

DOCKET DE 23-039

IN THE MATTER OF: Liberty Utilities (Granite State Electric) Corp.
d/b/a Liberty
Request for Change in Distribution Rates

DIRECT TESTIMONY

OF

Mark P. Toscano

New Hampshire Department of Energy

December 13, 2023

Table of Contents

Introduction.....	3
Summary.....	4
Overview of Liberty’s Phase 1 Battery Storage Pilot Program	5
Review of the Phase 1 Battery Storage Pilot Program	6
Order 26,784	8
Phase 2	8
Observations, Recommendations, and Conclusions	10

1 **Introduction**

2 **Q. Please state your full name**

3 A. Mark P. Toscano

4 **Q. By whom are you employed and what is your business address?**

5 A. I am employed by the New Hampshire Department of Energy (DOE or the Department). My
6 business address is 21 S. Fruit Street, Suite 10, Concord, NH 03301.

7 **Q. Mr. Toscano, please summarize your education and professional work experience.**

8 A. I am a licensed Professional Engineer (PE) in the State of New York and New Hampshire
9 and a Certified Energy Manager (CEM) through the Association of Energy Engineers (AEE).
10 I earned a Bachelor of Science degree in Mechanical Engineering Technology from the New
11 York Institute of Technology and an associate degree in Air Conditioning and Heating
12 Technology from Farmingdale University. I was employed for approximately three years by
13 the Long Island Lighting Company (LILCO), an investor-owned utility, where I worked as a
14 Project Engineer for the implementation of energy efficiency and demand-side management
15 programs. My primary activities included advising large commercial and industrial
16 customers on energy efficiency, demand reduction methods, and the coordination of
17 advanced metering installations. I was employed for approximately thirty-three years at the
18 Brookhaven National Laboratory (BNL) in various roles including as a Project Engineer,
19 Project Manager, Energy Manager, and the Manager of Energy Management and Utilities
20 Engineering. BNL is a U.S. Department of Energy research facility in New York on a 5,200-
21 acre campus with approximately 350 buildings and over 4 million square feet. I have
22 significant experience with DER, solar PV systems, energy procurement, energy efficiency,

1 and specifying, installing, and operating advanced metering and building automation systems
2 (BAS).

3 I joined the DOE's Regulatory Support Division in March 2022 where I prepared technical
4 statements, reviewed and evaluated projects and initiatives, participated in investigations, and
5 testified in dockets.

6
7 **Q. What is the purpose of your testimony in this proceeding?**

8 A. The purpose of my testimony is to provide my assessment of the existing Liberty battery
9 Phase 1 pilot program as well as the proposed Phase 2 expansion of this pilot program as
10 described in the DE 23-039 testimony of Dmitry Balashov¹.

11
12 **Summary**

13 **Q. Please summarize your testimony.**

14 A. In my testimony, I provide a high-level overview of Liberty's Phase 1 battery pilot program
15 that was part of DE 17-189, including the Battery Storage Pilot Program Interim Evaluation
16 Report filed by Guidehouse² in 2022; a brief history and summary analysis of Phase 1; and
17 the order issued by the Commission upon completion of Phase 1, Order 26,784³. Finally, I
18 offer the following observations and recommendations regarding the proposed Phase 2
19 expansion:

- 20 • Liberty's efforts to implement and evaluate a battery storage pilot program are
21 commendable. It is helpful in providing real-world operational experience to guide
22 potential future energy storage efforts throughout the state.

¹ [23-039_2023-05-05_GSEC_TESTIMONY-BALASHOV.PDF \(nh.gov\)](#)

² <https://guidehouse.com/>

³ [17-189_2023-03-15_NHPUC_ORDER-26784.PDF](#)

- 1 • The performance of the Phase 1 pilot program met the requirements/objectives using
2 originally agreed upon assumptions, with a Benefit-Cost Ratio (BCR) of 0.99.⁴
3 However, minor variations in the assumptions can result in significantly lower BCRs.
4 I believe the assumptions are overly optimistic, specifically assumptions regarding
5 battery output over time.
- 6 • Liberty proposed a Phase 2 project for an additional 150 utility-owned batteries, and
7 up to 150 customer-owned bring your own device (BYOD) batteries. For reasons
8 discussed below, I recommend delaying or eliminating the Liberty-owned battery
9 portion of Phase 2.

10

11 **Overview of Liberty’s Phase 1 Battery Storage Pilot Program**

12 **Q. What were the goals and objectives of Phase 1 of Liberty’s Battery Storage Pilot**
13 **Program?**

14 A. Liberty’s Phase 1 pilot program goal was to install a total of 200 Tesla Powerwall batteries at
15 100 locations (2 batteries/location). The program was designed to meet various objectives
16 including a requirement for third-party verification. If performance criteria/objectives were
17 met, Liberty would be able to propose a Phase 2 project. The objectives were defined in the
18 DE 17-189 Settlement Agreement⁵.

19

20 **Q. Please provide a brief description of Phase 1 of the program.**

21 A. The first batteries were installed in mid-2020, with most of the remaining installations
22 completed by mid-2022. In November 2022, Liberty provided a comprehensive interim report

⁴ The BCR is stated as 0.99 in the Liberty’s testimony as well as the Guidehouse Interim report.

⁵ [17-189_2018-11-19_GSEC_SETTLEMENT.PDF \(nh.gov\)](#)

1 prepared by Guidehouse “Battery Storage Pilot Program Interim Evaluation Report” (Interim
2 Report)⁶ which contained substantial detail on battery operational performance. The interim
3 report also confirmed Phase 1 objectives were met.

4

5 **Review of the Phase 1 Battery Storage Pilot Program**

6

7 **Q. Please describe how you conducted your review of Phase 1 of the Battery Storage Pilot**
8 **Program.**

9 A. In reviewing the Liberty Battery Storage Pilot Program, I reviewed materials such as project
10 history, Benefit-Cost Tests (BCT), performance reports, and the interim report. I also
11 obtained technical and battery performance information from Tesla and other battery
12 manufacturers. Additionally, I performed various BCTs using the Liberty/Guidehouse-
13 provided Benefit Cost Analysis (BCA) Excel workbook, using various assumptions.

14

15 **Q. What were the results of your review?**

16 A. I believe it is important to note the interim report shows the full Phase 1 and Phase 2 battery
17 pilot project barely meeting the required performance criteria for the BCT, showing a
18 Benefit-Cost Ratio (BCR) of 0.99. However, as discussed below a change in just one of the
19 basic assumptions can negatively affect the BCR.

20

21 After checking the Tesla website, it appeared at least one of the battery performance numbers
22 was overstated in the Liberty/Guidehouse BCT analyses. The battery energy retention

⁶ https://www.puc.nh.gov/Regulatory/Docketbk/2017/17-189/LETTERS-MEMOS-TARIFFS/17-189_2022-11-29_GSEC_INTERIM-EVALUATION-REPORT.PDF

1 (expressed as a % of the rated battery storage capacity in kWh) over time used in the BCT
2 analyses is 80% by year 10⁷. However, Tesla’s product warranty literature⁸ says it as 70% by
3 year 10. Listed below is a summary table from Tesla’s website.

4

Ten Year Limited Warranty

Tesla, Inc. warrants that:

(1) Your Powerwall will be free from defects for ten years following its initial installation date; and

(2) Your Powerwall will have an energy capacity of 13.5 kWh on its initial installation date, and will retain energy capacity as shown in the table below.

Application	Energy Retention ¹	Operating Limitation
Solar self-consumption/ backup only ²	70% at 10 years following initial installation date	Unlimited cycles
Any other application or combination of applications	70% at 10 years following initial installation date	37.8 MWh of aggregate throughput ³

Note that this Limited Warranty (including its duration) is subject to a number of important exclusions and limitations, which are set out in detail below.

5

6 Using the Tesla value of 70% energy retention by year 10 in the BCA Excel model yields a BCR
7 of 0.896.

8

9 **Q. Did you review any additional materials regarding battery degradation over time?**

10 A. In DE 17-189, data request DOE 5-4 asked whether other references were used by
11 Liberty/Guidehouse for the battery degradation. Liberty’s response stated “The company is
12 seeing actual energy degradation of 2% annually,....”. Since the batteries had only been in-
13 service for 2 years or less at the time of the evaluation report, I am not confident
14 Liberty/Guidehouse’s observed 2%/year loss will continue.

15

⁷ [17-189_2023-02-07_EXH-22.PDF \(nh.gov\)](#), Reference Bates 035, Page 34, Section 3.3.4

⁸ https://www.tesla.com/sites/default/files/pdfs/powerwall/powerwall_2_ac_warranty_us_1-4.pdf

1 **Q. Do you have any additional concerns regarding long-term performance of the**
2 **batteries?**

3 A. I have operational concerns including long-term performance of other parts of the system
4 including, but not limited to, controls, battery, and component warranty claims. Based on my
5 review, I anticipate that there will likely be issues involving service calls, equipment failure,
6 replacement parts, and warranty. I am not aware of an allowance in the pilot project for these
7 types of issues, which would further reduce the BCR. The National Renewable Energy
8 Laboratory (NREL) estimates the fixed operational and maintenance costs to be 2.5% of the
9 capital costs.⁹

10

11 **Order 26,784**

12 **Q. Please briefly summarize Commission Order No. 26, 784.**

13 A. In Order 26,784 the Commission determined Phase 1 of the Battery Pilot was complete. The
14 Commission also ordered Liberty to file a proposal for next steps no later than May 30, 2023.
15 On May 26, 2023, Liberty filed their response¹⁰, “Liberty’s Future Plan for the Phase 1
16 Battery Pilot and Reporting, BYOD, and Pursuit of Phase 2.” Liberty’s proposal was to close
17 Docket No. DE 17-189 and transfer any remaining issues to DE 23-039, to be reviewed as
18 part of its distribution rate case

19

20 **Phase 2**

21 **Q. Please briefly describe Phase 2 of Liberty’s battery storage project.**

⁹ NREL. “Residential Battery Storage,” Electricity 2023 ATB NREL.

¹⁰ https://www.puc.nh.gov/regulatory/Docketbk/2017/17-189/LETTERS-MEMOS-TARIFFS/17-189_2023-05-26_GSEC_RESPONSE-ORDER-26784.PDF

1 A. As part of testimony filed in DE 23-039, Liberty proposed a second phase (Phase 2) of their
2 battery storage pilot project that includes up to an additional 150 utility-owned batteries, and
3 up to 150 customer-owned bring your own device (BYOD) batteries. Details of this project
4 are identified in the testimony of D. Balashov¹¹.

5
6 **Q. Please summarize your review of the costs associated with Phase 2.**

7 A. Regarding the 150 utility-owned batteries, the testimony states “A key value feature of the
8 program is the fact that Liberty holds a contract that would enable Phase 2 battery units’
9 procurement at costs that would be approximately 30% lower than the current market prices
10 for similar units.”¹²

11
12 The ability of Liberty to offer this discount strikes me as a potential issue. Potential issues
13 include whether this could be perceived by battery storage developers with the BYOD programs
14 as an unfair advantage to Liberty, as well as whether this could result in more utility-owned
15 battery installations than would otherwise happen in a fully competitive scenario.

16
17 In Mr. Balashov’s testimony, Liberty proposes the creation of an Emerging Technologies
18 Facilitation Office (ETFO) with new staff, “who, among other duties, would be required to
19 perform proactive and reactive vendor evaluation and broader market scans with the aim of
20 periodically updating program rules to ensure that the program can accommodate the latest
21 technological and commercial offering with the potential of offering customer value.”¹³ Mr.

¹¹ [23-039_2023-05-05_GSEC_TESTIMONY-BALASHOV.PDF \(nh.gov\)](#)

¹² Direct testimony of Dmitry Balashov beginning line 9, Bates II-685

¹³ Testimony of D. Balashov at 15, Bates II-681

1 Balashov’s testimony later states, “[t]he Company proposes to launch the ETFO to assist
2 customers with storage- and EV related inquiries. The ETFO is proposed to be initially staffed by
3 two individuals – a Program Manager and a Solutions Engineer.”

4
5 Table 1 on Page 16 of Mr. Balashov’s testimony lists “BYOD: Software and Studies Costs” of
6 \$71,000 per year and “ETFO staffing costs” of \$258,000/year for Rate Year 1 and Rate Year 2
7 respectively. However, no details are provided such as the amount of time Liberty allocated in
8 their estimate for the proposed ETFO staff’s time addressing various functions for the utility-
9 owned battery program, the BYOD program, EV related inquiries, research, vendor services, etc.

10

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty
Docket No. DE 23-039
Battery Storage
Direct Testimony of Dmitry Balashov
Page 16 of 16

Table 1: Phase 2 Storage Pilot Program and ETFO Staffing Costs

Component / Year	Rate Year 2	Rate Year 3
Utility-Owned BESS: Device Costs	\$1,300,000	\$1,300,000
BYOD: Software and Studies Costs	\$71,000	\$71,000
ETFO Staffing Costs	\$258,000	\$258,000

11

12

13 **Observations, Recommendations, and Conclusions**

14 **Q. Please summarize your recommendations regarding Phase 2 of Liberty’s Battery**
15 **Storage Pilot Program.**

16 A. My overall observations and recommendations regarding the Phase 2 battery storage project
17 are as follows:

- 1 • While the performance of the Phase 1 pilot program met agreed upon
2 requirements/objectives, it did so with an optimistic assumption of battery
3 performance over time. Further, there are no allowances for equipment failures,
4 service calls, and associated costs.
- 5 • The Phase 1 battery installations have been in service for only 3 years. Obtaining
6 more real-world performance is recommended before proceeding with Phase 2 utility-
7 owned batteries. (Liberty has proposed inclusion of Phase 2 utility-owned batteries in
8 rate base along with Phase 1 batteries.)
- 9 • For the reasons discussed above, I recommend that Phase 2 regarding Liberty-owned
10 batteries be postponed at this time.
- 11 • The proposed customer-owned BYOD program should be implemented. However,
12 additional detail is needed regarding the proposed ETFO staffing costs.

13

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

15 A. Yes.