

BEFORE THE
STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION

DOCKET NO. DE 21-119

IN THE MATTER OF: PUBLIC SERVICE COMPANY OF NEW
 HAMPSHIRE D/B/A EVERSOURCE ENERGY

 PROPOSED TARIFF AMENDMENTS TO
 RESIDENTIAL TIME OF DAY RATE

DIRECT TESTIMONY

OF

Elizabeth R. Nixon
Electric Director
New Hampshire Department of Energy

March 4, 2022

1 **Introduction**

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

3 A. My name is Elizabeth R. Nixon.

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) as the Electric Director
6 in the Regulatory Support Division. My business address is 21 South Fruit Street, Suite 10,
7 Concord, New Hampshire.

8 **Q. Please summarize your education and professional work experience.**

9 A. I joined the New Hampshire Public Utilities Commission (NH PUC or Commission) in
10 August 2012 in the Sustainable Energy Division working on renewable energy issues. In
11 August 2016, I became a Utility Analyst in the NH PUC's Electric Division, which is now
12 part of the DOE. In January 2022, I became the Electric Director in the Regulatory Support
13 Division of DOE. Prior to the NH PUC, I was employed at the New Hampshire Department
14 of Environmental Services, Air Quality Division, from 1999 until 2012, in various positions.
15 Prior to joining the State, I worked as a consultant at ICF and AER*X, Inc. Throughout my
16 career, I have focused on energy, environmental, and economic issues and analysis. I earned
17 a B.S. in Mathematics from the University of Vermont. More details on my educational and
18 professional background are provided in Attachment ERN-1.

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

20 A. The purpose of my testimony is to comment on Eversource's proposed changes to its
21 residential time of use (TOU) rate.

22 **Q. Please summarize your findings and recommendations.**

1 A. We believe that Eversource's proposed TOU rate is an improvement over the current TOU
2 rate, but we recommend that Eversource develop a revised residential TOU rate with the
3 following features:

- 4 • A peak to off-peak ratio of at least 3 to 1 for the all-in rate.
- 5 • A shorter peak period of 5 hours.
- 6 • A lower monthly customer charge of no more than about \$16.50 or, in the alternative,
7 a charge consistent with the Rate R customer charge of \$13.81.
- 8 • Seasonal adjustment of the TOU rates, with a summer period of May to September.
- 9 • A time-varying generation (i.e., energy supply service) component.

10 **Assessment of Eversource's Residential TOU Rate**

11 **Q. Please explain why Eversource proposed changes to its residential TOU rate.**

12 A. The Settlement Agreement in Docket No. DE 19-057, approved by Order No., 26,433, stated
13 the following in Section 14.6:

14 *Within six months of the Commission's approval of this Settlement Agreement, the*
15 *Company shall propose amendments to its tariff to revise its optional time-of-day rate for*
16 *residential customers. Such proposal shall include, but not be limited to, a two-period*
17 *rate structure consisting of peak and off-peak periods, with a peak period lasting no more*
18 *than eight hours.*

19 **Q. Please summarize the changes that Eversource made to their residential TOU rate.**

20 A. Eversource's proposed residential TOU rate includes the following:

- 21 • A seven-hour peak period (noon-7 pm) on non-holiday weekdays, and an off-peak
22 period for all other hours.
- 23 • TOU rates for the transmission and distribution rate components only.

- 1 • A customer charge of \$32.08 per month
- 2 • A ratio of peak to off-peak TOU-only rates of 2.6 to 1 and a ratio of 1.5 to 1 for the
- 3 total all-in rates including non-TOU rate components.

4 **Q. Does Eversource’s proposal meet the requirements of the approved Settlement**
5 **Agreement?**

6 A. Consistent with the approved Settlement Agreement, Eversource submitted its proposal on
7 June 15, 2021, which was six months after the approval of the Settlement Agreement. The
8 proposal modifies the current residential TOU tariff by reducing the peak period to seven
9 hours - no more than eight hours, as required by the settlement terms. The Settlement
10 Agreement did not specify any other changes required to be made, and no other changes are
11 proposed by Eversource.

12 **Q. Do the approved settlement terms allow Eversource to make other changes to the**
13 **optional residential TOU rate?**

14 A. Yes, and we recommend that the rate include other changes as described below.

15 **Q. Has the DOE provided an assessment of Eversource’s proposed whole house residential**
16 **TOU rate in any other docket.**

17 A. Yes. Please refer to Attachment ERN-2, for an excerpt of testimony provided by Dr. Sanem
18 Sergici on behalf of the DOE in Docket No. DE 20-170. Dr. Sergici reviewed Eversource’s
19 proposed separately-metered residential electric vehicle TOU rate and also Eversource’s
20 residential whole house TOU rate, which is the subject of this docket.

21 **Q. Please summarize DOE’s assessment of Eversource’s proposed whole house residential**
22 **TOU rate.**

1 A. We agree that Eversource’s proposed residential TOU rate is an improvement over the
2 existing TOU rate, but it could be enhanced further, as Dr. Sergici notes, to align the rate
3 better with marginal price signals and make it more attractive for customers. As Dr. Sergici
4 explained, the following enhancements would improve the whole house TOU rate:

- 5 • Peak to Off-Peak Ratio - Based on research¹ conducted by Dr. Sergici’s consulting
6 firm, The Brattle Group, a peak to off-peak ratio of at least 3 to 1 for the all-in rate
7 would provide a greater incentive for customers to shift electricity usage from the
8 peak period to the off-peak period.
- 9 • Peak Period Duration – The proposed rate does provide for a shorter peak period than
10 the current rate (11 hours), but a shorter peak period of 5 hours would be better and
11 allow customers to more easily shift load for a shorter duration. See Attachment
12 ERN-3 explaining how Eversource determined a 5-hour period in their proposed
13 electric vehicle TOU rate.
- 14 • Customer Charge – As Dr. Sergici explained, the proposed customer charge includes
15 marginal customer costs (such as meter and service drops and customer expenses) as
16 well as marginal local distribution facilities costs (including transformers and primary
17 and secondary conductors). A monthly customer charge reflecting the marginal
18 customer costs only (at about \$16.50) is more similar to the residential non-TOU
19 customer charge rate of \$13.81. See Attachment ERN-4 for explanation of the
20 \$16.50/month charge. The marginal local distribution facilities costs could be
21 incorporated into the peak TOU rate, which would provide a stronger price signal and

¹ Ahmad Faruqui, Ryan Hledik, Sanem Sergici. “A Survey of Residential Time-Of-Use (TOU) Rates”, November 12, 2019. https://www.brattle.com/wp-content/uploads/2021/05/17904_a_survey_of_residential_time-of-use_tou_rates.pdf

1 incentive to shift customer usage to the off-peak period, and would also help alleviate
2 future needs for distribution system capacity expansion by reducing system peak
3 demand. Alternatively, the customer charge could match the Rate R customer charge
4 rate (based on an approved settlement agreement) in the interests of consistency for
5 residential customers with other relevant costs collected through the volumetric peak
6 period rate.

- 7 • Seasonally-Adjusted TOU Rates – A seasonally-adjusted TOU rate would also
8 improve price signals as summer peak periods are the primary driver for distribution
9 system capacity costs. Based on Dr. Sergici’s analysis, the period from May to
10 September seems to have similar load shapes and therefore, should serve as the
11 summer period for that purpose.
- 12 • Time-Varying Generation Component – The TOU rate should also include a time-
13 varying generation (i.e., energy supply service) component. Originally, Eversource
14 had indicated that billing system upgrades necessary to implement a three-component
15 time-varying rate would be prohibitively expensive. However, see Attachment ERN-
16 5, where Eversource estimates that the billing system upgrades to implement a three-
17 component, two-period TOU rate could be done more cost-effectively for a total cost
18 of approximately \$600,000.

19 **Q. Do you have any additional comments regarding the proposed rate?**

20 A. Yes. Since the approval of the DE 19-057 Settlement Agreement, Eversource has proposed a
21 separately-metered residential electric vehicle charging TOU rate with three time periods in
22 Docket No. DE 20-170. See Attachment ERN-6 for a summary of Eversource's proposed
23 three-period, three-component electric vehicle TOU rate. Eversource has indicated that the

1 billing system upgrades would be too excessive to implement such a rate.² However, if
2 Eversource were able to cost-effectively handle the billing for a three-period residential TOU
3 rate, through either a billing system upgrade or manual billing, then we would recommend
4 that the whole house residential TOU rate include three distinct periods, instead of just two.
5 Moreover, if the separately-metered three-period electric vehicle charging TOU rate is
6 approved in Docket No. DE 20-170, then a similar rate could be – and should be –
7 implemented for the whole house TOU rate.

8 **Q. Should this new whole house TOU rate replace the current Rate R-OTOD?**

9 A. Yes. The new whole house residential TOU rate should replace the current Rate R-OTOD.

10 Offering more than one whole house TOU rate would be too confusing for customers. Plus,
11 the purpose of this docket is to update the rate to better align with cost causation principles of
12 rate design and to provide an incentive for customers to reduce their demand during a
13 shortened peak period. The new rate should become effective 30 days after approval, if
14 possible, or no later than six months after approval if additional time is needed to modify
15 customer billing systems.

16 **Q. Did Eversource propose a plan for outreach and education regarding the proposed**
17 **revised residential TOU rate?**

18 A. No, it did not, but we believe that Eversource should provide additional outreach and
19 education regarding this revised TOU rate option, possibly through social media and targeted
20 emails. Eversource should assist customers in evaluating how this rate option could reduce
21 their bills, and how customers can shift load away from peak periods, thereby benefiting not

² See Moore, Rice, Davis Joint Rebuttal Testimony, Docket No. DE 20-170, p. 4, lines 10-14,
https://www.puc.nh.gov/Regulatory/Docketbk/2020/20-170/TESTIMONY/20-170_2021-12-10_EVERSOURCE_REBUTTAL-TESTIMONY-MOORE-RICE-DAVIS.PDF

1 only participating customers but all of Eversource's customers. Eversource should also reach
2 out to existing residential TOU rate customers through targeted emails, and possibly also
3 phone calls, to ensure that those customers are aware of the proposed changes and how their
4 bills might be impacted. The current customers should be given the option to switch to the
5 new TOU rate or to the non-TOU rate, regardless of how long they have been on the TOU
6 rate. Customers need to understand how the revised residential TOU rates would affect their
7 total bills before committing to switching to the new rate design. In addition, customers need
8 to be encouraged to shift their load during peak periods and be provided with suggestions on
9 how to achieve lower bills under the revised rate.

10 **Q. Can net metering customers opt-in to this rate?**

11 A. Pursuant to Puc 903.02 (w) and RSA 362-A:9, VIII, small customer-generators are billed on
12 a rate that is not time-based, unless the utility has petitioned for such a rate or the
13 Commission has established such a rate. We encourage Eversource and the Commission to
14 consider allowing small customer-generator net metering customers to opt-in to this
15 residential TOU rate alternative.

16 **Recommendations**

17 **Q. Please provide your recommendations regarding Eversource's proposed revised**
18 **residential TOU rate design.**

19 A. We recommend that Eversource adopt a revised residential TOU rate, but with the following
20 features:

- 21 • A peak to off-peak ratio of at least 3 to 1 for the all-in rate.
- 22 • A shorter peak period of 5 hours.

- 1 • A lower monthly customer charge of no more than about \$16.50 or, in the alternative,
2 a charge consistent with the Rate R customer charge rate of \$13.81.
- 3 • Seasonal adjustment of the TOU rates, with a summer period of May to September.
- 4 • A time-varying generation (i.e., energy supply service) component.

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

6 Yes, it does.

1 Attachment ERN-1

2 Education and Professional Background

3 Elizabeth R. Nixon

4
5 My name is Elizabeth R. Nixon. I am employed as the Electric Director in the
6 Regulatory Support Division at the New Hampshire Department of Energy (DOE). My business
7 address is 21 S. Fruit St., Suite 10, Concord, NH 03301.

8 I earned a B.S. in Mathematics from the University of Vermont in 1985. I worked for
9 ICF, a consulting firm, where we estimated, modeled, and analyzed the energy, environmental
10 and economic impacts of various emission reduction strategies at electric utilities. At ICF and
11 AER*X, Inc., I assisted companies in implementing market-based emissions trading programs. I
12 provided comments on various air quality programs affecting the electric utilities and other
13 industries in the Northeast and other states. I also worked for the Center for Clean Air Policy
14 where we coordinated a dialogue of states and electric utilities to discuss energy efficiency and
15 other emission control strategies to reduce acid rain and greenhouse gases at electric utilities.

16 At the New Hampshire Department of Environmental Services, I wrote the air quality
17 permits for Eversource's electric generating facilities as well as other electric generating
18 facilities and manufacturing facilities in NH. I testified before the NH Air Resources Council
19 regarding the determination of the baseline mercury emissions for Eversource's coal-fired
20 electric generating facilities.

21 I joined the New Hampshire Public Utilities Commission, which is now DOE, in August
22 2012. I started in the Sustainable Energy Division where I managed renewable energy incentive
23 programs, determined compliance with the renewable portfolio standard (RPS) program, and

1 conducted analysis of and provided testimony and presentations on the RPS program and rebate
2 programs. In August 2016, I joined the Electric Division. I completed electric utility rate
3 training at New Mexico State University's Center for Public Utilities. As of July 1, 2021, I was
4 a Utility Analyst in the Regulatory Support Division at DOE. In January 2022, I became the
5 Electric Director in the Regulatory Support Division at DOE.

6 I have testified in the energy efficiency program dockets (DE 17-136 and DE 20-092),
7 Liberty Utility's battery storage pilot docket (DE 17-189), and Unitil Energy System's
8 distribution rate case (DE 21-030). In addition, I have provided Staff recommendations in the
9 grid modernization docket (IR 15-296) and electric vehicle rate design docket (IR 20-004).

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

Docket No. DE 20-170

IN THE MATTER OF: Electric Distribution Utilities

Electric Vehicle Time of Use Rates

**DIRECT TESTIMONY
OF
SANEM I. SERGICI**

October 13, 2021

1 IV. Assessment of Eversource Residential EV TOU Rates
2 and High Demand Draw Alternative

3 **Q16. Please describe your understanding of how Eversource developed their residential**
4 **EV TOU rates.**

5 A16: Eversource proposed a residential EV TOU rate, “Rate R-EV” that is separately
6 metered but connected to the same service as the primary residence. The proposed rate
7 is revenue neutral to the residential rate “Rate R” and was developed assuming an
8 average residential customer load profile.

9 The rate has three TOU periods: peak, midpeak, and offpeak. A five-hour peak period
10 commences at 2 p.m. and ends at 7 p.m. for all weekdays except holidays; a midpeak
11 begins at 7 a.m. and ends at 11 p.m. each day, except for peak period hours; and all
12 other hours are offpeak. The three periods are established based on the timing and the
13 duration of marginal costs within each service component (generation, transmission,
14 and distribution).

15 Time periods are non-seasonal and defined based on annual averages of marginal cost,
16 despite the Commission’s guidance to establish seasonality. The proposed rate follows
17 the Commission’s other guidance in that it establishes a maximum five-hour peak
18 period and attains an annual average of 3.07:1 peak/offpeak ratio before the other flat
19 charges are included and 2.7:1 peak/offpeak ratio after the other charges are accounted
20 for (see Table 1).

21 **TABLE 1: PROPOSED RESIDENTIAL EV TOU RATE (\$ PER KWH)**

	Generation (\$/kWh)	Transmission (\$/kWh)	Distribution (\$/kWh)	Other Charges (\$/kWh)	Total (\$/kWh)
Peak	\$0.103	\$0.087	\$0.064	\$0.016	\$0.271
Midpeak	\$0.062	\$0.021	\$0.060	\$0.016	\$0.159
Offpeak	\$0.050	\$0.012	\$0.021	\$0.016	\$0.099
Peak :Offpeak					
Ratio	2.7 :1				

22 Note: Other charges include SCRC, SBC, and other volumetric charges. Customer
23 charge is \$16.50 per month.
24

1 For each service component, TOU rates are determined by adjusting the revenue target
2 for the marginal cost differences between the time periods. Marginal costs are allocated
3 on an hourly basis over the course of the year, using a proprietary model determining
4 each hour's expected probability of being the annual peak for each service component.
5 These hourly marginal costs are then assigned to TOU periods by averaging them by
6 period. Charges for each service component are obtained as the following:

- 7 • **Distribution:** Hourly marginal distribution costs are obtained from the 2019/20
8 marginal cost of service (MCOS) study, which yielded monthly marginal costs due to
9 customers, local distribution facilities, and distribution substation costs. These costs
10 are then annualized and adjusted for 2021 dollars. The allocation of the annualized
11 distribution cost to hours is based on each hour's expected probability of being the
12 annual peak at the distribution substation level, using hourly load from 2015 through
13 2018.
- 14 • **Transmission:** The Company's ISO-NE monthly Regional Networks Service (RNS)
15 rate (\$/kW-year) is allocated to each hour, based on the probability that each hour
16 will be that month's peak hour in the transmission system.
- 17 • **Generation:** Hourly marginal costs are obtained based on hourly ISO-NE locational
18 marginal prices (LMPs), forward capacity market (FCM) capacity prices (based on
19 probability of peak analysis to allocate yearly price to hours), marginal losses,
20 Renewable Portfolio Standard (RPS) costs, energy and RPS reconciliation factors,
21 and working capital expenses.

22 **Q17. Please describe how Eversource calculated the customer charge for the residential**
23 **EV TOU rates.**

24 A17: The customer charge for the residential EV TOU rates is \$16.5 per month. This is
25 reduced compared to the customer charge of \$32.08 per month of the current
26 residential time of day rate (R-OTOD), because local facilities cost is removed from
27 the customer charge and built into the TOU volumetric prices in the peak and midpeak
28 periods. If a customer charges an EV during offpeak hours, they would not be charged

1 for the local facilities costs. This is intended to signal the need for increased local
2 capacity during midpeak or peak periods.

3 **Q18. Did Eversource propose a plan for exploring EVSE embedded metering**
4 **capabilities that could mitigate the second meter costs necessary to implement**
5 **separately metered EV TOU rates?**

6 A18: No, not at this time. I understand that the Commission has expressed an interest for
7 utilities to further explore EVSE embedded metering capabilities that could potentially
8 increase the adoption of EV TOU rates by mitigating the additional meter costs.⁹ I
9 encourage the Company to design a pilot/demonstration program to understand the
10 technical feasibility of this option.

11 **Q19. What is your assessment of Eversource's proposed EV TOU rate?**

12 A19: I found that the design of the Eversource EV TOU rate is generally consistent with the
13 well-established marginal cost-based rate design principles. Number of periods, length
14 of the peak and super-offpeak periods are designed in a way to incentivize efficient
15 charging behavior consistent with the system marginal cost signals. These price signals
16 can be further improved if the rates are differentiated by season reflecting seasonal
17 considerations in the allocation of generation, transmission, and distribution costs. EV
18 customers charging their EVs under this rate structure will observe cost savings if they
19 are able to shift their charging load to the offpeak period. This in turn will help reduce
20 current and future system costs.

21 Unfortunately, it is my understanding that Eversource does not recommend
22 implementation of this rate at this time.

23 **Q20. Why is the Company unable to implement this rate at this time?**

24 A20: While the Company submitted the proposed rate described above in Docket No. DE
25 20-170, the Company does not recommend near-term implementation of a separately
26 metered EV TOU rate due to substantial modification needed to enterprise-wide

⁹ Order 26, 394, page 13.

1 MDMS and CIS systems. Eversource projects \$9 million of costs would be associated
 2 with the upgrade necessary to offer either a three period rate or a time of use generation
 3 component. Eversource projects that, after the future conversion of the enterprise
 4 systems, cost associated with offering either a three period rate or time-varying
 5 generation would still be approximately \$5 million.¹⁰ Eversource is also planning to
 6 update all of its customer systems over the next three-four years as a result of a recent
 7 order in Massachusetts directing them to develop a timeline for AMI deployment.¹¹

8 **Q21. Please describe the Company's existing customer billing system and time of use**
 9 **rate offerings.**

10 A21: As a basis for its recommendation against its time-varying *generation* rate, Eversource
 11 states that it “utilizes one legacy customer billing system across three states” and cites
 12 \$9 million of costs relating to “regression testing to ensure no impact to other state
 13 jurisdictions with this change.”¹² However, the Company's Connecticut affiliate
 14 already offers a two period time-varying rate that includes a time-varying generation
 15 component for residential customers,¹³ small general service customers,¹⁴ a small
 16 general service customer alternative rate that appears to be the Company's Connecticut
 17 electric vehicle demand charge alternative,¹⁵ intermediate general service customers,¹⁶
 18 and large general service customers.¹⁷ Given that the Company utilizes one legacy
 19 customer billing system across three states, and given that the Company's Connecticut

¹⁰ Attachment SIS-2 (Eversource Response to Request Energy 2-019). *See* also Attachment SIS-3 (Eversource Response to Request Energy 3-008, Attachment 1).

¹¹ Joint Testimony of Dennis E. Moore, Brian J. Rice and Michael R. Goldman, Docket No. DE 20-170, page 11.

¹² Attachment SIS-4 (Eversource Response to Request Energy 3-001).

¹³ Connecticut Light and Power. Rate 7. https://www.eversource.com/content/docs/default-source/rates-tariffs/ct-electric/rate-7-ct.pdf?sfvrsn=8224c062_24

¹⁴ Connecticut Light and Power. Rate 27. https://www.eversource.com/content/docs/default-source/rates-tariffs/ct-electric/rate-27-ct.pdf?sfvrsn=7d24c062_26

¹⁵ Connecticut Light and Power. Rate 27a. https://www.eversource.com/content/docs/default-source/rates-tariffs/ct-electric/rate-27a-ct.pdf?sfvrsn=b600a362_4

¹⁶ Connecticut Light and Power. Rate 37. https://www.eversource.com/content/docs/default-source/rates-tariffs/ct-electric/rate-37-ct.pdf?sfvrsn=a24c062_24

¹⁷ Connecticut Light and Power. Rate 58. https://www.eversource.com/content/docs/default-source/rates-tariffs/ct-electric/rate-58-ct.pdf?sfvrsn=e441c762_48

1 affiliate clearly has the ability to offer a two period time varying rate with a time
2 varying generation component, it seems that the Eversource should be able to offer a
3 two period time-varying generation component to New Hampshire ratepayers. I have
4 structured the remainder of my testimony under this assumption.

5 **Q22. What is your recommendation if the Company is unable to offer a time-varying**
6 **generation component?**

7 A22: If for some reason the Company is unable to provide such an offering, I recommend
8 that the Commission direct the Company to conduct an RFP process to seek third
9 parties who can provide three period time of use rates, inclusive of a time varying
10 generation component, as a service to the Company on a pilot basis for separately
11 metered electric vehicle customers. The RFP could be structured so that the metering
12 and billing occurs independent of the Company's legacy systems and could utilize the
13 metering technology embedded in most chargers. This approach has the potential to
14 avoid costly upgrades to legacy systems. The RFP process should be stakeholder
15 inclusive, and the Department of Energy and other interested stakeholders should have
16 an opportunity to weigh in on responding proposals before the Commission.

17 **Q23. Does Eversource offer any other residential TOU rate that might be available to**
18 **EV customers?**

19 A23: Yes. Eversource has proposed a new residential time-of-use rate in DE 21-119.¹⁸ This
20 rate has two periods including a seven hour peak period (noon -7 p.m.) during non-
21 holiday weekdays and offpeak hours, covering all other hours. Eversource's proposed
22 rate is reproduced in Table 2 below.

¹⁸ Eversource's testimony also set forth a load management proposal as an alternative to time of use rates. I do not address this proposal in my testimony because load management proposals were not a noticed issue in this proceeding and are currently a matter pending Commission decision in DE 20-092. See, DE 20-092, December 21, 2020 Transcript at page 139, lines 8-15. Available at:

https://www.puc.nh.gov/Regulatory/Docketbk/2020/20-092/TRANSCRIPTS-OFFICIAL%20EXHIBITS-CLERKS%20REPORT/20-092_2021-01-06_TRANSCRIPT_12-21-20.PDF

TABLE 2: PROPOSED R-OTOD-2 RATE (\$/KWH)

	Generation (\$/kWh)	Transmission (\$/kWh)	Distribution (\$/kWh)	Other Charges (\$/kWh)	Total (\$/kWh)
Peak	\$0.066	\$0.074	\$0.028	\$0.020	\$0.188
Offpeak	\$0.066	\$0.017	\$0.023	\$0.020	\$0.126
Peak :Offpeak					
Ratio	1.5 :1				

Note: Other charges include SCRC and SBC. Customer charge is \$32.08 per month.

In addition to the variable charges reported in Table 2, this rate also involves a customer charge of \$32.08 per month, which is more than twice Eversource’s residential customer charge of \$13.81.

Q24. What is your assessment of Eversource’s two period residential TOU rate?

A24: While this newly proposed residential TOU rate is an improvement over Eversource’s existing TOU rate, which includes an 11-hour peak period, there is still room for improvement to make this rate better aligned with marginal cost signals and more attractive for the customers. More specifically:

- The peak to offpeak (P/OP) ratio purely based on the time-varying components of the rate (distribution and transmission) is 2.6. However, when other variable charges in the rate design are included to create an “all-in variable” charge for both peak and offpeak rates, the peak to offpeak ratio becomes 1.5. Prior Brattle research has shown that the P/OP ratios below 2 will not sufficiently incentivize customers to change their consumption patterns and a ratio of at least 3 is ideal to incentivize customers and provide reasonable bill saving opportunities.¹⁹

¹⁹ Nova Scotia Power Time-Varying Pricing Project Submission to Nova Scotia Utility and Review Board, June 30, 2020.
https://brattlefiles.blob.core.windows.net/files/19479_nova_scotia_utility_and_review_board_-_time-varying_pricing_project_submission.pdf

- 1 • A peak period of seven consecutive hours is typically considered long from a
2 customer experience point of view. Given that this rate will apply to the whole house
3 load, customers may find it difficult to shift their usage for the seven hour period,
4 impacting their willingness to sign up for this rate. Reducing peak period duration to
5 five hours might be ideal, which will also help with creating stronger peak period
6 price signals as the peak period costs will now be allocated to five hours, instead of
7 seven.²⁰
- 8 • Eversource’s 2019 Marginal Cost study estimated monthly marginal customer costs
9 (including meter and service drop, customer expenses) by customer class, monthly
10 marginal local distribution facilities costs (transformers, primary and secondary
11 conductors) by customer class, and distribution substation costs. It is our
12 understanding that Eversource’s proposed customer charge of \$32.08 includes both
13 the marginal customer costs and marginal local distribution facilities costs. It may be
14 reasonable to exclude the marginal local distribution facilities cost from the proposed
15 customer charge and recover these additional costs in the distribution peak chargers.
16 This would serve two purposes: 1) it will provide the customers with a stronger price
17 signal during the peak period and incentivize them to reduce their peak demand; and
18 2) by lowering peak demand during the peak period, it will help lower future capacity
19 needs. In fact, this approach was used by Eversource in their design of the three
20 period EV TOU rate, where the costs of the local transformer were recovered in the
21 volumetric rate component outside of the offpeak period in order to provide price
22 signals that encourage offpeak (overnight) EV charging and discourage charging at
23 times that may cause the need for additional local facilities’ capacity and thereby
24 cause incremental costs to be incurred at the individual customer level (*e.g.*, increased
25 transformer/service requirements).²¹

²⁰ Ahmad Faruqui, Ryan Hledik, Sanem Sergici. “A Survey of Residential Time-Of-Use (TOU) Rates”, November 12, 2019. https://www.brattle.com/wp-content/uploads/2021/05/17904_a_survey_of_residential_time-of-use_tou_rates.pdf

²¹ Testimony of Edward A. Davis, Docket No. DE 20-170, page 5-6.

- 1 • Eversource’s proposed two-period residential TOU rate does not include seasonal
2 variation. Seasonal variation may improve the quality of the price signals, and more
3 accurately attribute costs that are driven by seasonal demand elements (*i.e.*,
4 generation capacity costs are driven by summer peak periods). I analyzed
5 Eversource’s class load profile and found that May through September are more
6 closely clustered together and have similar load shapes compared to the other months.
7 Therefore, May through September should be defined as the summer months for rate
8 design purposes.
- 9 • Eversource’s proposed two-period residential TOU rate does not include a time-
10 varying generation component.

11 **Q25. How can Eversource improve its two period residential TOU rate to provide**
12 **stronger price signals to customers for load shifting and at the same time improve**
13 **its attractiveness?**

14 A25: Given that Eversource will not be able to implement its proposed three-period EV TOU
15 rate at this time, and that the two-period TOU rate will be the transitional rate to
16 incentivize efficient charging of the EVs, I recommend that Eversource revises its two-
17 period residential TOU rate to account for the areas of concern listed above. A
18 seasonally differentiated two-period rate with a shorter peak window that reflects the
19 marginal facility costs and a lower customer charge is more likely to be attractive to
20 customers both with and without EVs.

21 **Q26. Does Eversource have a marketing plan in place to market EV TOU rates to its**
22 **customers with electric vehicles?**

23 A26: No, I am not aware of any formal plans and marketing budget allocated to effectively
24 marketing EV TOU rates to customers. Increased adoption of EV TOU rates will
25 benefit customers in the form of bill savings if they can shift their charging to offpeak
26 periods. It will also benefit Eversource and other customers as the demand during
27 system peak hours are moderated (due to customers shifting their charging load to
28 offpeak periods) and avoid costly expansions. I strongly encourage the Company to

1 develop a targeted marketing plan with the objective of increasing the uptake of the
2 TOU rates among the EV customer population.

3 **Q27. Please describe your understanding of how Eversource developed their high draw**
4 **demand charge alternative rate design.**

5 A27: In Docket No. DE 21-078, Eversource proposes a rate for public EV charging stations
6 as an alternative to its Rate GV service, which it offers to customers with no more than
7 1,000 kW of peak demand.²² The proposed rate is a demand-charge alternative rate
8 design; however, it is not TOU-based as instructed by the Commission. The rate is
9 designed for charging station utilization of up to 10%, where utilization below 10%
10 results in lower monthly charges than would occur under Rate GV.

11 Rate components for the EV demand-charge alternative rate design include a customer
12 charge and a volumetric charge. The customer charge is maintained at \$211.21/month,
13 as it is for the Rate GV class. The volumetric charge portion recovers two types of costs:

- 14 • Demand charges related to distribution, transmission, and stranded cost recovery.
15 Revenue requirements for demand charges associated with distribution, transmission,
16 and stranded cost recovery charges (SCRC) are each divided by the class's annual
17 kWh consumption to obtain an average class rate on a \$/kWh basis. These values are
18 then multiplied by a "rate parity adjustment" which is obtained by dividing the
19 current class average load factor (55%) by station utilization, which is assumed to be
20 10%.
- 21 • Volumetric charges related to energy supply, system benefits charge, and remaining
22 stranded cost recovery charges. These costs are recovered from Rate-GV customers

²² Eversource's demand charge alternative was docketed as part of DE 21-078. In the October 16, 2020 Order of Notice in DE 20-170, the Commission delineated the noticed issues in this proceeding as including "issues related to whether the EV TOU rate proposals to be developed and filed are consistent with the rate design standards delineated in Order No. 26,394." Order No. 26,394 directed the utilities to file high demand draw proposals in this proceeding that may consider demand charge alternatives. Liberty and Unifil have both filed their demand charge alternatives in this proceeding. For ease of review, and as a matter of administrative efficiency, I have chosen to present my assessment of all three demand charge alternative proposals in this proceeding.

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-170

Date Request Received: 08/13/2021

Request No. DOE 3-010

Request from: Department of Energy

Date of Response: 08/27/2021

Page 1 of 1

Witness: Edward A. Davis, Michael R. Goldman

Request:

Please refer to the testimony of Ed Davis.

- a. Please provide Attachment EAD-1 and its supporting work papers in electronic format.
- b. Please provide Attachment EAD-3 and its supporting work papers in electronic format.
- c. Page 3, line 2: please describe the analyses that led to the determination of the 5 hour peak window.
- d. Page 4, line 7: please confirm that the EV TOU rate was designed to be revenue neutral to the residential class revenues. If not, please explain how you ensured revenue neutrality.
- e. Page 4, line 16. Please explain how marginal cost estimates were used to “inform” rates by time period.
- f. Page 6, lines 5-6. Please summarize how the remaining costs of distribution service has been delineated on a TOU basis.
- g. Please describe how the Company intends to apply the EV TOU rate for customers receiving service from competitive suppliers.
- h. Please describe Company’s current plan for recovering the costs of the additional meter.
- i. Page 10, line 5. Please report the metering equipment cost per customer that leads to an additional monthly customer charge of \$16.5 /per month. Please calculate the payback for the investment if customer chose to finance the EV metering costs
- j. Page 11, line 1-2. Refer to “Even without the additional fixed costs associated with EV TOU implementation, savings are small.” Please report the level of savings that are deemed small.
- k. Has the Company surveyed its NH residential EV customers to understand their preferences for: 1) EV TOU rates 2) Whole-house EV TOU rates and 3) Active Managed Charging? If so, please provide a summary of the results/responses.
- l. Has the Company surveyed its MA and/or CT residential EV customers to understand their preferences for: 1) EV TOU rates 2) Whole-house EV TOU rates and 3) Active Managed Charging? If so, please provide a summary of the results/responses.

Response:

a. and b. Please see DOE 3-010 Attachment EAD-1 and and DOE 3-010 Attachment EAD-3, included in this response.

c. A five-hour peak was provided based on an analysis of marginal cost results, following the guidelines provided in the Commission's in IR-20-004 (Order 26,394 dated August 18, 2020). The Company reviewed the results of the marginal costs by hour developed by our marginal cost consultant. These revealed that the 5-hour weekday period from 2 pm to 7pm includes the highest marginal costs of total

procurement and delivery service (sum of generation, transmission, and distribution marginal cost) year-round. Therefore EV charging in those hours will make the Company incur in significant incremental procuring and delivery cost., conducted a regression analysis of the total hourly cost against the five-peak hour period which confirmed that this period had the strongest alignment with marginal cost compared to other options..

d. Yes, the proposed EV TOU rate was designed to be revenue neutral for each component of service (please see the rate design section of DOE 3-010 Attachment EAD-1, attached).

e. For each component of service the marginal costs for each time period and each component of service were relied upon to set marginal cost differentials between time periods and calculate proposed TOU rates. Use of these differentials and reconciling rates with total revenue requirements for the designated time periods provides cost reflective, efficient rates.

f. The marginal distribution cost differentials, as per the distribution marginal cost study conducted as part of the Company's distribution rate case, were used to set the TOU price differential for this component of service, while reconciling to meet the total distribution revenue target, except for marginal customer costs, which are recovered in the fixed charge. The difference between Part A and Part B (see file DOE 3-010 Attachment EAD-1) is that the reconciliation process in Part B, shifts fixed costs away from the off peak period to leave local marginal facilities costs outside of the overnight hours, and into the mid peak and peak charges. Notably, the off-peak price in that design is set at 2.065 cents instead of the 4.917 cents/kWh in Part A, and this allows recovery of the local facilities cost outside of the off peak period.

g. Currently, the Company is able to bill competitive supply on behalf of a supplier is on a flat, monthly per kWh basis. The Company does not know how a competitive supplier who directly bills customers would apply an EV TOU rate, but is not aware of such suppliers who are able to do so. As discussed in prefiled testimony the Company would need to make changes to its billing system and processes in order to bill competitive supply to EV customers on a TOU basis.

h. The recovery of the cost of the additional meter required to implement the proposed EV TOU rate would be reflected and included as much as possible in the monthly customer charge.

i. The Company has utilized the marginal cost of a residential TOU meter from its distribution marginal cost study, and includes that as part of its rate design in this proposal and not as a customer finance option.

j. The characterization of savings is a relative measure. As illustrated in Attachment EAD-3 of Davis testimony, savings are calculated by the difference between flat volumetric rates under Residential Rate R and the off-peak rate under the proposed Residential EV TOU rate. For a BEV consuming 325 kWh, Line 21 of Attachment EAD-3 shows a savings of \$.31, which is approximately 0.6% less than the total Rate R charge for the comparative rates that would be instead charged at the proposed off-peak rate (0.6% = savings of \$.32 compared with $\$47.95 = 325 \text{ kWh} \times \$0.14754/\text{kWh}$).

k. The Company has not performed such a survey. The Company has applied the Commissions guidelines in developing its proposal and is relying on a phased approach by which the proposed managed charging program would serve near term needs and goals while new rate designs for both whole house and separate EV charging can be developed, implemented and tested. A revised and

Docket No. DE 21-119
Direct Testimony of Elizabeth R. Nixon
Attachment ERN-3
Page 3 of 3

updated residential whole house TOU rate has been proposed and is being considered in Docket No. DE 21-119, in compliance with the Company's recent distribution rate case settlement agreement, which once approved and implemented can provide the basis for evaluating EV charging as part of whole house load. Surveys of customer preferences from these early applications can be performed to inform continuation or changes that might be made to designs that are implemented, and to inform potential future offerings. As stated in prefiled testimony, "it is important to recognize the contextual and practical considerations and challenges in implementing [the EV TOU rate], This includes consideration of the relative benefits possible for a customer charging under an EV TOU rate compared with charging at rates for overall service to their residence, whether Rate R or Rate R-OTOD, plus the possible benefits of adding managed charging incentives to these overall service rates."

I. The Company has not performed such a survey. Recognizing the Company has experience with managed charging and two-period whole house rates in its CT jurisdiction, the deployment of residential EV charging is still in its early stages. Surveys of customer preferences that may be conducted as new rates are being developed in both jurisdictions may help inform preferences for the Company's NH EV customers.

Docket No. DE 21-119
Direct Testimony of Elizabeth R. Nixon
Attachment ERN-4

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-170

Date Request Received: 08/13/2021

Date of Response: 08/27/2021

Request No. CLF-CENH 2-006

Page 1 of 1

Request from: Conservation Law Foundation & Clean Energy New Hampshire

Witness: Edward A. Davis

Request:

At the August 9, 2021 technical session, Eversource stated that it has documents detailing what is included in the proposed \$16.50 customer charge for Eversource's TOU rate. Please provide these documents and any other documents discussing the fixed cost components of the \$16.50 customer charge. Please describe how these fixed costs were determined and what fixed costs are included in the customer charge.

Response:

The \$16.50 customer charge is an estimated charge based on the monthly marginal customer-related cost, developed as part of the distribution marginal cost of service study prepared by the Company's consultant, Amparo Nieto (see Davis Testimony, page 4, note 2). This charge consists of one twelfth of the annualized costs of meter, service drop, and customer account and informational and service expenses, as detailed in CLF-CENH 2-006 Attachment 1.

Docket No. DE 21-119
Direct Testimony of Elizabeth R. Nixon
Attachment ERN-4

Docket No. DE 20-170
Data Request CLF-CENH 2-006
Dated 08/13/2021
Attachment 1, Page 1 of 1

	R-OTOD Residential OTOD
	<u>\$/Customer</u>
Installed Meter Cost	\$152.35
With General Plant Loading	\$162.96
Annual ECC related to Capital Investment	9.37%
Subtotal Annualized Meter Costs	\$15.27
Meter O&M Expenses with A&G Loading	\$27.33
Installed Service Cost	\$1,019.15
With General Plant Loading x 1.0697	\$1,090.18
Annual ECC related to Capital Investment	9.09%
Annualized Service Drop Costs	99.12
<u>Customer services</u>	
Customer Accounts Expenses	\$50.07
Customer Service & Informational Expenses	\$0.53
With A&G Loading x 1.0487	
(Non-plant Related)	<u>\$53.06</u>
Expenses	\$194.77
<u>Working Capital Rev. Req.</u>	
Material, Supplies and Prepayments	\$2.26
Cash Working Capital	<u>\$1.01</u>
Total Annual Customer Marginal Costs	\$198.05
Per Month	\$ 16.50

Public Service Company of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-170

Date Request Received: January 28, 2022 Data Date of Response: February 04, 2022
Request No. RR 1-004 Page 1 of 1

Request from: Public Utilities Commission

Request:

Exhibit 33

Eversource cost to implement Rate 7 2-period, R-OTOD 2-period, and NH default service time variant 2-period.

Response:

The Company has prepared a high level, order of magnitude estimate of the work required and cost to develop service plan options within its C2 billing system to implement a new, 2-period residential time-of-use rate option (based on monthly peak and off-peak period kWh consumption), for 3 components of service: distribution, transmission and company-supplied energy service. The Company estimates that work to implement either option would involve design, build, test and deployment under its C2 system and take approximately 6 months. Estimate cost for either option is approximately \$600,000. It is assumed that a scalar time-of-use meter would be utilized, and competitive supply service would not be time-differentiated.

1 based on the marginal cost of providing service for each of these components. The
2 Company has aligned the cost of service and rate design of each component to achieve a
3 five-hour peak period from 2 pm - 7pm, weekdays (excluding holidays), a daily mid-peak
4 period from 7 am through 11 pm (excluding peak periods), and a daily off-peak from 11
5 pm each day through 7 am the following day. A summary of this rate structure and
6 associated pricing is provided in Table 1, below.

Table 1
3-Period Residential EV TOU Rate Summary

	<u>Off Peak</u>	<u>Mid-Peak</u>	<u>Peak</u>
Distribution	\$ 0.02065	\$ 0.05988	\$ 0.06402
Transmission	0.01199	0.02070	0.08746
Energy Service	<u>0.05026</u>	<u>0.06229</u>	<u>0.10294</u>
Total	\$ 0.08290	\$ 0.14287	\$ 0.25442

Time of Use Periods

Peak: Weekdays: 2 pm -7 pm (excl. holidays)

Mid-Peak: Weekdays: 7am-2pm and 7pm-11pm ;Weekends: 7am - 11 pm

Off-Peak: Daily, 11 pm - 7 am

Notes:

Distribution pricing reflects adjustment to implement a \$16.50/month customer charge with local facilities costs included in peak & mid-peak

7

8 **Q. Please discuss the overall characteristics of this rate design.**

9 A. In the Order, the Commission provided guidance and directives emphasizing the use of
10 marginal costs as much as possible. The Order further requires separate TOU rates for
11 the distribution, transmission and generation components of service, and provides several
12 key measures that should be reflected in the overall design.

13 As an initial matter, in developing the proposed rate design the Company reviewed the