

UNITIL ENERGY SYSTEMS, INC.

DIRECT TESTIMONY OF
ROBERT S. FURINO

EXHIBIT RSF-1

New Hampshire Public Utilities Commission

Docket No. DE 19-____

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1

2 **I. INTRODUCTION AND SUMMARY**

3 **Q. Please state your name and business address.**

4 A. My name is Robert S. Furino. My business address is 6 Liberty Lane West, Hampton,
5 New Hampshire.

6 **Q. What is your position and what are your responsibilities?**

7 A. I am the Director, Energy Contracts of Unitil Service Corp. (“Unitil Service”) which
8 provides centralized utility management services to Unitil Corporation’s subsidiary
9 companies. I am also a Vice President of Unitil Corporation’s utility operating
10 subsidiaries Fitchburg Gas and Electric Light Company (“FG&E”), Northern Utilities,
11 Inc. (“Northern”), and Unitil Energy Systems, Inc. (“UES” or “the Company”). My
12 responsibilities are primarily in the areas of wholesale supply procurement and
13 management of retail supplier programs.

14 **Q. Please describe your educational background and professional experience in the
15 energy and utility industries.**

16 A. I received a Bachelor of Arts degree in Economics from the University of Maine in 1991
17 and completed coursework toward a Master of Arts degree also at the University of
18 Maine. I joined Unitil Service in March 1994 as an Associated DSM Analyst in the
19 Regulatory Services Department and have worked in the Regulatory, Product
20 Development, Finance and Energy Contracts departments, while assuming positions of
21 increasing responsibility. I have been in my current position since 2008.

1 **Q. Have you previously testified before the New Hampshire Public Utilities**
2 **Commission or other regulatory agencies?**

3 A. Yes. Dating back to the implementation of UES's electric industry restructuring in 2003
4 and continuing until 2011, I regularly submitted testimony to obtain New Hampshire
5 Public Utilities Commission ("NHPUC") approval of electric transition/ default service
6 procurements and resulting rates. I also testified in support of Northern's 2015 Integrated
7 Resource Plan (DG 15-033). In Massachusetts, I provided testimony before the
8 Department of Public Utilities in support of long-term renewable contracts and natural
9 gas matters. In Maine, I have testified before the Maine Public Utilities Commission in
10 support of natural gas contract approval filings, retail choice rules, Integrated Resource
11 Plans and other gas supply matters.

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

13 A. The purpose of my testimony is to describe the Company's proposed Time of Use Study
14 ("TOU Study"), to request Commission approval to proceed with the TOU Study, and to
15 request Commission approval of the Company's cost recovery proposal for the TOU
16 Study.

17 The Company developed its proposed TOU Study to be responsive to the Commission's
18 Order Accepting Settlement Provisions, Resolving Settlement Issues, and Adopting a
19 New Alternative Net Metering Tariff, Order No. 26,029, DE 16-576, dated June 23,
20 2017. ("June 2017 Net Metering Order")

1 **Q. Please describe the direction provided by the Commission in its June 2017 Net**
2 **Metering Order.**

3 A. In its June 2017 Net Metering Order, the Commission found that “a well-designed TOU
4 pilot program should generate detailed data regarding customer behavior and utility cost
5 and rate impacts related to time-varying rates, and that data can inform future net
6 metering and general rate designs, including a potential transition to TOU rate
7 alternatives for all customer rate classes.”¹ Accordingly, the Commission directed UES
8 to “develop and propose a TOU pilot program, open to both residential and small
9 commercial customers and to both distributed generation (“DG”) and non-DG customers,
10 with a statistically significant number of participants in each category to ensure the data
11 and results generated by the program are statistically valid.”² The Commission stated
12 that “it is not necessary that the TOU pilot program designs all be identical, nor that they
13 cover only a single on-peak and off-peak differential;” but that it is necessary that “the
14 program designs reflect appropriate customer class load profiles and actual system
15 conditions.”³

16 **Q. What was the Company’s approach in developing this proposal?**

17 A. In developing this TOU Study proposal, the Company focused on several key objectives.
18 The Company pursued an approach that: (a) best allows UES and stakeholders to assess

¹ NH PUC Order No. 26,029, DE 16-576 (June 23, 2017), p. 62.

²Id.

³Id.

1 (and implement, if appropriate) TOU rates⁴; (b) fills in key gaps regarding data and
2 analysis needed to develop and assess TOU and the future structure of net metering; (c)
3 builds on and leverages UES's deployment of advanced metering systems and data
4 sharing efforts; (d) offers some form of TOU pricing to all customers; (e) represents a
5 targeted and cost-effective use of investment dollars; and (f) integrates stakeholder input
6 and facilitates learning for all parties.⁵ The TOU Study will also (g) assess the
7 Company's technical ability to efficiently implement metering and billing of the selected
8 TOU rate design(s), and to provide Competitive Electric Power Suppliers the opportunity
9 to offer power supply to customers under TOU rates. Critically, the TOU Study will also
10 (h) explore ways to explain and promote TOU rates, while assessing customer acceptance
11 of TOU rates and interest among vendors in providing products and services that will
12 help customers take advantage of TOU rates.

13 Throughout my testimony I demonstrate how the TOU Study meets these objectives.

14 First, however, I will discuss two key points that are foundational to these objectives.

15 **Q. Please explain the Company's TOU Study objectives.**

16 A. First, in considering program design, UES focused on avoiding merely replicating prior
17 industry TOU studies. To date, electric utilities have conducted many pilots evaluating
18 alternative electric rate structures, including TOU rates: a report prepared by The Brattle
19 Group documented 337 experimental and non-experimental pricing treatments from over

⁴ This assessment would include an evaluation of the effectiveness of cost-based TOU rate structures in helping to mitigate regionally-allocated wholesale market and transmission costs to UES customers.

⁵ See, Unil Energy Systems, Inc., "Time of Use Pilot" Presentation, July 19, 2018.

1 60 pilots.⁶ As part of UES’s affiliate FG&E’s Massachusetts Grid Modernization Plan,
2 FG&E prepared and filed a report entitled “Time-Varying Rates: Industry Experience,”
3 which provided a summary of results from several studies and deployments.⁷

4 Moreover, UES previously conducted a TOU pilot from June to August of 2011 that
5 included both UES’s and FG&E’s service territories in New Hampshire and
6 Massachusetts, from which the Company collected significant data and prepared impact
7 analyses for TOU rate designs and enabling technologies, as documented in evaluation
8 reports on residential and commercial customers.⁸

9 The primary focus now was to design this TOU Study proposal in a manner that would
10 advance the TOU rate-related goals of the Company, Commission, and stakeholders at a
11 reasonable cost. The proposed study detailed below will enable assessment of broad-
12 based deployment of TOU rates for residential and small commercial and industrial
13 customers without incurring the expense and analytical limitations of marketing a pilot
14 program and implementing actual billing under various TOU regimes.

⁶ “Arcturus 2.0: A meta-analysis of time-varying rates for electricity,” Ahmad Faruqui, Sanem Sergici, Cody Warner, The Brattle Group, The Electricity Journal Volume 30, Issue 10, December 2017, Pages 64-72.

⁷ Docket DPU 15-121, Appendix G, “Time-Varying Rates: Industry Experience” Concentric Energy Advisors., (May 2015)

⁸ See, Docket DE 09-137, Evaluation Reports of the Residential and Commercial Time-of-Use Pilot Programs. February 27, 2012. Also filed in Massachusetts, DPU 09-31, “Smart Grid Pilot Program Evaluation Report” January 30, 2012.

1 Second, the Company is seeking a collaborative process that will engage and educate
2 stakeholders and provide information and an opportunity for parties to address the
3 important issues related to this proposal.⁹

4 **Q. Please provide a summary of UES' proposed TOU Study.**

5 A. The TOU Study will involve two primary components: a table top quantitative analysis of
6 TOU rate structures (“Table Top Quantitative Analysis”) and an assessment of key TOU
7 rate-related questions and topics (“Assessment of Key Topics and Questions”) that is
8 primarily qualitative. The TOU Study will involve significant stakeholder participation,
9 including quarterly updates and meetings, and will culminate in a final report (“Final
10 Report”) that summarizes the results of analysis, highlights key conclusions and
11 recommendations, and proposes next steps regarding a TOU rollout, if appropriate.

12 **Q. Will the TOU Study apply the same rate design options to customer usage and net**
13 **customer distributed generation?**

14 A. Yes. The TOU Study will apply the same rate design for customer usage (consumption
15 of power supply) and net customer distributed generation (delivery of excess production
16 of power supply from the customer to the distribution system). Thus, the term “TOU
17 rates” incorporates time of generation and applies equally whether a customer is buying
18 power or selling power. Under this proposal, UES does not plan to separately meter
19 customer-owned generation so as to separately price the customer’s offset usage and their

⁹ The Commission’s directives regarding the TOU pilot program were based in large part on proposals by stakeholders. NH PUC Order No. 26,029, DE 16-576 (June 23, 2017), p. 62.

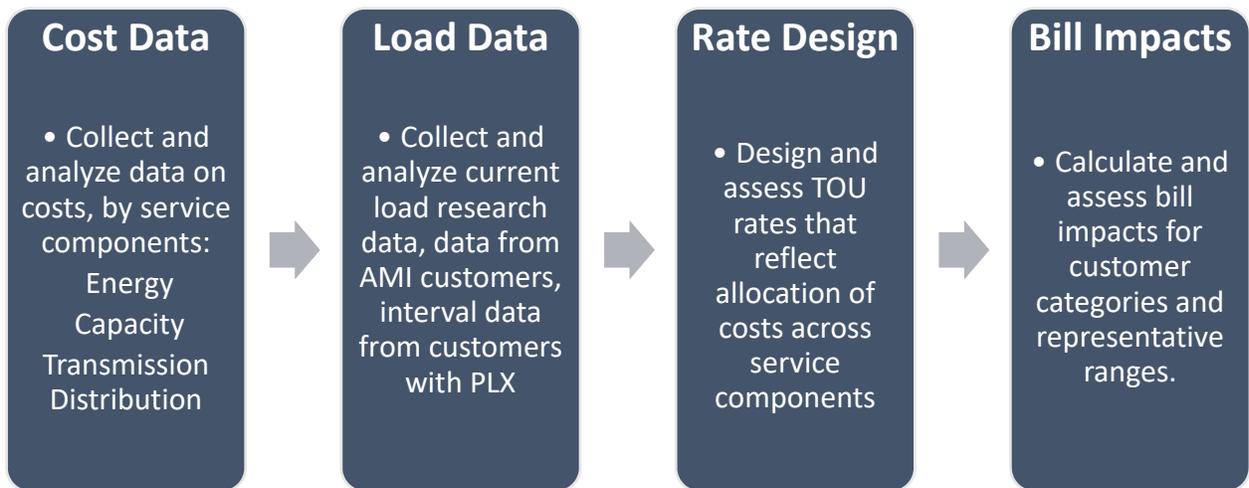
1 owned generation that offsets that usage. As such, UES’s proposal focuses on reads at
2 the customer’s meter, both in terms of pricing and data management.

3 **II. UES’ TOU STUDY DETAILS**

4 **Q. Please describe the Table Top Quantitative Analysis.**

5 A. Figure 1, below summarizes the process UES proposes for the Table Top Quantitative
6 Analysis.

7 Figure 1: Summary of Table Top Quantitative Analysis Process



8
9

10 Cost Data: UES will collect data on costs and customer usage; the cost data will be
11 functionalized, i.e., separated by service components (energy, capacity, transmission, and
12 distribution).¹⁰ Cost data related to energy, capacity, and regional network transmission

¹⁰ Distribution costs will be further functionalized into categories (customer, capacity and supply).

1 will reflect information from ISO New England (“ISO-NE”), local transmission service
2 charges will reflect data from Eversource, and distribution information will be obtained
3 from UES records and studies.

4 Load Data: To inform the cost allocation and rate design decisions, UES will use samples of
5 metered customer data obtained from existing meters and systems. UES’ existing
6 metering includes advanced metering infrastructure (“AMI”) meters capable of recording
7 multiple TOU blocks daily, as well as some metering capable of recording interval data.

8 Rate Designs: The Company will: (a) select the rate designs to study; (b) select customer
9 samples and compile billing determinants from load research and other interval capable
10 meters as well as from AMI meters; and (c) design the rates. Candidate rate designs will
11 be assessed in terms of how well they reflect the actual underlying costs of all service
12 components taken together, how easily they can be explained to customers and how
13 meaningful they are likely to be in terms of driving customer and vendor decisions.

14 Bill Impacts: As the final step in the Table Top quantitative analysis, the Company will
15 calculate bill impacts for various types of customers, such as: low-income customers;
16 customers in various ranges of annual usage; customers in various ranges of maximum
17 demand or load factor; and customers with and without distributed generation.¹¹

18 Throughout this process, we will work with the stakeholder group to consider and
19 execute appropriate modifications and enhancements to the TOU Study.

¹¹ For the TOU Study, the Company will limit the analysis of customers with distributed generation to rooftop solar panels.

1 In their comments on the Company’s July 19, 2018 presentation, the Office of the
2 Consumer Advocate encouraged the Company to review guidance provided by the Staff
3 of the New York Department of Public Service in the rate reform sub-docket of the
4 Reforming the Energy Vision (“REV”) proceeding.¹² The Company’s process has been
5 informed by that Mass Market Rate Reform and Bill Impact Analysis process, which
6 included the New York Value of Distributed Energy Resources (“VDER”) Rate Design
7 Working Group.

8 I provide additional detail on each of the Table Top Quantitative Analysis elements in
9 Section III, below.

10 **Q. How will the results of the Table Top Quantitative Analysis support conclusions,**
11 **guidance, and recommendations for development and possible implementation of**
12 **cost-based TOU rates?**

13 A. The Table Top Quantitative Analysis will model selected TOU rate alternatives which
14 will allow the Company to vary assumptions to test bill impact, develop qualitative
15 conclusions, guidance, and recommendations in the Assessment of Key Topics and
16 Questions. In terms of process, as the Company is collecting the data and conducting the
17 Table Top Quantitative Analysis, we will also be collecting, assessing, and documenting
18 information on several key topics and questions to inform the Company, stakeholders,
19 and Staff throughout the process. This will be documented in the Final Report, as
20 described in more detail below. For the purposes of this filing, UES has developed the

¹² Docket No. DE 16-576, Office of the Consumer Advocate, “Comments in Response to Initial TOU Proposals” August 10, 2018 (“OCA Comments”), p. 10.

1 following initial list of questions and topics.¹³ UES will, however, seek the input of the
2 Staff and other stakeholder regarding additions or modifications.

3 Initial List of Key Topics and Questions for Qualitative Assessment

- 4 1. How do the Table Top Quantitative Analysis results inform the need for customer
5 engagement, education, and outreach? What are industry best practices in this regard
6 that may be appropriate for a roll-out of TOU rates? What are reasonable estimates of
7 customer acceptance rates to opt-in or opt-out policy?
- 8 2. How are ISO-NE costs for energy, capacity, and regional network transmission
9 service assessed to UES customers? How do the costs of Eversource's local network
10 service compare to ISO-NE's assessment of the costs of regional network service?
- 11 3. Given the structure of regional system costs for energy, generation capacity and
12 transmission service, how can retail prices be designed to send meaningful cost-based
13 price signals that will enable customers to make well-informed decisions on usage
14 behaviors and investments in distributed energy resources or applications?¹⁴
- 15 4. What effect would cost-based TOU rate structures have on efforts to mitigate
16 regionally allocated wholesale market and transmission costs to UES customers?
- 17 5. Can TOU distribution rate structures provide appropriate price signals to customers
18 concerning usage of and investment in distributed energy resources or energy
19 applications that will improve the utilization of the Company's distribution system?
- 20 6. How would different categories of customers be impacted by TOU rate structures?
21 What is the range of impacts for these customer groups?
- 22 7. What changes would be needed to UES' data and communications systems, supplier
23 service agreements and tariffs to allow Competitive Electric Power Suppliers (CEPS)
24 to provide power supply to UES customers under TOU rates? Are CEPSs interested
25 in providing TOU rates to customers?

¹³ The Company does not anticipate that this study will be able to provide final definitive answers to each and every one of these lines of inquiry. It does intend, however, to use these questions as guides for the conduct of the study and the framework for reaching conclusions and recommended next steps.

¹⁴ The term "applications" is used to refer to behaviors, actions, or investments that may not be universally viewed as "resources" but may nonetheless be impacted by and inform decisions regarding TOU rates. For example, "applications" could include demand response, peak load management, energy conservation, energy storage, heat pumps, and electric vehicles.

1 8. To what extent will UES' current metering, communications, billing, wholesale load
2 allocation and other infrastructure support TOU rate structures? What modifications
3 or additional investment would be needed? What are the estimated costs of these
4 modifications or investments, and how might these costs affect the future rollout of
5 TOU rates?

6 9. What impact might the Table Top Quantitative Analysis have on policy decisions
7 regarding net metering in New Hampshire going forward, if any?

8 **Q. Please describe the proposed role of stakeholders in the TOU Study.**

9 A. A foundational element of the proposed study is to work with Staff and other
10 stakeholders. As a primary means to achieve this, the Company proposes to hold
11 quarterly stakeholder sessions, at which the Company will provide any updates and seek
12 stakeholder input on relevant topics.

13 Consistent with this approach, the Company has not proposed finalized recommendations
14 or details on several elements of the TOU Study. The Company submits that it is
15 providing sufficient detail to give the Commission, Staff, and stakeholders an ample basis
16 to assess the proposal, and for the Commission to approve it. The Company will develop
17 the study details working collaboratively with Commission Staff and stakeholders.

18 **Q. Please describe prior stakeholder feedback on the TOU Study proposal.**

19 A. Following the Company's presentation at the technical conference on July 19, 2018, Staff
20 and stakeholders provided oral input, and stakeholders were invited to provide additional
21 written comments. The Company appreciates the thoughtful input from stakeholders,
22 including in the written comments which were filed on August 9-10, 2018, which have

1 informed the development of this proposal.^{15,16} Generally, stakeholders were supportive
 2 and offered a variety of suggestions, including more information on estimated costs and
 3 bill impacts, suggestions on relative pricing for different TOU periods, maximum
 4 duration of an on-peak period, special consideration for low income customers and
 5 consideration of including TOU distribution rates. Section III, below, addresses certain
 6 aspects of these comments that have particularly influenced our proposal.

7 **Q. What are key deliverables in the Company’s proposed TOU Study, and what is the**
 8 **preliminary timeline for the TOU Study?**

9 A. Table 1, below, provides a preliminary schedule of key milestones, deliverables, and
 10 activities.

11 **Table 1: Illustrative Schedule of Milestones/ Deliverables/ Activities**

Milestone/ Deliverable/ Activity	Illustrative Date(s)
Commission Approval of TOU Study Proposal	April 30, 2019
Quarterly Check-in Meetings	June, September and December of 2019, February 2020, with additional sessions as needed, until the Final Report is filed
Collect and analyze costs and load data	May 2019 - September 2019
Determine TOU blocks and rate designs to analyze	June 2019 - October 2019
Calculate revenue neutral rates for selected rate designs	August 2019 - December 2019
Analyze bill impacts	September 2019 - January 2020

¹⁵ For written comments, see, Docket No. DE 16-576, “Joint Stakeholder Comments on Time-Of-Use Rates,” and Office of the Consumer Advocate, “Comments in Response to Initial TOU Proposals” August 10, 2018.

¹⁶ Specifically, and as stated on page 8, the Company’s rate design and bill impact table top analysis is based on the Mass Market Rate Reform and Bill Impact Analysis process that was followed by the New York VDER Rate Design Working Group; the Mass Market Rate Reform and Bill Impact Analysis process is a component of the New York Public Service Commission’s Reforming the Energy Vision proceeding

Assess billing capability and estimate costs	July 2019 - December 2019
Summary presentation to stakeholders	March, 2020
Final Report	April, 2020

1

2 As this table shows, the Company proposes to have quarterly check-in meetings starting
3 in June of 2019, with additional sessions to be scheduled as needed, until the Final Report
4 is filed. The Company proposes to provide a presentation to stakeholders summarizing
5 the study results and recommendations in March 2020, followed by a filing of the Final
6 Report in April 2020.

7

8 **III. DESCRIPTION OF TABLE TOP QUANTITATIVE ANALYSIS**

9 **Q. Please describe the Table Top Quantitative Analysis.**

10 A. As described above, the core analytic component of the TOU Study is the Table Top
11 Quantitative Analysis. This analysis will utilize cost data for various service components
12 (*i.e.*, energy, capacity, transmission and distribution) and leverage UES’s existing
13 metering capability to explore and assess TOU rate designs for possible broad
14 applicability to all or most customers.

15 **Q. What are the Company’s criteria and considerations in designing the TOU rates for**
16 **the Table Top Quantitative Analysis?**

17 A. One of the Company’s core criteria in designing the TOU rate structures is to allocate the
18 costs of each of the service components - energy, generation capacity, transmission,

1 distribution – to rate components, time periods and seasons according to appropriate
2 principles of cost incurrence. Energy and capacity are traded in external markets for
3 power supply; either UES or a Competitive Electric Power Supplier can provide power
4 supply to customers. Transmission and wholesale distribution services are external
5 services that UES acquires for all customers. For the TOU Study, energy, generation
6 capacity, and transmission costs to be allocated to retail customers for these services will
7 be developed based on actual experience, including the level and timing of billing
8 determinants. As such, the TOU rates will be designed to align retail prices with these
9 costs, thus sending more accurate price signals that better reflect cost causation. Certain
10 other costs that are not time sensitive, such as Renewable Portfolio Standards compliance
11 costs and System Benefits Charges, will be held constant across TOU blocks.¹⁷ Lastly,
12 distribution costs are internal to UES. Distribution costs may be allocated to classes
13 based on distribution cost studies, if required data from UES records and studies is
14 available. Although any proposal to adopt time of use distribution rates would require a
15 base rate case, consistent with stakeholder feedback, UES proposes to assess TOU rates
16 for distribution service as part of the TOU Study.¹⁸

17 Another criteria when designing rates for the Table Top Quantitative Analysis is to seek
18 opportunities for cost savings at both the customer and Company level. The bill impact
19 analyses will inform the range of charges at the customer level under traditional flat rates
20 and various TOU rate structures. An important assessment will be the degree of

¹⁷ This approach is consistent with Joint Stakeholders Comments, p. 2.

¹⁸ As required in the settlement agreement in DE 15-137, the Company anticipates that it will propose a revenue decoupling mechanism, or similar alternative mechanism, in its next base rate case filing.

1 variability in customer bills that might result from changes in the structure of retail
2 rates.¹⁹ UES also intends to assess the feasibility of estimating reductions in external
3 costs and distribution system savings that might result from implementing one of the
4 TOU Study rate designs for large groups of customers.²⁰

5 UES plans to consider other factors, in addition to cost drivers, in rate design.
6 Ultimately, the Company is looking to identify TOU rates that improve customer
7 decision-making, are simple, understandable, equitable, and that result in rates and
8 revenues that are relatively stable. UES will not pursue TOU rate designs that are
9 excessively complex or that would require frequent revisions to the timing and duration
10 of the TOU periods.

11 Another important point regarding this analysis is that while some aspects of cost
12 causation and allocation are clear, such as locational marginal prices (“LMPs”) for
13 energy supply, other elements are not so “cut and dried.” For example, allocating
14 transmission and distribution costs to TOU periods requires careful study and
15 consideration, especially if the TOU rate design includes primarily volumetric (“per
16 kWh”) charges rather than demand (“per kW”) charges.

17 In addition, the Company will seek input from stakeholders, as well as guidance from
18 future Commission decisions, such as those pending in the Grid Modernization
19 proceeding, in designing TOU rates. As one example of this, the Company agrees with

¹⁹ The degree of variability in customer bills is an important consideration in opt-in / opt-out policy.

²⁰ The Company notes that the original plans of the NYSPSC rate design and bill impact project were modified to eliminate a planned estimation of customer responsiveness to the TOU rate designs that were evaluated.

1 the recommendation of the Joint Stakeholders that one peak period should be used across
 2 all cost components, even if individual components have different peaks.²¹

3 **Q. What types of meters are deployed throughout UES’ system and what are their**
 4 **capabilities to measure usage by TOU blocks?**

5 A. UES has existing AMI metering in place for all customers who do not have interval
 6 capable metering. AMI utilizes powerline carrier technology to receive daily reads for
 7 each meter. With appropriate programming, UES’ existing AMI meters are capable of
 8 holding and sending up to four (4) data elements daily, which can be usage during
 9 discrete time periods, thus providing TOU block usage data for TOU rates.

10 **Q. Does UES also have existing meters deployed that provide interval reads for small**
 11 **customers?**

12 A. Yes, UES has load research or newer powerline carrier meters deployed to a significant
 13 number of residential and small commercial customers. Table 2 below summarizes the
 14 Company’s interval meters currently in service for small customers.

15 **Table 2: UES Residential and Small Commercial Interval Meters in Service**

Metering Program	Meters Installed	Meter type	Meter Capabilities / Relevant Details
Load Research	400	Itron MV90	15 minute interval data that is collected monthly by drive-by meter readers
Replacement of AMI meters with newer PLX-capable meters ²²	2,900	New PLX-capable meters	Interval data via powerline carrier. Replacement meters are being installed as part of normal meter replacement cycle

²¹ Joint Stakeholders Comments, p. 3.

²² Newer PLX-capable meters are being installed in areas where older T2 powerline carrier data collectors have been replaced with newer PLX collectors.

1

2 Using the Itron MV90 and new PLX-capable meters, UES will be able to compile hourly
3 data to assess interval pricing options, such as LMP based energy pricing, as well as any
4 number of TOU block pricing options. Although UES has approximately 3,300 interval
5 meters deployed to small customers, very few are deployed to net metered customers. As
6 part of the proposed study, UES will explore rotating meters to obtain interval data from
7 net metered customers.

8 **Q. What TOU rate structure does UES propose to create and evaluate?**

9 A. UES proposes to primarily focus on designing and evaluating TOU “block pricing.” In
10 particular, UES proposes (a) to create and evaluate TOU block pricing rate structures that
11 reflect cost causation principles and equitable cost allocation, and (b) to assess rate
12 impacts and practicality of the TOU alternatives for different subsets of customers, such
13 as low-income customers; customers in various ranges of annual usage; customers in
14 various ranges of maximum demand or load factor, and customers with and without
15 distributed generation.^{23, 24} In assessing impacts, UES will compare revenues recovered
16 from each customer group under the TOU rate alternatives being studied to revenues
17 recovered under current flat pricing.

18 **Q. Why is UES focused primarily on TOU block rates?**

²³ These groupings will not necessarily be mutually exclusive.

²⁴ For the TOU Study, the Company will limit the analysis of customers with distributed generation to customers with rooftop solar panels

1 A. TOU block pricing is feasible for UES to deploy broadly because all or nearly all
2 customers have existing AMI meters capable of recording and transmitting usage data for
3 multiple time-based periods each day. By comparison, interval meters are relatively rare
4 in terms of current deployment. Moreover, increasing from a single (all hours) usage
5 period to, for example, three (3) TOU block periods would be a more manageable
6 challenge than trying to process hourly reads and prices. In addition, TOU block pricing
7 can likely be structured to send meaningful signals regarding costs of all aspects of
8 service (energy, capacity, transmission and distribution) whereas hourly pricing may only
9 provide meaningful price signals for energy costs. Finally, TOU block pricing may
10 provide opportunities to offer predictable pricing over long periods of time for certain
11 block periods, such as during the overnight, while rates for other block periods vary in
12 response to seasonal or market conditions.

13 **Q. Does UES plan to explore rate structures that involve interval or hourly pricing?**

14 A. Yes, in addition to TOU block pricing, UES plans to study hourly pricing for energy,
15 particularly for distributed generation and/or storage customers, as well as demand
16 pricing for capacity, transmission and distribution as an alternative to TOU block pricing
17 for those service components.

18 **Q. Please discuss the potential elements of these rate designs.**

19 A. A primary purpose of the Table Top Quantitative Analysis is to explore approaches to use
20 cost and customer load data to develop rate design elements that are consistent with cost
21 causation principles. Accordingly, UES believes that it is premature to determine

1 specific rate design elements, such as peak to off-peak price ratios or the preferred
2 duration and timing of TOU periods at this time. These rate design elements should be
3 based on analyses of costs and system or customer group load profiles, rather than, for
4 example, a party's initial expectations or goals for proposed rates.²⁵

5 **Q. Please describe the bill impact analysis portion of the TOU Study.**

6 A. UES proposes to assess the bill impacts of the rate structures studied for the various
7 customer types listed earlier. UES will assess rate design structures based on estimated
8 impacts at the customer group level but will also review individual customers within
9 samples to assess ranges of impact, if suitable data is available, in order to assess
10 consistency of results and identify possible vulnerable customer types.

11 **Q. Will this study assess the impacts of proposed rate designs on different applications?**

12 A. The Company plans to analyze the potential impacts of proposed rate designs for DG
13 customers with roof top solar / photovoltaic ("PV") equipment and for customers with no
14 DG applications.²⁶ UES believes that properly designed cost-based rates are appropriate
15 for all customers, regardless of the customers' applications, including whether a customer
16 is consuming power supply or delivering excess power supply to the distribution system.
17 The purpose of the TOU study is to assess TOU rates that would ultimately be applicable

²⁵ For example, the reasonableness of the Joint Stakeholders' suggestions that peak to off-peak price ratios should be at least 3:1 to elicit response from customers and that the peak period should be no more than three hours long, can be better assessed after cost and load data has been analyzed. See, Joint Stakeholders Comments, p. 2.

²⁶ The term "DG applications" refers to a number of developing uses or DG production equipment, including, for example, smart thermostats, heat pumps, storage, solar PV, or electric vehicle charging equipment.

1 to all or most customers, who would then have the opportunity to adopt different
2 technology types and/ or otherwise respond to the rates.

3 **Q. Please describe how you will develop the individual customer load profiles for cost**
4 **allocation and bill impact analyses.**

5 A. To capture the impact of proposed TOU rate designs on the Company’s non-DG
6 customers, UES plans to develop historical customer load profiles (hourly annual usage:
7 8,760 values) that represent a range of typical customers within defined groups.²⁷ Load
8 research and other available interval data will be used to define these “typical” non-DG
9 customer load profiles, which can then be reported into TOU blocks. The Company
10 plans to develop PV [DG] customer profiles by subtracting annual solar production
11 profiles from the appropriate typical non-DG customer load profile. The annual solar
12 production profiles will be developed from National Renewable Energy Laboratory
13 (“NREL”) profiles that reflect conditions in the Company’s service territory; the solar
14 production profiles will be scaled to the size of the corresponding non-DG customer load
15 profile.²⁸

16 **IV. QUALITATIVE AND OPERATIONAL CONSIDERATIONS**

17 **Q. How will the TOU Study inform questions related to opt-in/ opt-out policy?**

18 A. Ultimately, any proposal to proceed with implementing TOU rates will include proposed
19 provisions for applicability, including proposed tariff language. Such provisions will be

²⁷ The “typical” customer load profiles will be developed by customer groupings, as described earlier, that reflect ranges of parameters that may have an effect on customer bill impact analyses, such as annual usage, percent of total usage in high load hours and load factor, as well as for low income customers.

²⁸ NREL PVWatts Calculator: <https://pvwatts.nrel.gov/>

1 based on study findings including whether a group of customers is identified as
2 vulnerable to significant bill impacts under the proposed TOU rates. A recommendation
3 on proposed opt-in/ out policy will include qualitative considerations.

4 **Q. What are some non-quantitative issues or questions UES proposes to explore in**
5 **assessing the viability of offering TOU rates?**

6 A. The degree to which TOU rates can send meaningful, actionable signals to customers that
7 provide an opportunity to control energy costs and meet environmental goals will be
8 important to assess in determining whether TOU rates are worthwhile. Would some
9 categories of customers be harmed by TOU rates and what protections (if any) are
10 appropriate? To what extent might cost-based TOU rate structures impact regionally
11 allocated wholesale market and transmission costs to UES customers? Are Competitive
12 Electric Power Suppliers interested in providing service under time-based rates, and if so
13 what system changes would be needed? What changes to UES' current metering, billing,
14 communications and wholesale load allocation would be needed to provide TOU rates
15 and what are the estimated costs of such changes? How would TOU rate design impact
16 policy on net metering?

17 **Q. What are some of the Company's initial considerations regarding customer**
18 **education and communication?**

19 A. The Company recognizes customer education and communication are critical to
20 the success of TOU rates. The TOU Study is meant primarily to assess the viability of
21 TOU rate designs, but rate design development must consider how the Company would

1 ultimately communicate a new rate structure to customers and explain how such rates
2 might create opportunities. The Company will explore communication approaches such
3 as, for example, bill messages, monthly newsletters, dedicated bill inserts, text messages,
4 public service announcements (“PSAs”), and media slots on UES’s website and social
5 media platforms. Innovations in bill presentment may be a valuable tool: an example of
6 this might include graphics to visually display usage by block period, or even “shadow
7 billing,” *i.e.*, showing on a customer’s bill what their bill would have been if they were on
8 TOU rates. Recognizing that customer education and communication are important, ease
9 of communication will be a consideration in design of rates required for the Table Top
10 Quantitative Analysis. These efforts will inform a future market validation and formal
11 communication plan, should a decision be made to pursue TOU rates.

12 **Q. Please describe issues related to vendor engagement and acceptance.**

13 A. The Company recognizes that the products and services offered by a broad variety of
14 vendors, including Competitive Electric Power Suppliers, have potential to enable
15 customers to respond to and benefit from new TOU rates. The Company welcomes
16 vendor participation throughout this proceeding.

17 **Q. Are there aspects of wholesale load reporting that should be reviewed in**
18 **anticipation of introducing TOU rates?**

19 A. UES proposes to explore the interplay between retail customer billing and wholesale load
20 reporting, including the feasibility and market value of modifying our wholesale load
21 estimation and reporting (LERS) process in order to utilize more customer specific data.

1 Currently, other than for rate class G-1 (UES' large general service) customers, who have
2 interval meters, all customers are metered monthly for billing purposes. For energy
3 market settlement purposes, hourly loads for these customers are estimated and reported
4 to ISO-NE using "standard" load profiles by customer class. The load profiles are scaled
5 up or down for customers who historically use more or less than the average, and then
6 adjustments are made to reconcile aggregate hourly system loads to hourly wholesale
7 power deliveries into UES's system. Reporting estimated hourly loads based on standard
8 load profiles appears to be appropriate when all customers are served by the same
9 supplier, since the loads of individual customers are aggregated for wholesale reporting
10 and settlement purposes. However, if consumption patterns of certain customers differ
11 (for example in response to TOU rates), and they are served by different suppliers, then
12 the loads settled through the ISO-NE energy market and the charges assessed to the
13 supplier would not reflect such customers' unique consumption behavior. Similarly, DG
14 customers may use very little power or even generate net excess power during peak hours
15 or when energy prices are high. Reporting loads estimated using standard profiles,
16 however, will not reflect how these customer's costs differ from other customers. The
17 triggering of future capacity obligations would be similarly distorted.

18 **Q. Will the TOU periods be consistent regarding the different cost components?**

19 A. Yes. While the Company recognizes that there could be some variance in the cost drivers
20 of different service components,²⁹ we agree with stakeholders who noted that it would be

²⁹ For example, based on load and cost data, the duration and timing of the "optimal" TOU periods for supply pricing and for transmission pricing may not be identical.

1 overly complex and confusing for customers to design rates with different time periods.³⁰

2 As such, the rate designs will have one set of TOU periods for all components of service.

3 **Q. Will the TOU Study involve new or existing metering and other infrastructure /**
4 **equipment?**

5 A. UES intends to leverage existing metering and associated systems to obtain the data for
6 the study. UES would program a sample of existing AMI meters, which nearly all
7 customers have, to collect kWh usage in specific TOU periods. This effort would serve
8 the dual purposes of collecting data for analysis and also developing experience
9 programming the meters and managing the data collection and processing that would be
10 required if TOU rates were deployed. As explained earlier, UES also has approximately
11 3,300 interval meters deployed among small customers. The historical data for these
12 meters can be obtained and may be useful for the study. Lastly, UES will explore
13 rotating meters with interval data capability to net metered customer premises.

14 **Q. Is the Company upgrading its powerline carrier meter reading infrastructure, and**
15 **how does this relate to the TOU Study?**

16 A. The Company is in the midst of deploying new PLX data collectors and associated
17 systems, as we migrate from our aging TS2 system. The Landis & Gyr PLX system was
18 designed to be a replacement for the TS2 technology and, as such, is backwards
19 compatible, meaning the PLX collectors and transmitters can communicate with existing
20 AMI meters. Meters being deployed to new customers and under the normal meter

³⁰ Joint Stakeholder Comments, p. 3.

1 replacement cycle are PLX-compatible meters that have interval data capability. As
2 mentioned earlier, the PLX meters that are installed already may provide additional data
3 options for this study.

4 **Q. What data and system infrastructure may be required to implement TOU rates, and**
5 **how will an assessment of such needs be part of the TOU Study?**

6 A. The Company will assess requirements for modification and possible upgrades to several
7 systems that may be needed to effectively implement TOU rates. The following systems
8 have been identified as likely requiring modifications and upgrades; during the TOU
9 Study, the Company may identify additional systems to be modified or upgraded:

- 10 • Meter data management system (“MDMS”) for the collection, processing and
11 storage of metered data;
- 12 • Customer information system (“CIS”) for billing and bill presentment;
- 13 • Load estimation and reporting service (“LERS”) for wholesale load estimation
14 and market reporting; and
- 15 • Electronic data interchange (“EDI”) systems and protocols for transactional
16 communication with retail suppliers.

17 In addition, an interval data processing tool, capable of holding hourly LMP energy price
18 data and calculating total kWh consumption and weighted average price for a defined
19 period may be needed if interval pricing is to be offered.

20 An objective of the TOU study is to assess the data and system infrastructure and process
21 requirements needed to implement TOU rates and to estimate what additional
22 investments in systems would be required to support widespread implementation of TOU
23 rates.

1 **Q. Please expand on how the TOU Study will help UES understand incremental system**
2 **infrastructure requirements in the provision of a TOU rate.**

3 A. I will provide brief discussion of how each of these systems and related processes may
4 need to be modified to support TOU rates.

5 For the MDMS, a key question that will be addressed in the study is how much additional
6 data will need to be collected, stored, and analyzed for billing. The MDMS is structured
7 to receive monthly, daily and hourly reads and process those reads. These reads typically
8 come from a single data register. Introducing TOU block reads involves multiple
9 registers, which would add complexity. Programming of AMI meters and validation of
10 results is an important exercise, both in terms of obtaining data for the purpose of
11 analysis and also to test processes and practices that would need to operate smoothly if
12 TOU rates were to be deployed. As mentioned above, in the event that interval pricing is
13 recommended, a subsystem would be needed to calculate kWh usage and average price
14 for the billing period so they could be imported into the CIS for billing.

15 The CIS system may need to be modified to accommodate multiple block periods of
16 usage and rate data and to calculate charges in each block. Modifications would also be
17 needed in order to present necessary information on a customer's bill, ideally in a manner
18 that is clear and understandable for customers.

19 The Company currently uses a LERS system for wholesale load reporting, which utilizes
20 standard rate class load profiles for non-interval customers. Investment would likely be

1 required if wholesale load reporting for market settlement purposes is to reflect TOU
2 data.

3 Finally, EDI systems are used to provide secure data transfer to and from retail suppliers
4 to facilitate customer acquisition, billing and remittance advice. Additional protocols
5 would be needed for retail suppliers to communicate rates for multiple TOU block
6 periods, and for the Company to communicate customer usage for multiple periods. This
7 effort would likely involve additional investment, modifications to data transfer protocols
8 that are coordinated on a regional basis, and vendor education and coordination.

9 **Q. Will the TOU Study include a data sharing component?**

10 A. Yes. UES intends to identify relevant data to be utilized for the Table Top Quantitative
11 Analysis, and to share that data with stakeholders, as appropriate. As part of this process,
12 UES anticipates working with stakeholders to test and improve as appropriate the data
13 sharing protocols currently being discussed with the OCA and Staff in compliance with
14 the settlement in UES' last rate case, DE 16-384.

15 **V. FINAL REPORT**

16 **Q. Please describe the goals and scope of the Final Report.**

17 A. The Final Report will include assessment of results of the Table Top Quantitative
18 Analysis as well as the Assessment of Key Topics and Questions. It will also include
19 recommendations regarding TOU rates in a future rollout, including model tariffs and
20 opt-in/opt-out policy, as applicable. The Final Report will also address infrastructure and

1 system requirements, and related costs. Under the proposed schedule, UES would issue
2 the report in late April of 2020.

3 **VI. COST AND COST RECOVERY**

4 **Q. Did the Commission provide guidance regarding the Company's approach to cost**
5 **recovery in Order 26,029?**

6 A. Yes. In Order 26,029 at 51, the Commission approved the following provision regarding
7 cost recovery, that: "(j) Utilities to be permitted to recover prudently-incurred costs of
8 required metering upgrades, study expenses, and pilot program implementation."³¹

9 **Q. What is the estimated cost for the TOU Study?**

10 A. The total estimated budget for external consulting costs associated with the proposed
11 TOU Study is up to \$500,000.³²

12 **Q. What is the Company's proposed cost recovery approach?**

13 A. The Company proposes to recover the cost of external consulting services for the TOU
14 Study through its external delivery charge, which is charged to all customers reconciled
15 on an annual basis. The Company projects that a typical residential customer who
16 consumes 650 kWh per month would pay an extra \$0.27 monthly, or \$3.28 annually, to
17 fund the TOU Study. Total actual cost would be reconciled within the EDC mechanism.
18 As explained earlier, the Final Report will include estimates of additional expenses that
19 would be needed if a recommendation is made to implement TOU rates.

³¹ DE 16-576, Order 26,029, p. 51.

³² This does not include the costs of any future market validation plan and formal communication plan that would be separately provided for the Commission to approve.

1 **VII. CONCLUSION**

2 **Q. Please summarize your testimony.**

3 A. As described throughout my testimony, the Company has developed the TOU Study
4 proposal to satisfy the directives from the Commission in Order 26,029, as well as
5 recommendations from stakeholders. The Company believes it is proposing an optimal
6 approach that would advance customer benefits and opportunities, while promoting
7 policy objectives and goals of the Commission, stakeholders, and the Company in a cost-
8 effective way.

9 Accordingly, the Company requests Commission approval of the TOU Study plan and
10 associated cost recovery proposal.

11 **Q. Does this complete your testimony?**

12 A. Yes, it does.