STATE OF NEW HAMPSHIRE
BEFORE THE
PUBLIC UTILITIES COMMISSION

Docket No. DE 23-039

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty
Distribution Service Rate Case
Advanced Rate Design

DIRECT TESTIMONY

OF

GREGORY W. TILLMAN

May 5, 2023

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I. INTRODUCTION

Q. Please state your full name and business address.

A. My name is Gregory W. Tillman. My business address is 602 South Joplin Avenue, Joplin, Missouri.

Q. By whom are you employed and in what capacity?

A. I am employed by Liberty Utilities Service Corp. ("LUSC") as the Senior Manager of Rate Design.

Q. On whose behalf are you submitting this testimony?

A. I am testifying on behalf of Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty ("Liberty" or "the Company").

Q. Please describe your educational and professional background.

A. I earned a Bachelor of Science in Electrical Engineering from the University of Tulsa in 1987. Prior to joining LUSC in May 2019, I had over 26 years of experience in the regulated and deregulated energy industry including roles in regulatory, pricing, billing, and metering information. In 1990, after serving on active duty as a Signal Officer in the United States Army, I joined Public Service Company of Oklahoma ("PSO"). From 1990 through 1997, I was employed in various positions at PSO, including in the Information Services, Business Planning, Rates and Regulatory, and Ventures departments. During my tenure with the Rates and Regulatory Department, I served as the Supervisor of Power Billing and Data Collection. In this position, I managed the billing for large industrial and commercial customers and led the implementation of

PSO's real-time pricing program. I also managed the implementation of real-time pricing for the three remaining utilities in the Central and South West Corporation – Southwestern Electric Power Company, Central Power and Light, and West Texas Utilities.

In 1997, I joined the Retail Energy Department of the Williams Energy Company as the Manager of Systems for the retail gas and electric data and billing. I also managed the customer billing function at Williams Thermogas as well as the billing and accounting systems support functions at Williams Communications. From 2000 to 2002, I served as the Vice President of Energy Solutions for Automated Energy, a metering information and services company. In 2008, following several assignments as a consultant and project manager in various industries, I joined Oklahoma Gas & Electric Company ("OG&E") as a Senior Pricing Analyst. I was promoted to Manager of Pricing in January 2010 and became the Product Development Pricing Leader in 2013. While at OG&E, I was instrumental in developing and managing OG&E's pricing strategy and products, including the design and implementation of OG&E's SmartHours™ rate. From November 2015 to May 2019, I was employed at Walmart, Inc. as a Senior Manager of Energy Regulatory analysis. In that role, I advocated for Walmart's positions in regulatory proceedings throughout the nation.

I joined LUSC in May 2019 as the Senior Manager of Rates and Regulatory Affairs in the company's Central Region, where I was responsible for regulatory matters involving

electric, natural gas, and water utilities in Arkansas, Illinois, Iowa, Kansas, Missouri, and Oklahoma. I transitioned into my current role in December 2021.

Q. Please describe your duties at LUSC.

A. In my current role, I lead the rate design activities at LUSC and am responsible for all aspects of LUSC's regulated utilities' ratemaking, including strategy, research and analysis, customer outreach and education, and engagement with regulators in the jurisdictions in which we do business.

Q. Have you previously testified in regulatory proceedings before this Commission?

A. No, I have not.

Q. Have you testified in other regulatory jurisdictions?

A. Yes. I have testified in over 40 proceedings before 21 other state regulatory agencies. My testimony in those proceedings addressed the topics of revenue requirement, cost of service, rate design, revenue allocation, customer impacts, tariffs, and terms and conditions of service.

II. PURPOSE OF TESTIMONY AND EXECUTIVE SUMMARY

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to sponsor the Company's proposal to introduce full requirements time-of-use ("TOU") rate options available to residential and small commercial customers. The introduction of these rate options are the next steps in the Company's ongoing strategy to modernize its rate structures.

Additionally, I propose modifications to the Company's existing high draw Electric Vehicle ("EV") charging rates. These proposed changes are intended to reduce barriers to EV rate adoption associated with the demand-based EV charging rates (EV-L and EV-M) approved in Docket No. DE 20-170.

Further, I propose consolidating Liberty's TOU rate models into a single consolidated methodology for modeling TOU rates across the Company. A consolidated model will align the various TOU rates and streamline the process of determining, filing, and approving the various TOU rates included in the Company's tariff.

III. LIBERTY'S RATE MODERNIZATION STRATEGY

Q. What is rate modernization and why is it important for the Company to pursue modernization of its rates?

A. Simply stated, rate modernization includes the process of establishing rates that (1) create strong connections to the underlying costs of providing electric service; (2) incentivize efficient customer behavior; and (3) provide customers with a choice in pricing products. Liberty is pursuing a rate modernization strategy because Liberty believes it is critical to connect the price signals more directly to the underlying costs of providing service. Modernized rates incentivize efficient customer behavior through effective rate structures, creating downward pressure on prices and advancing affordability goals. The Company also believes it is important to our customers to have a choice of pricing products. Customers have a wide range of needs and desires, which can be addressed by introducing of a range of pricing options. Introducing generally available TOU rate

structures in this proceeding lays the groundwork for establishing the Company's overall advanced rate design strategy.

Q. Why is the Company undergoing a review of its TOU rates in this general rate case?

A. As part of the Settlement Agreement in Liberty's last rate case in Docket No. DE 19-064, the Company committed to review and modernize its retail rates in New Hampshire. In the course of that initiative, the company developed a phased approach to innovating its rate design. Liberty's strategy is described in the Company's Advanced Rate Design Roadmap, one of the specific commitments the Company made in the Settlement Agreement, which it delivered to stakeholders in April 2022.

Q. Do the proposals you are making in your testimony align with the Advanced Rate Design Roadmap?

A. Yes, they do, although they are not the entirety of the Company's plan for rate design innovation in New Hampshire. The proposals I present in my testimony comprise a first step in what Liberty expects to be an ongoing effort to advance and modernize rates to provide additional pricing options to customers.

Q. What are the generally accepted principles traditionally applied to the development of rates in the electric utility industry?

A. Bonbright outlines the key criteria for establishing a sound rate structure. The three primary criteria are as follows:

1. **The Revenue Requirement or Financial Needs Objective.** A utility has authority to charge a price that fairly compensates them for providing utility

service and, for private companies like Liberty, to earn a fair return on its investment.

2. **The Fair-Cost-Apportionment Objective.** The total cost of providing public utility service is distributed fairly among customers.

3. **The Optimum-Use or Consumer Rationing Objective.** Rates are designed to encourage efficient use and discourage wasteful use of system resources.

The remaining criteria include stability and predictability of rates, simplicity and understandability of rates, freedom from controversies as to proper interpretation, revenue stability, and avoidance of undue discrimination.[1]

Q. Are these same principles applicable to the development of modernized rates?

A. Yes. The criteria established in Bonbright's treatise continue to apply today. It remains crucially important that rates continue to be cost-causative, fair, and efficient.

IV. PROPOSED RESIDENTIAL AND SMALL COMMERCIAL TOU RATES

Q. Is the Company proposing new rate options for its residential and small commercial customers in this proceeding?

A. Yes. Liberty is proposing to introduce a residential whole-home (full requirements) TOU rate option ("D-TOU") and, likewise, a full requirements TOU rate option for its small commercial customers ("G-3-TOU"). The D-TOU and G-3-TOU offerings are intended to be available to customers currently served on the D and G-3 rates, respectively.

[1] James C. Bonbright, Principles of Public Utility Rates, (Columbia University Press: 1961) 1st Edition.

Q. What are TOU rates?

A. TOU rates are time-varying rates that present different prices associated with the corresponding costs to provide electricity during pre-determined times of the day. In its simplest form, the structure includes two time periods typically referred to as on-peak and off-peak. Additional periods may be included to reflect costs more accurately during other periods. The on-peak period is broadly defined by the periods of the day in which costs of providing electric service are highest, and off-peak times are associated with the remaining periods in which costs are typically lower. Since the costs of electric service are different during these defined time periods, it follows that the prices during the on-peak period are higher than the prices during the off-peak period. As customers respond to the price signals by reducing or shifting load away from the on-peak period, they reduce peak demands on the system resulting in more efficient use of system resources and lower overall costs for all customers.

Q. What are the primary goals of introducing full requirements TOU rates?

A. The over-arching goal is to provide a tool for customers to have more control over their electricity bill. For example, if a customer shifts load from the higher-priced on-peak period to the lower-priced off-peak period, they will create a direct reduction to their electric bill. Additionally, another important goal is supported because they are using system resources more efficiently and reducing the overall cost of providing service to all customers.

Q. What are some common characteristics of effective TOU rates used to guide development of the rates being proposed by the Company?

A. According to the Regulatory Assistance Project and the Brattle Group,[2] some common qualities of TOU rates include:

1. A short peak period. The on-peak period should be kept as short as possible while still reasonably spanning the period during which the system peak will likely occur.
2. A strong price signal and opportunity for significant bill savings. The differential between peak and off-peak prices should be large enough to give the customer a significant incentive to reduce consumption when the price is high and provide an opportunity for meaningful bill savings.
3. Rates should reflect system costs. While a significant price signal is important, the rate should still reflect the cost of providing electric service to the customer.
4. Simplicity. TOU rates should be easy for the customer to understand.

Q. Has the Commission previously issued guidance with respect to the development of TOU rates in New Hampshire?

A. Yes. In Order No. 26,394 (Aug. 18, 2020), in Docket No. IR 20-004, the Commission provided guidelines for the development of EV charging TOE rates. The Commission began with a summary of Commission Staff's proposal:

[2] Ahmad Faruqui , Ryan Hledik , Jennifer Palmer, Time-Varying and Dynamic Rate Design - Regulatory Assistance Project (raponline.org), July 23, 2012.

> Staff recommended the Commission issue guidance that any separately metered residential electric vehicle charging rate should: (1) be based directly on cost causation; (2) incorporate time varying energy supply, transmission, and distribution components; (3) have three periods (e.g., off peak, mid-peak, and peak); (4) be seasonably differentiated (e.g., summer and winter); (5) have an average price differential between off-peak and peak of no less than 3:1; and (6) have a peak period no longer than four hours in duration."[3]

The Commission largely accepted Commission Staff's recommendations:

> The guidelines proposed by the Commission Staff regarding a consistent framework for separately-metered residential electric vehicle charging rate designs are appropriate, subject to three clarifications. First, we agree with the City of Lebanon that the five-hour peak duration is more appropriate than the four-hour peak duration. Second, the 3:1 peak to off-peak ratio should represent an average ratio during a given year, not during any one season. Third, we note that these guidelines serve as a useful starting point and are generally consistent with the rate designed and approved for the purposes of Liberty's Battery storage pilot, and later adopted for Liberty's separately metered EV TOU Rate. Liberty Utilities (Granite State Electric) Corp., Order No. 26,376 at 9. (June 30, 2020)."[4]

While these guidelines were specific to the development of EV Charging rates (a subset of TOU rates), the Company has developed its proposed TOU rates to align with this guidance.

Q. Do customers enrolled in TOU rates generally respond to the pricing signals?

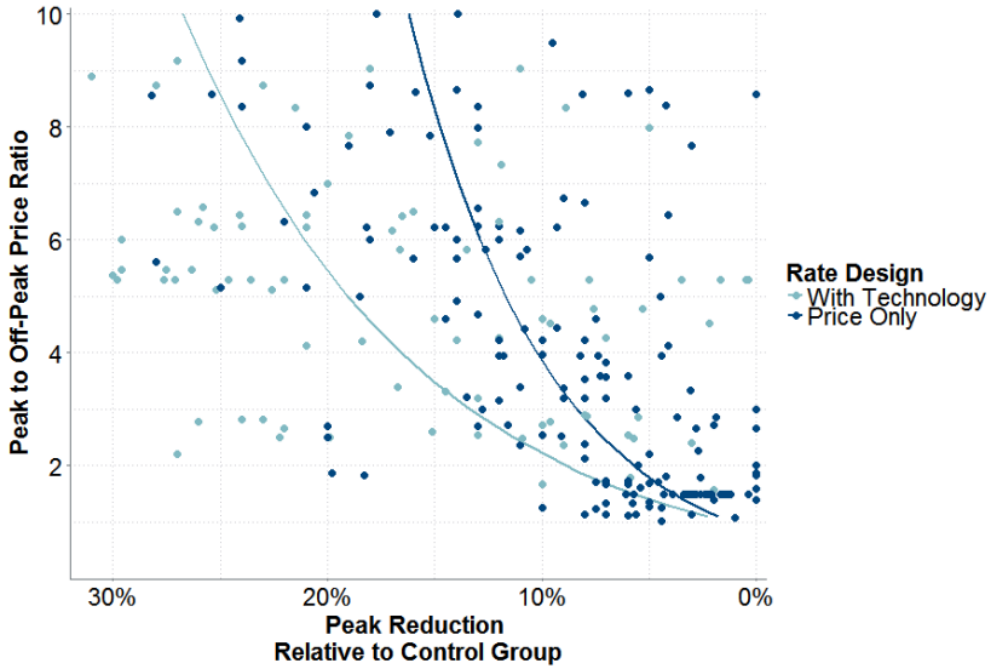
A. Yes. Many studies have shown that customers enrolled in time-based rates reduce their peak consumption in response to those TOU rates. The reduction in peak period usage

[3] Order No 26,394 at 15 (August 18, 2020).

[4] Order No. 26,394 at 16.

depends on the characteristics noted earlier in my testimony. Figure 1 below shows the peak reduction versus the peak to off-peak price ratios for many programs as compiled by The Brattle Group and published in The Electricity Journal in 2017.

Figure 1. *Price Responsiveness to TOU Rates*



Source: Ahmad Faruqui, Sanem Sergici and Cody Warner, "Arcturus 2.0: A Meta-Analysis of Time-Varying Rates for Electricity," The Electricity Journal, 2017.

Q. Has Liberty seen similar positive results in its TOU programs in other jurisdictions?

A. Yes. While it is still too early in the program to analyze and present concrete results, Time Choice Plus, Liberty's TOU program introduced to Missouri residential and small commercial customers in October 2022, has demonstrated a reduction in energy consumption during peak pricing periods. As a point of reference, the peak to off-peak price ratio for the Time Choice Plus rate is approximately 3.3 to 1. Figure 2 provides a

snapshot of the consumption profile for Time Choice Plus customers compared to the consumption profile of customers on the standard rate.

Figure 2. *Liberty's Missouri Customer Response to TOU Pricing*

Q. Are customers generally receptive to enrolling in TOU rate structures?

A. As discussed earlier, customers have a wide range of needs and desires when it comes to their preferred pricing structures. Many customers are attracted to the savings opportunities available from the TOU rate structure, but they must first understand the pricing structure itself and overcome any perceived risks of bill increases under the rate structures due to perceived or real inability to reduce or shift load from the peak pricing period to off-peak periods.

Q. Why is Liberty introducing the whole-home residential and full requirements small commercial TOU rate options now?

A. Liberty is proposing to implement TOU rates now, rather than waiting for the completed deployment of its planned Automated Metering Infrastructure ("AMI") investment, because doing so creates benefits for our customers. TOU rates support the development of a deeper understanding and knowledge of how customers respond to energy costs that vary over time and will support continued innovation once the AMI platform comes online. Likewise, the introduction of these rates now will provide an opportunity to increase our customers' exposure to and understanding of TOU rates.

Q. Can Liberty implement TOU rates without AMI?

A. Yes. The Company plans to utilize meters capable of and programmed to measure the consumption of energy during the time periods defined in the proposed rates. Since these time periods are consistent with the existing EV charging rates and the Battery Storage Pilot, the same metering and billing solutions for those rates will apply to the solutions required for support of the full requirements TOU rates being proposed by Liberty.

Q. Will these rate schedules be available to all customers in their respective classes?

A. Yes, these rates will be made available to all customers in the classes for which they are intended. Prior to the deployment of AMI meters, subscription may be limited by the availability of TOU meters or limitations on other resources needed to support the rates. The Company will make every effort to have sufficient meters on hand to support customer enrollments. However, if a backlog of enrollments awaiting meters is

encountered, then meters will be installed, and customers will be placed on the TOU rates in the order in which they request to be enrolled in the TOU rate.

Q. Does the Company's proposal address the need for customer understanding of the rates being offered and to mitigate the customers' perceived risk of higher bills under the TOU rate?

A. Yes. To increase customer understanding of these new pricing programs, the Company is developing a customer education program to communicate the availability of the new rate options, their features, and the benefits to customers. To overcome any perceived risks of bill increases that might discourage customers from enrolling in the TOU rates, Liberty has included a first year "Best-Bill Guarantee" provision within its proposed residential and small commercial TOU rates.

Q. Please provide an overview of the proposed customer education and outreach plan.

A. The customer education program represents the Company's plan to carry out a comprehensive, multi-channel program to provide our customers with information regarding the benefits of time-of-use rate structures and how their choices on the program will impact their electric bill. Targeted initiatives will be included in the communications plan to recruit customers to enroll in the proposed rates. The communications plan incorporates a continuing plan supported by an annual budget of $105,000. It includes existing, traditional customer communications channels, earned and paid media, and digital outreach as outlined in Figure 3.

Figure 3. *Customer Education Plan Tactics and Budget*

Communication Tactics	Target Audience	Annual Budget
Bill Insert	All NH Electric Customers	$15,000
Bill Message	All NH Electric Customers	$0
Informational Video	All NH Electric Customers	$5,000
Website Landing Page	All NH Electric Customers	$0
Customer Email(s)	All NH Electric Customers	$5,000
Customer Print Newsletter	All NH Electric Customers	$15,000
Direct Mail	All NH Electric Customers	$40,000
Earned Media (Press Release/Story Pitches)	All NH Electric Customers	$0
Social Media – Boosted	Select communities in service areas	$5,000
Digital Campaign – 60 days	Select communities in service areas	$5,000
Radio Spot – 3 60-day runs (production & schedule)	Select communities in service areas	$15,000
Total		**$105,000**

Q. How will the Best-Bill Guarantee work for customers that opt into the TOU rates?

A. The Best-Bill Guarantee promises that if, after the initial annual subscription period of receiving service on the TOU rate, the customer has paid more under the TOU rate than they would have paid under the standard tariff rate for the same usage, the Company will calculate the difference and refund that amount to the customer in the form of a bill credit. Following the customer's first year on the TOU rate, the customer may switch back to the standard rate or remain on the TOU rate without the benefit of the Best-Bill Guarantee.

Q. Has Liberty established separate rate classes to define the revenue targets for the proposed D-TOU and G-3-TOU rates?

A. No. While the Company will create separate rate classes for the TOU classes in a future rate case, we lack the data necessary to accurately assign costs to the TOU classes within the current case. New rate classes would require information, which is currently unavailable, about the customers that will eventually choose to subscribe to the TOU rates and how those customers will modify their usage based on the TOU rates.

Q. How did the Company establish the revenue targets for the proposed new TOU rate structures?

A. The proposed rates were established based on the underlying cost to serve the respective classes for which the TOU rates are being developed. In other words, the rates were designed to be revenue neutral to the standard rate classes. This means that, on average, customers would pay the same for their consumption regardless of the rate they choose. If a typical customer switches from rate D to the D-TOU rate and does not modify their usage pattern, their bill under rate D-TOU rate will be the same as if they were billed on rate D. The same would apply for customers served on the G-3 and G-3-TOU rates.

Q. What are the primary costs included in a customer's bill for electric service?

A. The overall cost for electric service broadly includes three major components. First is the energy generation cost, which primarily consists of the generation capacity related costs and the generation variable production costs. For Liberty, these are the costs included in the default service (or competitive supplier) rate. Second, customers pay the cost of

transmission service (or external delivery) to bring the energy to the local distribution system. And third, customers pay the cost of the local distribution system for delivery to their homes. The development of the TOU rates includes steps to differentiate the rates for each of these components across the defined time periods.

Q. How were the time periods for the proposed TOU rates determined?

A. The main goal for the selection of TOU time periods is to reflect the previously discussed characteristics of effective TOU rates. To do so, Liberty gathered and reviewed historical load and ISO – New England ("ISO-NE") locational marginal pricing ("LMP") data to ensure that the time periods were established to ensure effective TOU rates. The Company also considered its existing Battery Pilot and EV Charging rates and their established peak, mid-peak, and off-peak periods. Additional technical considerations were made for the current metering solutions as well as the established periods under the existing Battery Pilot and EV Charging rates. To ensure continuity and simplification of the implementation of the proposed rates, the Company decided that it was preferable to maintain the time periods used within the existing rates.

Q. Are the periods as defined in the current TOU rates reasonable for use in the design of the proposed D-TOU and G-3-TOU rates?

A. Yes. While the time period analysis identified some areas of potential improvement, these existing time periods result in a reasonable structure for the proposed TOU rates.

Q. What are the time periods included in the proposed D-TOU and G-3-TOU rates?

A. The time periods defined for the rates are the same periods used in the Battery Pilot, rate D-11, and EV Charging, Rate D-12, as well as the high draw EV charging rates, EV-L and EV-M. The time periods for the Peak, Mid-Peak, and Off-Peak periods are shown in Figure 4.

Figure 4. *TOU Periods*

Time-Of-Use Periods	
Peak Hours:	3 PM to 8 PM Monday through Friday Except Holidays
Mid-Peak Hours:	8 AM to 3 PM Monday through Friday Except Holidays
	and
	8 AM to 8 PM Saturday, Sunday, and Holidays
Off-Peak Hours:	12 AM to 8 AM and 8 PM to 12 AM Daily

Q. Are the proposed rates also differentiated to reflect seasonal periods?

A. Yes. The rates reflect a defined summer season and winter season. The summer season will include the months of May through October and the winter season will include November through April.

Q. Is it possible that the time periods and seasons could be refined over time?

A. Yes. As the rates become more mature and subscription levels increase it is possible that refinements will improve the effectiveness of the rates. And note that the implementation of AMI technology will allow the Company to more easily support changes to the defined

periods. For example, creating time periods that address specific seasonal load and price characteristics may allow the Company to establish more impactful price ratios in the summer and winter seasons. Further refinement of the seasonal definitions to include shoulder months might also enable stronger differentiation of underlying costs into the TOU periods. Finally, customer response to the rates may lead to sufficient changes in consumption patterns to warrant refinement of the TOU periods to address changes in system or market load and price patterns.

Q. For the purposes of establishing the proposed TOU rates, how did the Company determine the generation cost to be recovered?

A. The total generation costs to be recovered in the design of the TOU rates are determined for an annual period based on the default energy service charge multiplied by the total kWh. Once the total generation cost is calculated, the TOU rates associated with recovery of generation costs can be determined based on how these costs are incurred in each of the TOU periods.

Q. How is generation cost differentiated into the defined Peak, Mid-Peak, and Off-Peak time periods?

A. The general approach is to first differentiate the default energy service costs into its two main components (1) the capacity component and (2) the energy, or non-capacity, component. The total generation cost is separated based on the ratio of the expected annual capacity costs and energy costs for the customer class for the rating period. Once capacity costs and non-capacity costs are distinguished, each can be assigned to the

defined time-of-use periods to establish price signals that communicate how costs are incurred.

Q. How are the total annual non-capacity generation costs determined and allocated to the time periods?

A. The non-capacity generation costs for a particular class were estimated based on the forecasted monthly LMP forwards and class loads. The energy, or non-capacity, costs are then assigned to the TOU periods by calculating the marginal cost per hour of energy service. This is accomplished by multiplying the hourly loads for that particular class and the market clearing price across each hour of the rating period. Next, the ratio of the marginal energy cost falling into each defined TOU period is calculated for the rating year. These calculated marginal energy cost ratios are then used to assign the annual total energy cost recovery across the time periods to calculate the differentiated non-capacity cost for each period.

Q. What is the process used to determine and assign the capacity related generation costs to the various time periods?

A. The capacity related generation costs associated with a particular class are based on the forecasted forward capacity market ("FCM") charge rate estimated by the ISO-NE by the Installed Capacity ("ICAP") tag of that class. The capacity related generation costs are then allocated to the Peak, Mid-Peak, and Off-Peak periods based on a probability of peak analysis. The analysis determines the probability that the annual peak load used to determine capacity costs will occur during each of the defined time periods. While one

might generally expect the peak to occur exclusively during the Summer Peak period, it is possible, due to impacts of unexpected weather patterns or other variables, that the peak load might occur outside of the defined summer peak period. This probability analysis identifies and allocates the capacity costs to each period based on the historical probabilities.

Q. How are the transmission costs allocated to the various time periods?

A. Transmission costs are assigned to Liberty's customers based on the utility's contribution to the ISO-NE's monthly coincident peak load for Regional Network Service (the system transmission service) and Local Network Service (local transmission provider service). The total monthly transmission cost for the Company was allocated to a particular class using that class's coincidence with the ISO-NE peak. This monthly cost was then allocated to the time periods based on the monthly probability of peak analysis. The monthly probability of peak analysis calculates the probability of a particular hour in each period being the peak hour for that month using five years of historical load data. The probabilities are then applied to the transmission charge rates to apportion the total monthly transmission costs to the pre-defined time periods.

Q. Do distribution system costs to serve customers vary by the time of day?

A. No, the costs of the distribution function are primarily fixed in nature and do not vary based on the time of day in which the distribution service is used. In other words, as a customer changes consumption patterns throughout the day, there is no direct impact on the costs for the distribution function. In contrast, changes in a customer's load pattern

throughout the day will result in direct impacts to the cost of generation capacity, generation energy, and transmission service required to serve that customer.

Q. Would a purely cost-based distribution rate result in time-differentiated rates for the recovery of revenue?

A. Typically, one would not expect distribution rates to be time-differentiated in a purely cost-based rate. However, in certain circumstances, a small portion of distribution costs may be considered time-variant. For example, constraints on the distribution system may exist that create a situation that incremental loads may call for distribution system upgrades in the near term. The costs of the system upgrades driven by incremental loads, even though they are circuit specific, could lend themselves to an avoided cost driven time-differentiation tied to circuit loading levels.

Q. In previous proceedings establishing TOU rates for Liberty, have distribution components of the rates been time-differentiated?

A. Yes. In each of the existing TOU rates offered by the Company, distribution rate components are time differentiated. While the models used to establish the time-differentiation of the rates vary, distinguishing the rates based on the timing of the load on the distribution system is the primary method of differentiating the costs assigned to the rate periods.

Q. Is it reasonable for the Commission to establish that vary by time of day even when costs do not?

A. Yes. It is certainly reasonable, and aligned with rate-making principles, to pursue objectives other than cost-causation in rate design. While time-differentiated distribution rates are not directly supported by a pure cost-causation approach to rate design, there are certainly valid reasons for the Commission to establish policies that encourage time-differentiated distribution rates. Some examples of appropriate uses for time-differentiated distribution rates are to encourage beneficial electrification and technology adoption, develop a better understanding of customer desires and behavior, gain deeper insights into grid operations and modernization investments, and capture the benefits of distributed resources.

Q. Are there consequences that may result from using time-differentiated rates for recovery of costs that do not vary by time of day?

A. Yes. The use of time-differentiated rates to recover non-time-varying distribution costs could lead to cross-subsidies or lost revenues. TOU rates are designed to encourage customers to reduce their bill by shifting consumption away from the high-priced periods. That shift reduces distribution revenue without creating a matching change in the underlying cost of distribution service.

Q. Is the Company proposing time-differentiated distribution rate components for the proposed D-TOU and G-3-TOU rates?

A. Yes. To support the continuation of policies established in the prior proceedings the Company has included time-differentiated distribution rates in its proposed D-TOU and G-3-TOU rates. However, as these and other TOU rates mature and are transitioned into separate rate classes, the Company will review the impacts of continued time-differentiation of distribution rate components and, where appropriate, modify the design to address any excessive subsidy or revenue recovery issues.

Q. What methods have been used to differentiate the Peak, Mid-Peak, and Off-Peak distribution prices in previous dockets?

A. Two modeling tools that are publicly available as part of the record of past Commission proceedings. The first was introduced and used in the Company's Battery Storage Pilot Program proceeding, Docket No. DE 17-189. There, rate analyses were undertaken using a relatively complex model which incorporated a cost-duration method to assign different levels of costs to the TOU periods based on the amount of loading on the distribution system across all hours of the year to determine time-differentiated rates. In the EV rates docket, Docket No. DE 20-170, a model was adopted that simplified the allocation of costs to different periods based on a method using the square of system loads to determine the proportion of the costs assigned to each period. While these models utilize different methods to allocate costs to the TOU periods, they result in similar time-differentiation of the distribution rates.

Q. How have distribution rates been time-differentiated in the proposed D-TOU and G-3-TOU rates?

A. The Company has adopted the simpler approach described above of utilizing the load squared method to assign distribution costs to the rate periods for the proposed Rates D-TOU and G-3-TOU. This approach is aligned with the Commission's decision regarding the time-differentiation of EV charging rates approved in Docket No. DE 20-170.[5]

Q. Has the Company determined illustrative pricing for the D-TOU and G-3-TOU rates based on the methodologies discussed in your testimony?

A. Yes. Figure 5 provides a summary of the D-TOU and G-3-TOU peak, mid-peak, and off-peak rates. These rates are revenue neutral to the proposed Rates D and G-3 in this docket and the currently applicable model inputs to determine the time-varying default service, transmission, and distribution rates. The TOU models used for developing Rates D-TOU and G-3-TOU can be found in Attachments GWT-1 and GWT-2, respectively. To maintain revenue neutrality, the remainder of the rate components are set equal to Rates D and G-3 rate components.

[5] Order No. 26,604 (April 7, 2022).

Figure 5. *TOU Rates by Component*

D-TOU Rate ($/kWh) by Component						
	Winter			Summer		
	Peak	Mid-Peak	Off-Peak	Peak	Mid-Peak	Off-Peak
Generation						
Non-Capacity Costs	$0.2302	$0.2117	$0.1961	$0.2092	$0.1730	$0.1395
Capacity Costs	$0.0000	$0.0000	$0.0000	$0.2607	$0.0494	$0.0019
Transmission	$0.1497	$0.0128	$0.0032	$0.1266	$0.0411	$0.0010
Distribution	$0.0864	$0.0728	$0.0641	$0.1019	$0.0819	$0.0673
Other						
Total	**$0.4664**	**$0.2973**	**$0.2634**	**$0.6984**	**$0.3455**	**$0.2096**
On/Off Price Ratio	**1.8**			**3.3**		

G-3-TOU Rate ($/kWh) by Component						
	Winter			Summer		
	Peak	Mid-Peak	Off-Peak	Peak	Mid-Peak	Off-Peak
Generation						
Non-Capacity Costs	$0.2443	$0.2203	$0.2079	$0.2261	$0.1828	$0.1506
Capacity Costs	$0.0000	$0.0000	$0.0000	$0.2087	$0.0319	$0.0014
Transmission	$0.1401	$0.0146	$0.0029	$0.1126	$0.0309	$0.0007
Distribution	$0.0762	$0.0774	$0.0644	$0.0835	$0.0851	$0.0617
Other						
Total	**$0.4606**	**$0.3123**	**$0.2751**	**$0.6309**	**$0.3307**	**$0.2144**
On/Off Price Ratio	**1.7**			**2.9**		

Q. Rates D-TOU and G-3-TOU include time-differentiated default service rates for the energy portion of the bill. Can customers enrolled in these rates take energy service from a third-party energy service provider?

A. Yes, customers who elect to be served under Rate D-TOU or G-3-TOU may elect an alternative energy service provider. It should be noted that customers who choose a competitive supplier must seek access to time-differentiated energy service rates through their selected energy service provider.

Q. If a customer does not take the Company's default energy service, will the proposed Best-Bill Guarantee apply to the energy service obtained through the alternative supplier?

A. No. The proposed Best-Bill Guarantee will apply only to the services provided by Liberty. In this case, the Company will ensure the total paid for distribution and transmission service under the TOU rate does not exceed the billing under the alternative D or G-3 rate over the initial 12 months of service.

Q. Does the Company currently have an approved TOU-based rate generally available to residential customers?

A. Yes. Rate D-10 is a time-of-use rate that differentiates the distribution charges between an on-peak period and an off-peak period. The D-10 rate is based on a different time-period consisting of a thirteen-hour peak period window (8 AM to 9 PM, Monday through Friday, excluding holidays) and, unlike the proposed D-TOU rate, does not provide for the time differentiation of the generation and transmission components of the bill.

Q. How many customers are enrolled in Rate D-10?

A. Currently, there are about 440 customers enrolled in the rate.

Q. Should Rate D-10 be retained if the Commission approves the proposed Rate D-TOU?

A. No. Rate D-10 does not align with the previously discussed Commission guidance for TOU rates nor the characteristics of effective TOU rates. Also, offering multiple whole-

home TOU rate options to the Company's residential customers could lead to confusion and unnecessary administrative burden.

Q. What is the Company proposing for Rate D-10 if the Commission approves Rate D-TOU?

A. If the Commission approves Rate D-TOU, the Company proposes to close and eliminate Rate D-10. By default, all customers enrolled in Rate D-10 would be moved to Rate D. However, customers enrolled in Rate D-10 will have the option to enroll in Rate D-TOU in lieu of being placed on Rate D. Prior to closing the rate, Liberty will notify Rate D-10 customers, informing them that the rate will be eliminated, and they will be placed on Rate D unless they elect to take service on the newly approved Rate D-TOU.

Q. Based on their current consumption patterns, would these customers be better served to opt into the proposed D-TOU rate?

A. Yes. Based on Liberty's proposed rates and assuming no change to the consumption patterns for these customers, the typical customer currently served on Rate D-10 will pay about 4.7% less if they opt to be served on Rate D-TOU rather than take service on Rate D. See Attachment GWT-3.

V. ELECTRIC VEHICLE CHARGING RATE MODIFICATIONS

Q. Is Liberty proposing a change to its High Draw EV Charging Rate Options?

A. Yes. The Company is proposing the EV Large Energy Option ("EV-L-E") and EV Medium Energy Option ("EV-M-E") as transitional rate options to its EV-M and EV-L electric vehicle charging rates.

Q. Why is the Company proposing an optional rate structure for EV-L and EV-M?

A. The current EV-L and EV-M rates are intended to encourage the adoption of electric vehicles throughout the Company's service territory. However, as of this filing, Liberty's Rates EV-L and EV-M have no subscribers. While it is not clear that the structure of these rates is the primary reason for their lack of adoption, the demand charge component of these rates is inherently unattractive during the initial start-up and transition phases of high-draw EV charging applications. To reduce any real or perceived disincentives in adopting these rates, Liberty is proposing these optional transitional rates to alleviate the impact of demand charges on customers building out their EV charging infrastructure.

Q. How do these rates differ from the current EV-L and EV-M rates?

A. At utilization levels consistent with class averages, Rates EV-L and EV-M are designed to be revenue neutral with Rates G-1 and G-2, respectively. Likewise, Rates EV-L-E and EV-M-E are revenue neutral with the demand-based counterparts at typical utilization. However, these optional EV charging rates have eliminated the demand charge component. The time-based energy charges are adjusted to account for the removal of the demand charges. In all other respects, energy option rates are the same as the EV-L and EV-M demand-based rates.

Q. Have you developed representative TOU rates for the EV-L-E and EV-M-E based on the EV-L and EV-M rates?

A. Yes. The TOU rate designs for EV-L-E and EV-M-E are provided in Attachment GWT-4 and GWT-5. Figure 6 provides a comparison of the energy option EV charging rates

with their demand-based counterparts. Again, at typical consumption patterns, Rates EV-L and EV-L-E are equivalent; and Rates EV-M and EV-M-E are equivalent.

Figure 6. *Rates EV-L-E and EV-M-E with Comparative Rates EV-L and EV-M*

EV-L-E TOU Rate by Component							
	Demand Charges ($/kW)	Energy Charges ($/kWh)					
		Winter			Summer		
		Peak	Mid-Peak	Off-Peak	Peak	Mid-Peak	Off-Peak
Generation							
Non-Capacity Costs		$0.1781	$0.1607	$0.1531	$0.1649	$0.1335	$0.1126
Capacity Costs		$0.0000	$0.0000	$0.0000	$0.1259	$0.0200	$0.0008
Transmission		$0.1034	$0.0114	$0.0022	$0.0985	$0.0308	$0.0006
Distribution	$0.0000	$0.0381	$0.0376	$0.0330	$0.0401	$0.0394	$0.0323
Total	**$0.0000**	**$0.3196**	**$0.2097**	**$0.1883**	**$0.4294**	**$0.2236**	**$0.1463**
On/Off Price Ratio		**1.7**			**2.9**		

EV-L TOU Rate by Component							
	Demand Charge ($/kW)	Energy Charges ($/kWh)					
		Winter			Summer		
		Peak	Mid-Peak	Off-Peak	Peak	Mid-Peak	Off-Peak
Generation							
Non-Capacity Costs		$0.1781	$0.1607	$0.1531	$0.1649	$0.1335	$0.1126
Capacity Costs		$0.0000	$0.0000	$0.0000	$0.1259	$0.0200	$0.0008
Transmission		$0.1034	$0.0114	$0.0022	$0.0985	$0.0308	$0.0006
Distribution	$6.29	$0.0216	$0.0214	$0.0188	$0.0228	$0.0224	$0.0184
Total	**$6.29**	**$0.3032**	**$0.1935**	**$0.1740**	**$0.4121**	**$0.2066**	**$0.1323**
On/Off Price Ratio		**1.7**			**3.1**		

EV-M-E TOU Rate by Component							
	Demand Charges ($/kW)	Energy Charges ($/kWh)					
		Winter			Summer		
		Peak	Mid-Peak	Off-Peak	Peak	Mid-Peak	Off-Peak
Generation							
Non-Capacity Costs		$0.1772	$0.1604	$0.1508	$0.1655	$0.1347	$0.1108
Capacity Costs		$0.0000	$0.0000	$0.0000	$0.1259	$0.0207	$0.0008
Transmission		$0.1138	$0.0120	$0.0023	$0.0926	$0.0283	$0.0006
Distribution	$0.0000	$0.0505	$0.0473	$0.0438	$0.0571	$0.0533	$0.0427
Total	**$0.0000**	**$0.3415**	**$0.2196**	**$0.1968**	**$0.4412**	**$0.2371**	**$0.1549**
On/Off Price Ratio		**1.7**			**2.8**		

EV-M TOU Rate by Component							
	Demand Charges ($/kW)	Energy Charges ($/kWh)					
		Winter			Summer		
		Peak	Mid-Peak	Off-Peak	Peak	Mid-Peak	Off-Peak
Generation							
Non-Capacity Costs		$0.1772	$0.1604	$0.1508	$0.1655	$0.1347	$0.1108
Capacity Costs		$0.0000	$0.0000	$0.0000	$0.1259	$0.0207	$0.0008
Transmission		$0.1138	$0.0120	$0.0023	$0.0926	$0.0283	$0.0006
Distribution	$6.32	$0.0270	$0.0252	$0.0234	$0.0305	$0.0285	$0.0228
Total	**$6.32**	**$0.3180**	**$0.1976**	**$0.1764**	**$0.4145**	**$0.2122**	**$0.1350**
On/Off Price Ratio		**1.8**			**3.1**		

Q. Are these rates likely to recover the full cost of service during the transitional period before full utilization of the EV charging equipment is achieved?

A. No. Like their demand-based counterparts, the underlying cost of service associated with these rates is represented by Rates G-1 and G-2 at full utilization. By their nature, the bills for these rates will result in lower charges during the period of low utilization (i.e., low load factor) of the charging station than their full charge counterparts.

Q. Can you provide a simple example of the impact on bills at low utilization?

A. Yes. As an example, assume a high-voltage charging station operates at 25 kW with a utilization of 15% during the off-peak period and 5% utilization during the peak and mid-peak periods over a month. As shown in Figure 7, the monthly bill, under Rate EV-M-E is 25.1% lower than under Rate EV-M.

Figure 7. *Comparison of EV-M-E and EV-M for Low Utilization*

	Demand	Utilization		Consumption			Total
		Peak	Off-Peak	Peak	Mid-Peak	Off-Peak	
Units	25	5%	15%	131	334	1,395	1,860
EV-M Rate	$ 6.32			0.41454	0.21221	0.13498	
EV-M Bill	$ 158.00			$ 54.41	$ 70.83	$ 188.30	$ 471.54
EV-M-E Rate	$ -			0.44116	0.23708	0.15489	
EV-M-E Bill	$ -			$ 57.90	$ 79.13	$ 216.07	$ 353.10
						Difference	$ 118.43
						% Savings	25.1%

In contrast, as the charging load grows and the load factor increases, the EV-M rate would be preferable for EV charging. Assuming full utilization of 90% during the off-

peak and 30% during the peak period, the respective bills for EV-M will be about 3.4% lower than the energy-based rate. See Figure 8.

Figure 8. *Comparison of EV-M-E and EV-M for High Utilization*

	Demand	Utilization		Consumption			
		Peak	Off-Peak	Peak	Mid-Peak	Off-Peak	Total
Units	25	30%	90%	788	2,003	8,370	11,160
EV-M Rate	$ 6.32			0.41454	0.21221	0.13498	
EV-M Bill	$ 158.00			$ 326.45	$ 424.95	$ 1,129.81	$ 2,039.22
EV-M-E Rate	$ -			0.44116	0.23708	0.15489	
EV-M-E Bill	$ -			$ 347.41	$ 474.76	$ 1,296.45	$ 2,118.62
						Difference	$ (79.40)
						% Savings	-3.9%

Q. Will the customer be responsible for selecting the EV charging rate which best suits their utilization levels?

A. Yes. However, the Company will work with the customer to perform an initial and annual comparison of the EV charging rates at expected utilization levels. This rate comparison will support the customer's informed decision regarding the most economical rate to subscribe as utilization of the EV charging equipment increases.

VI. TOU MODEL CONSOLIDATION

Q. Earlier in your testimony, you discussed that the Company has multiple methods of time differentiation of TOU rate components within its existing and proposed TOU rates. Please provide an overview of the differences in these models.

A. Generally, the methods used to allocate generation and transmission costs into the TOU period rates are similar across the various rate methodologies. However, the distribution rates are time-differentiated using two distinct methods.

The first method was introduced in conjunction with the battery pilot. It is often referred to as the cost-duration method and is used to differentiate rates into the various TOU periods based on the level of utilization of distribution system assets across each hour of the year. This methodology assigns a greater portion of the cost to the hours in which the load is highest, and the rates during each period reflect this allocation. This methodology is currently used to establish time-differentiated distribution rates for the Company's Rate D-11 and Rate D-12.

The second method, which is based on a much simpler calculation, utilizes the ratios of the square of the hourly loads to differentiate the rates by time periods. This method also allocates a greater portion of the TOU period rates into periods where the loads are highest. This method is used to create the differential in TOU rates for the Company's current EV-L and EV-M rates. It is also the method used in the proposed new TOU rates: D-TOU, G-3-TOU, EV-L-E, and EV-M-E.

Q. Are the variations between the existing and proposed models supported by differences in the underlying requirements of the various TOU rates?

A. No. TOU rates should be defined by the same underlying principles and methodologies across the entire portfolio of TOU rates available to our customers. The use of different models and/or inputs to develop the rates creates inconsistencies in the various TOU rates. Further, multiple approaches tend to add confusion to the rate determination, review, and approval processes. The inconsistency and confusion can be minimized through the consolidation of the various approaches into a single model used for all rates.

Q. What is the Company proposing?

A. Liberty proposes to establish a single consistent methodology with similar models to calculate the TOU period rates for the generation, transmission, and distribution components of the following TOU rates:

1. Rate D-11, Battery Storage Pilot
2. Rate D-12, Residential EV Charging
3. Rate EV-M, High Draw EV Charging Medium
4. Rate EV-L, High Draw EV Charging Large
5. Proposed D-TOU, Residential Whole-Home TOU
6. Proposed G-3-TOU, Small Commercial TOU
7. Proposed Rate EV-M-E, High Draw EV Charging Energy Only
8. Proposed Rate EV-L-E, High Draw EV Charging Energy Only

The corresponding models for each rate would use consistent market and system-level data and will, where appropriate, use applicable class-level load data to support the design of the rates. The sources for the data used to establish various TOU rates will be consistent across the rates and more readily available for determination, review, and approval of the rates.

Q. Has the Company provided representative models for each of the rates?

A. Yes. The TOU models for the newly proposed Rates D-TOU, G-3-TOU, EV-L-E, and EV-M-E were presented earlier in my testimony and are contained in Attachments GWT-1, GWT-2, GWT-4, and GWT-5, respectively. The models for the D-11 and D-12 rates are aligned with the D-TOU model since they are all currently based on Rate D. As distinct rate classes are created for these rates the models will be based on the load and cost characteristics of those newly established classes and modified accordingly. TOU models for Rates EV-L and EV-M are contained in Attachments GWT-6 and GWT-7, respectively.

Q. Does the Company propose any changes to how TOU rate changes are reviewed?

A. The Company recognizes the need to develop a better process to communicate TOU rate changes to allow for ease of review and verification of inputs and resulting calculations whenever there is a change in one of the underlying components. The Company is committed to working with interested stakeholders to develop a better understanding of the TOU rate mechanics and verification of the calculation.

VII. CONCLUSION

Q. Does this conclude your pre-filed direct testimony?

A. Yes.

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