BEFORE THE

NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION

DOCKET DE 21-030

IN THE MATTER OF: Unitil Energy Systems, Inc.
Request for Change in Rates

DIRECT TESTIMONY

OF

Stephen R. Eckberg
Utility Analyst
New Hampshire Department of Energy

November 23, 2021

Q. Please state your full names.

A. Stephen R. Eckberg.

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

A. I am employed as a utility analyst with the New Hampshire Department of Energy in the Regulatory Support Division. My business address is 21 South Fruit Street, Suite 10, Concord, NH, 03301.

Q. Please summarize your relevant education and professional work experiences.

A. I was previously employed as a Utility Analyst with the New Hampshire Office of Consumer Advocate (OCA) from 2007 to 2014. In 2014, I joined the Sustainable Energy Division of the Public Utilities Commission. In 2019, I joined the Commission's Electric Division. In July, 2021, with the passage of HB2, the New Hampshire Legislature created the Department of Energy (DOE) and I became an employee of the Regulatory Support Division of DOE. I have a B.S. in Meteorology from the State University of New York at Oswego and an M.S. in Statistics from the University of Southern Maine. I have worked in a variety of energy related analytic and administrative roles for over 25 years. Attachment SRE-1 provides more complete details of my education and professional work experience.

Q. What is the purpose of your testimony?

A. The purpose of our testimony is to present DOE's position on the Depreciation Study and recommendations from that Study by Unitil's witness Mr. Ned Allis. I also provide DOE's recommendation regarding cash working capital as it relates to Unitil's transmission costs

and transmission-related operating costs. While these costs are not included in this rate case, the lead-lag study which provides the framework for calculating cash working capital on transmission costs, is part of this case. Recovery of cash working capital on transmission costs will be considered annually in a separate filing.

Depreciation

Q. Please briefly describe your background in utility depreciation matters.

A: I am familiar with depreciation matters, having reviewed depreciation studies in numerous utility rate case dockets in which I have participated. I have taken the Fundamentals of Depreciation training course offered by the Society of Depreciation Professionals and am working toward becoming a Certified Depreciation Professional (CDP). I have not previously filed testimony specifically addressing depreciation before this or any regulatory commission.

Q: Please provide a summary of your recommendations regarding depreciation in this case.

A: My recommendations to the Commission include:

1) Approve the use of depreciation accrual rates developed using the whole life (WL) technique to determine the accrual rates and annual depreciation amount, by plant account, rather than rates developed using the remaining life (RL) technique as submitted in the Depreciation Study performed by Company witness, Mr. Ned Allis.
2) Direct the Company to perform future Depreciation Studies using the whole life technique in conformance with past Commission practice.

3) Approve $12,854,711 as the unadjusted whole life depreciation annual accrual amount for the test year based on pro-forma end of test year plant account balances. This amount does not include adjustments related to recommended plant adjustments included in the testimony of Mr. Dudley. Those adjustments are included in the testimony of Ms. Mullinax.

4) Approve a five year amortization of the theoretical reserve imbalance of ($7,652,721) resulting in annual credit to ratepayers of ($1,530,544). As in item 3) above, this amount does not include adjustments related to recommended plant adjustments of Mr. Dudley. Those adjustments are included in the testimony of Ms. Mullinax.

Q: What is the significance of depreciation in rate of return utility regulation and for purposes of this proceeding?

A: Unitil, as with all public utilities, includes in its revenue requirement an amount that is, at least theoretically, equal to the decline in the value of the company's capital assets over a twelve month period. This is necessary because all capital assets decline in value over their period of usage. To account for this, the annual amount of depreciation is deducted in the calculation of the utility's rate base and that same amount becomes an addition to its operating cost. In this manner, the utility's shareholders receive both a return on their investment, and, via the depreciation charges, a return of their investment.

The accounting necessary to determine the depreciation amount is complicated. Utilities, including Unitil, constantly add new capital assets to their rate base, and accurate records must be kept about the additions, and related removals. In addition, operating conditions are not static, and existing assets may not depreciate exactly as they were expected to at the

time they were installed and included in rate base. For this reason, utilities such as Unitil, conduct, from time to time, a depreciation study usually completed by experienced consultants who are expert in the field of depreciation. A depreciation study is a statistical undertaking that takes into account the vintage of the utility's assets – the year when each asset was placed in service and the rate at which specific assets are being retired from service. Actuarial techniques are used to update determinations of how much useful life remains, on average, in the capital assets included in rate base. Depreciation experts use statistical techniques to fit survival curves to groups of assets and make calculations of how the forces of retirement are acting upon each asset group to derive an estimate of the service life remaining in each such group.

Q: Have you reviewed the depreciation study and recommendations that UES' witness, Mr. Allis, has presented?

A: Yes, I have.

Q: What did the depreciation study performed by Mr. Allis present?

A: Mr. Allis' study, which used the straight-line method, average service life broad group procedure, and RL technique, presented newly developed depreciation accrual rates for most of the common production, distribution, and general plant accounts used to record the company's distribution assets. As Mr. Allis states on Bates 1635 of his testimony, the straight-line method and average service life broad group procedure approach was used in the previous depreciation study performed for UES' 2010 rate case docketed as DE 10-055.

However, in this current study, Mr. Allis used the remaining life technique, which is a change from the prior study. UES' prior depreciation study used the whole life technique.

Q: Was that rate case in 2010 which you mentioned UES' most recent rate case?

A: No. UES had a more recent distribution rate case which was filed in 2016. That was docketed as DE 16-384. However, in that 2016 UES rate case, no new depreciation study was performed. The Company continued to use the depreciation accrual rates that were developed and approved in the 2010 case.

Q: You mentioned that Mr. Allis used the remaining life technique in his study, representing a change from the prior study. Do you support that change in technique?

A: No. I recommend that the Company continue to use depreciation accrual rates developed using the whole life technique. The use of the whole life depreciation technique is consistent with the Commission's practice for setting depreciation accrual rates for other electric companies as well as for natural gas and water utilities. See Attachment SRE-2 for a list of PUC Orders relating to the use of the whole life technique. As stated above, the whole life depreciation technique is the basis for the Commission approved depreciation accrual rates that are currently in place for Unitil.

Q: Can you briefly explain the difference between the whole life and the remaining life techniques?

A: The whole life technique allocates the original cost of the assets less the estimated net salvage[1] over the total estimated life of the asset. The whole life formula is defined as follows:

WL Depreciation Accrual Rate = (1 – Net Salvage Rate) / (Average Service Life)

For example, if a capital asset has an average service life of 10 years and a net salvage rate of 20 percent, the WL accrual rate would be calculated as follows:

WL rate = (1 – 0.20) / 10 = (0.8)/10 = 0.08 = 8% annual accrual rate

This accrual rate would result in collecting 80% of the original asset value over the 10 year depreciable life of the asset with the remaining 20% of the asset's original cost realized through its salvage value.

The remaining life technique takes a different approach. It recovers the undepreciated original cost less the net salvage over the remaining life of the asset. That is, the original plant cost less current book depreciation is used as the depreciable cost and the average remaining life is used in the denominator to calculate the annual depreciation accrual rate. The formulas for both the remaining life depreciation amount and the corresponding rate are more complicated than the whole life formulas and I will not attempt to provide them here. Additional detail on the remaining life formulas is provided in Attachment SRE-3[2].

[1] Net salvage represents the estimated gross salvage value less the estimated cost of removal at retirement. Net salvage can be either positive (if gross salvage > cost of removal) or negative (if cost of removal > gross salvage).
[2] Information provided in Attachment SRE-3 is from the NARUC manual titled "Public Utility Depreciation Practices" August 1996.

Q: Are there advantages and disadvantages of each whole life and remaining life techniques?

A: Yes, there are. The whole life technique is simpler to explain and to present mathematically. However, because the whole life approach uses the original cost of the asset to calculate the accrual rate even as new information comes in over the life of the asset about changes in the net salvage rates and the asset life itself (an asset may prove to deteriorate more quickly or last longer than originally planned), there can be differences which develop between the booked depreciation reserve (the total amount of depreciation expense collected from ratepayers) and the theoretical or calculated depreciation amount. This difference is referred to as a theoretical reserve imbalance.

Q: Please explain what a theoretical reserve imbalance represents.

A: A utility's theoretical depreciation reserve is the calculated balance that would be in the company's accumulated depreciation account at a point in time using the currently approved depreciation parameters. A utility's booked depreciation reserve, alternately called accumulated depreciation, is equal to the total amount of depreciation expense (collected from ratepayers) relative to all of the utility's capital assets as stated on the utility's balance sheet. A depreciation reserve imbalance occurs when there is a difference between the depreciation reserve recorded on the company's balance sheet (book reserve) and the calculated value of the accumulated depreciation (theoretical reserve).

Q: Please continue with your explanation of the advantages and disadvantages of the whole life and remaining life techniques.

A. As I explained above, use of the whole life technique may result in a theoretical reserve imbalance. That imbalance is then something which may require attention. The remaining life technique differs in that it uses the undepreciated value of the asset and the remaining service life to calculate the annual accrual rate. This method incorporates into the accrual rate calculation any theoretical reserve imbalance and spreads it out over the remaining life of the asset. It's important to note that the remaining life method starts with the undepreciated value of the assets – this is the original cost less the book reserve which means that this method already incorporates any potential reserve imbalance into its calculations. This method has some advantage in that, theoretically, it will always collect no more and no less than the original cost of the plant asset over the life of that asset, even as new information comes in over time about retirements, service life, and salvage value during subsequent depreciation studies.

Q: Does Mr. Allis also explain and compare the whole life and remaining life techniques?

A: Yes. On Bates 1635 – 1638 of his testimony, Mr. Allis provides a comparison of these two techniques and explains why he believes the remaining life method is superior.

Q: Can you provide a synopsis of why Mr. Allis believes the remaining life depreciation technique to be superior?

A: My understanding is that because the remaining life technique corrects for issues that arise when average service lives change over time, and adjusts the accrual rate to compensate for prior over- or under-collection of depreciation amounts without the need for external

amortization of any theoretical reserve imbalance, Mr. Allis finds that remaining life is superior to the whole life technique.

Q: Did Mr. Allis' depreciation study determine that there was a theoretical reserve imbalance that would need to be dealt with?

A: No. As explained, the depreciation study prepared by Mr. Allis used the remaining life technique so any imbalance has been incorporated into his calculated depreciation accrual rates and any imbalance is spread over the average remaining life of the assets in each plant account.

Q: However, in your recommendations at the beginning of your testimony, you stated that there is a reserve imbalance and you recommended a period over which it should be amortized. What is the source of the calculation of the reserve imbalance?

A: In response to discovery, Mr. Allis performed additional calculations using the whole life technique to determine a total annual depreciation accrual amount and a theoretical reserve imbalance. The response to data request DOE 5-12 and its attachments are included as Attachment SRE-4 and are the source of information used in my recommendation.

Q: Does the theoretical reserve calculated by Mr. Allis in response to data request DOE 5-12 represent the "correct" reserve amount?

A: No. The theoretical reserve is an estimate developed at a point in time based on the current plant balances, the current life and net salvage estimates developed using available plant records. It provides a useful measurement which can be compared to the Company's actual

book reserve to establish the relative position of the two estimates. It should not generally be considered as the "correct" reserve amount. This is, in part, because development of the theoretical reserve value depends on decisions and judgement made during the study of "best fit" Iowa Curves (asset survival curves) among other things. These decisions are, to a degree, subjective and experts will not always agree on every particular. For example, there may be several different Iowa curves which each fit plant data reasonably well but which yield slightly different results for average service life for assets in a plant account. Therefore, determination of accrual rates and depreciation accrual amounts are not an exact science – they are the result of the application of mathematical techniques, the results of which are based, in part, on the decisions of the expert conducting the study.

Q: Can the reserve imbalance change from one depreciation study to the next?

A: Yes. As more, and newer, information becomes available about plant retirements, net salvage amounts, and changing plant technologies which impact service life, the depreciation accrual rates for various accounts will likely change from one study to the next. These changes will, in turn, impact the calculation of the theoretical reserve.

Q: What is the annual depreciation accrual amount recommended by Mr. Allis in his study compared to the amount he calculated in response to DOE's data requests?

A: The amounts are shown below in Table 1. These amounts are the basis for my recommendations regarding depreciation techniques, total annual depreciation amount, and amortization of theoretical reserve imbalance. It should be noted that any changes to plant

in service as a result of recommendations by other witnesses will impact the total annual depreciation accrual amount.

Table 1. Comparison of Allis Depreciation Calculation Using Remaining Life and Whole Life Techniques for Pro Forma Test Year.

	Remaining Life	Whole Life
Depreciation Amount	$12,799,754	$12,854,711
Theoretical Reserve Imbalance		($7,652,721)
Amortization of Reserve Imbalance over 5 years results in annual return to ratepayers		($1,530,544)

Source: Allis Depreciation Study, Response to Energy 5-12 and Energy TS 1-5.
See Attachment SRE-4 and Attachment SRE-5.

Transmission Cash Working Capital

Q: In your introductory remarks, you stated that you would address the issue of cash working capital relating to UES' transmission costs. Please address that issue.

A: In docket DE 21-121 Unitil' Annual Stranded Cost Recovery and External Delivery Charge (EDC) Reconciliation and Rate Filing, the Company filed to recover its costs related to, among other things, its transmission costs incurred for getting electric power to its distribution system for delivery to customers. At hearing held on July 23, 2021, DOE questioned the Company about the methodology that the Company used to determine the cash working capital (CWC) requirement related to its transmission costs. Specifically, the discussion centered around the issue of use of a lead-lag study to determine the net lag to be used in the CWC calculation. (*See* hearing transcript pages 38 – 44)

Q: Does the Company currently use a lead-lag study in the development of its CWC requirement related to transmission costs?

A: No it does not. As the transcript reference above states, the Company uses the alternate method of a formula "based on the length of ½ of the utility's billing cycle plus 30 days in lieu of a detailed lead-lag study"[3] (*i.e.*, the 45-day method). That approach was the result of the Settlement Agreement in the Company's 2010 Distribution Rate Case, DE 10-055, and has continued through the present.

Q: What did the Commission conclude about the issue in docket DE 21-121?

A: In its order, the Commission stated:

> "Regarding Unitil's working capital requirement for transmission costs, we believe it is important for working capital to be accurate. Given that is has been eleven years since the settlement agreement cited by Unitil as the basis for the 45 day figure, with a rate case in the interim, we agree that [the] best way to determine an accurate figure would be through a lead-lag study. While we approve the rate with the fixed 45 day lag at this time, we will consider the issue in the upcoming rate case, and anticipate moving to a more accurate working capital number moving forward. *See* Order 26,500 at 5-6.

Q: Has the issue of the transmission working capital been explored in the current rate case?

A: Yes. Through the discovery process, DOE requested information targeted at this issue. The response to discovery request DOE 4-65 and DOE 4-66 and the related attachment are included as Attachment SRE-6 and Attachment SRE-7, respectively, to my testimony and are relevant to this issue. As shown in Response DOE 4-65, Unitil calculated that the net lag for transmission costs is 0.47 days. In addition, UES calculated that the net lag for "Other Flow-

[3] See Puc 1604.05 (t) regarding working capital.

Through Operating Expenses Excluding Transmission" costs that are also recovered through the EDC is 5.32 days. *See* Response to DOE 4-66. Based on the Commission's Order quoted above, DOE would expect Unitil to use the information provided in these responses to calculate its working capital requirement related to transmission costs in its next External Delivery Costs docket in 2022, and to present the results for approval when those costs are reviewed.

Q: Does this conclude your testimony?

A: Yes.

Qualifications of Stephen R. Eckberg

My name is Stephen R. Eckberg. I am employed as a Utility Analyst with the Regulatory Support Division of the New Hampshire Department of Energy. My business address is 21 S. Fruit Street, Suite 10, Concord, New Hampshire 03301.

I earned a B.S. in Meteorology from the State University of New York at Oswego and an M.S. in Statistics from the University of Southern Maine.

After receiving my M.S. degree, I was employed as an analyst in the Boston office of Hagler Bailly, Inc, a consulting firm working with regulated utilities to perform evaluations of energy efficiency and demand-side management programs. From 2000 through 2003, I was employed at the NH Governor's Office of Energy and Community Services as the Director of the Weatherization Assistance Program. Following that, I was employed at Belknap Merrimack Community Action Agency as the Statewide Program Administrator of the NH Electric Assistance Program (EAP). In that capacity, I presented testimony before the NH Public Utilities Commission (PUC) in dockets related to the design, implementation and management of the EAP. I have also testified before Committees of the New Hampshire General Court on issues related to energy efficiency and low income electric bill assistance. From 2007 – 2014 I was employed as a Utility Analyst with the New Hampshire Office of the Consumer Advocate (OCA). During my tenure with the OCA, I attended rate making and regulatory training at New Mexico State University's Center for Public Utilities.

In my position with the OCA, I entered pre-filed testimony jointly with Kenneth E. Traum, former Assistant Consumer Advocate, in the following dockets:

- DG 08-048 Unitil Corporation and Northem Utilities, Inc. Joint Petition for Approval of Stock Acquisition
- DW 08-070 Lakes Region Water Company Financing & Step Increase

- DW 08-098 Aquarion Water Company of New Hampshire
- DE 09-035 Public Service of New Hampshire Distribution Service Rate Case

I entered (non-joint) pre-filed testimony in the following dockets:

- DT 07-027 Kearsarge Telephone Company, Wilton Telephone Company, Hollis Telephone Company & Merrimack County Telephone Company Petition for Alternative Form of Regulation. Phase II & Phase III.
- DW 08-073 Pennichuck Water Works, Inc. Petition for Rate Increase
- DW 08-070 Lakes Region Water Company Third Step Increase.
- DW 08-065 Hampstead Area Water Company Petition for Rate Increase.
- DE 09-170 2010 CORE Energy Efficiency Programs.
- DW 10-090 Pittsfield Aqueduct Company Petition for Rate Increase.
- DW 10-091 Pennichuck Water Works Petition for Rate Increase.
- DW 10-141 Lakes Region Water Petition for Rate Increase.
- DE 10-188 2011-2012 CORE and Natural Gas Energy Efficiency Programs.
- DE 11-250 PSNH Installation of a Wet Flue-Gas Desulphurization Scrubber.
- DE 12-262 2013-2014 CORE and Natural Gas Energy Efficiency Programs.
- DE 12-292 PSNH 2013 Default Energy Service Rate.
- DE 12-262 2014 CORE Energy Efficiency Programs Update Filing.
- DE 13-108 PSNH 2012 Energy Service Reconciliation.
- DG 14-091 Liberty Utilities Special Contract and Lease Agreement with Innovative Natural Gas, LLC dba iNATGAS.

In August 2014, I joined the PUC's Sustainable Energy Division (SED). My responsibilities included grant review and administration, and compliance oversight of New Hampshire's Renewable Portfolio Standard requirements. While employed with SED, I filed testimony in:

- DE 18-140 Liberty Utilities Petition for Approval of a Renewable Natural Gas Supply and Transportation Contract

In October 2019, I joined the PUC's Electric Division. I have filed testimony in:

- DE 17-136 2018-2020 New Hampshire Statewide Energy Efficiency Plan - 2020 Third Year Programs.

- DE 19-197 Development of a Statewide, Multi-Use Online Energy Data Platform (Joint Testimony with Jason Morse).

- DE 20-092 2021 – 2023 Triennial Energy Efficiency Plan.

In July 2021, with the passage of HB2, the New Hampshire Legislature created the Department of Energy, I became an employee of the Regulatory Support Division of the Department of Energy.

A list of NH PUC cases where the whole life depreciation method was adopted.

1. Order No. 22,141 (May 13, 1996)(GSEC)(stating "GSEC agrees to maintain its current **whole life** depreciation methodology and to submit a new depreciation study with its next rate case filing")
2. Order No. 22,883 (March 25, 1998)(PWW)(stating "Finally, regarding depreciation, Pennichuck and Staff agree to use the '**whole life**' rather than Pennichuck's proposed 'average remaining life' methodology, for an annual depreciation expense of $1,272,791, which results in an annual composite depreciation rate of 2.44%.")
3. Order No. 24,072 (October 25, 2002)(Concord Electric Co.)(stating "Under section 3.6, UES agrees to file a general base rate case and an updated depreciation study using the **whole life** methodology no later than five years from the issuance of the Commission's final order.")
4. Order No. 24,075 (October 28, 2002)(Northern)(Stating "Staff and the Parties agreed to use of the Broad Group/**Whole Life** depreciation rates with the applicable plant in service balance as of June 30, 2001 plus the annual amortization of the depreciation reserve imbalance over five years to determine the required level of depreciation expense.")
5. Order No. 24,369 (September 2, 2004)(PSNH)(stating "The signatories agreed to adopt Staff's recommendations, both as to the annual deduction from rate base to reflect the declining value of assets over time and as to the corresponding addition to PSNH's annual operating costs as depreciation expenses. Staff recommended that depreciation accrual rates be applied to plant balances as of June 30, 2003. It was Staff's further recommendation to use the **whole life** technique, as opposed to PSNH's proposed use of the remaining life technique, to determine estimated depreciation expense.")
6. Order No. 25,123 (June 28, 2010)(PSNH)(stating "The settlement agreement also notes that the rate increases allowed under the settlement agreement were calculated using Commission-approved **whole-life** depreciation rates, and that the Company should continue to record its depreciation expense using the **whole-life** rates testified to by Staff witness Cunningham.")
7. Order No. 25,352 (April 24, 2012)(Northern)(stating "Pursuant to Section 4.1 of the Settlement Agreement, the Company will use **whole-life** depreciation accrual rates, as presented in supporting schedules and explained in Mr. Cunningham's testimony.")
8. Order No. 26,129 (May 2, 2018)(Northern)(Stating "The Settling Parties agreed that Northern would reflect updated **whole-life** rates for book depreciation purposes (as shown on Exhibit 7 at 315) and that there would be no amortization of the reserve variance. *Id.* at ¶ 3.2."
9. Order No. 26,433 (December 15, 2020)(PSNH)(stating "Section 7 addresses certain cost of service adjustments, including the use of **whole-life** depreciation and the treatment of an accrual for uncollectible expense.")

mortality data were accumulated. The prediction of future retirement patterns is also necessary in application of the vintage group procedure. However, ELG is much more sensitive to these predictions. ELG may be expected to produce greater fluctuations in depreciation expense from year to year than the broad group procedure.

The Broad Group procedure does not require that an assumption be made concerning the shape of the appropriate survivor curve (see Chapter VI) in the grouping process. However, Vintage Group, as generally applied, and ELG require such a determination. ELG depends upon the survivor curve forecast to determine the subgroups. With the FCC's agreement, the ELG procedure has been widely adopted by telephone companies subject to FCC jurisdiction. Some of the state commissions, however, have disallowed its use for intrastate rate making on both practical and technical grounds. The Vintage Group and Equal Life Group procedures are discussed in more detail in Chapter XII.

Application Techniques

There are two techniques commonly used to determine the depreciation rate to be applied to a utility's plant depreciation categories: Whole Life and Remaining Life.

Whole Life

The Whole Life technique bases the depreciation rate on the estimated average service life of the plant category. Whole life depreciation results in the allocation of a gross plant base over the total life of the investment. However, to the extent that the estimated average service life assigned turns out to be incorrect, (and precision in these estimates cannot reasonably be expected), the Whole Life technique will result in a depreciation reserve imbalance. For example, such over-accrual or under-accrual may remain in the reserve indefinitely unless offset by later overages or underages in the opposite direction. However, when a depreciation reserve excess or deficiency is reasonably certain, the Whole Life technique may be modified to include an adjustment to the accrual rate designed to eliminate the reserve imbalance in the future. For example, a special amortization of the difference may be allowed.

Remaining Life

The Remaining Life technique seeks to recover the undepreciated original cost less future net salvage over its remaining life. With this technique, the gross plant less book depreciation reserve is used as the depreciable cost and the remaining life or future life expectancy is used in the denominator. The formula is:

$$D = \frac{B - U - C'}{E} \quad (11)$$

where D is the depreciation expense or annual accrual
where B is the book cost of the Gross Plant
where U is the book depreciation reserve at start of the year
where C'is the Estimated Future Net Salvage in dollars
where E is the Estimated Average Remaining Life

The following formula is used to arrive at the depreciation rate in percent:

$$\text{depreciation rate } d = \frac{D}{B} \times 100 \quad (12)$$

This rate may also be derived by dealing entirely in percentages as follows:

$$\text{depreciation rate } d = \frac{100 - u - c'}{E} \quad (13)$$

Unitil Energy Systems, Inc.
Docket No. DE 21-030
DOE Data Requests – Tech Session Set 1

Date Request Received: 09/28/2021 Date of Response: 10/12/2021
Request No. Energy TS 1-5 Witness: N. Allis / C. Goulding / D. Nawazelski

REQUEST:

Depreciation. Reference DOE 5-12 Attachment 2 and Schedule RevReq 3-16 (Bates 000173).

a. Please confirm that using Whole Life as provided in DOE 5-12 the Total Pro Forma Depreciation expense is $12,854,711 as compared to as filed Remaining Life Total Pro Forma Depreciation expense of $12,799,754.
b. Please confirm that the Theoretical Reserve Imbalance is $7,205,142?
c. Does the Whole Life Total Pro Forma Depreciation expense of $12,854,711 include the amortization of the Theoretical Reserve Imbalance? If not, please confirm that an additional adjustment will be required to amortize the Theoretical Reserve Imbalance of $7,205,142.

RESPONSE:

a. Confirmed

b. Confirmed. However, this amount includes general plant amortization accounts, for which a five-year recovery is proposed for the adjustment to amortization accounting. Mr. Allis would include a similar proposal if whole life depreciation rates were used.

c. No, with the exception of the reserve adjustment for amortization of $89,515. It is often appropriate to make an additional adjustment for the theoretical reserve imbalance to ensure the full recovery of the Company's assets over their service lives. The determination of an adjustment requires the selection of an approach for the recovery and the period of time over which the theoretical reserve imbalance is recovered. Generally, Mr. Allis's opinion is that an amortization over the remaining life of the Company's assets (either by account or in total) is most equitable, although different periods have been used in various circumstances. For a given account, the amortization of the theoretical reserve imbalance over the remaining life produces an overall expense that is similar to the use of the remaining life technique.

Unitil Energy Systems, Inc.
Docket No. DE 21-030
DOE Data Requests – Set 5

Date Request Received: 09/02/2021 Date of Response: 09/17/2021
Request No. DOE 5-12 Witness: Ned W. Allis

REQUEST:

Depreciation. Reference Schedule RevReq-3-16, response to OCA 2-3.

a. Please provide a schedule comparing Whole Life and Remaining Life methodologies.
b. Please provide a revised Schedule RevReq 3-16 using Whole Life.
c. Please provide the resultant theoretical reserve imbalance assuming Whole Life.

RESPONSE:

a. Please see DOE 5-12 Attachment 1 to this response for a schedule showing the whole life depreciation rates using the depreciation parameters recommended in the depreciation study as well as a comparison of the resulting depreciation rates and accruals using the remaining life and whole life techniques.

b. Please see DOE 5-12 Attachment 2 to this response for a revised Schedule RevReq 3-16, page 2 using Whole Life.

c. Please see DOE 5-12 Attachment 1 to this response for a schedule showing the theoretical reserve imbalance for each account.

UNITIL ENERGY SYSTEMS, INC. **DOE 5-12 Attachment 1**

SUMMARY OF ESTIMATED SURVIVOR CURVE, NET SALVAGE PERCENT, ORIGINAL COST AND CALCULATED ANNUAL AND ACCRUED DEPRECIATION RELATED TO ELECTRIC PLANT AS OF DECEMBER 31, 2020 BASED ON THE WHOLE LIFE TECHNIQUE

	ACCOUNT	SURVIVOR CURVE	NET SALVAGE PERCENT	ORIGINAL COST AS OF DECEMBER 31, 2020	CALCULATED WHOLE LIFE ANNUAL ACCRUAL AMOUNT	CALCULATED WHOLE LIFE ANNUAL ACCRUAL RATE	CALCULATED ACCRUED DEPRECIATION
	(1)	(2)	(3)	(4)	(5)	(6)=(5)/(4)	(7)
	ELECTRIC PLANT						
	PRODUCTION PLANT						
343.00	PRIME MOVERS	10-S3	0	56,575.22	5,658	10.00	45,437
	TOTAL PRODUCTION PLANT			**56,575.22**	**5,658**	**10.00**	**45,437**
	DISTRIBUTION PLANT						
361.00	STRUCTURES AND IMPROVEMENTS	55-R4	(30)	2,173,616.44	51,314	2.36	322,333
362.00	STATION EQUIPMENT	49-R1.5	(40)	50,412,131.73	1,439,770	2.86	11,484,456
364.00	POLES, TOWERS AND FIXTURES	50-R1.5	(80)	75,140,860.60	2,705,071	3.60	28,089,114
365.00	OVERHEAD CONDUCTORS AND DEVICES	45-R0.5	(65)	92,313,722.86	3,381,452	3.66	27,856,919
366.00	UNDERGROUND CONDUIT	60-R2.5	(25)	2,587,958.32	54,024	2.09	778,749
367.00	UNDERGROUND CONDUCTORS AND DEVICES	55-R2.5	(50)	23,862,963.47	651,459	2.73	8,120,399
368.00	LINE TRANSFORMERS	40-R1.5	(10)	29,259,308.24	804,398	2.75	9,851,934
368.01	LINE TRANSFORMER INSTALLATIONS	40-R1.5	0	25,947,042.32	648,675	2.50	5,358,557
369.00	SERVICES	40-R2	(50)	25,642,632.28	961,349	3.75	11,479,997
370.00	METERS	20-R1.5	0	11,764,061.66	579,872	4.93	6,622,460
370.01	METER INSTALLATIONS	20-R1.5	0	7,165,764.75	358,288	5.00	1,936,362
371.00	INSTALLATIONS ON CUSTOMERS' PREMISES	15-L0	(10)	2,404,367.15	176,315	7.33	659,122
373.00	STREET LIGHTING AND SIGNAL SYSTEMS	20-L0	(10)	3,580,954.49	196,953	5.50	1,348,847
	TOTAL DISTRIBUTION PLANT			**352,255,384.31**	**12,008,940**	**3.41**	**113,909,249**
	GENERAL PLANT						
390.00	STRUCTURES AND IMPROVEMENTS	55-R3	0	19,114,262.13	347,880	1.82	1,979,075
391.01	OFFICE FURNITURE AND EQUIPMENT						
	FULLY ACCRUED			139,487.40	0	0.00	139,488
	AMORTIZED	15-SQ	0	1,150,389.44	76,731	6.67	137,383
	TOTAL OFFICE FURNITURE AND EQUIPMENT			1,289,876.84	76,731	5.95	276,871
393.00	STORES EQUIPMENT						
	FULLY ACCRUED			50,899.20	0	0.00	50,899
	AMORTIZED	25-SQ	0	39,757.34	1,590	4.00	19,898
	TOTAL STORES EQUIPMENT			90,656.54	1,590	1.75	70,797
394.00	TOOLS, SHOP AND GARAGE EQUIPMENT						
	FULLY ACCRUED			367,743.18	0	0.00	367,742
	AMORTIZED	25-SQ	0	2,062,148.55	82,486	4.00	735,461
	TOTAL TOOLS, SHOP AND GARAGE EQUIPMENT			2,429,891.73	82,486	3.39	1,103,203
395.00	LABORATORY EQUIPMENT						
	FULLY ACCRUED			245,174.17	0	0.00	245,173
	AMORTIZED	25-SQ	0	703,356.15	28,134	4.00	255,909
	TOTAL LABORATORY EQUIPMENT			948,530.32	28,134	2.97	501,082
397.00	COMMUNICATION EQUIPMENT						
	FULLY ACCRUED			1,747,454.08	0	0.00	1,747,455
	AMORTIZED	15-SQ	0	3,258,113.85	217,316	6.67	1,529,392
	TOTAL COMMUNICATION EQUIPMENT			5,005,567.93	217,316	4.34	3,276,847
398.00	MISCELLANEOUS EQUIPMENT						
	FULLY ACCRUED			83,715.14	0	0.00	83,717
	AMORTIZED	20-SQ	0	19,228.27	961	5.00	16,181
	TOTAL MISCELLANEOUS EQUIPMENT			102,943.41	961	0.93	99,898
	TOTAL GENERAL PLANT			**28,981,728.90**	**755,098**	**2.61**	**7,307,773**
	TOTAL DEPRECIABLE PLANT			**381,293,688.43**	**12,769,696**	**3.35**	**121,262,459**
	NONDEPRECIABLE PLANT AND ACCOUNTS NOT STUDIED						
301.00	ORGANIZATION			380.00			
303.00	MISCELLANEOUS INTANGIBLE PLANT - 5 YEAR			6,638,390.64			
303.01	MISCELLANEOUS INTANGIBLE PLANT - 3 YEAR			87,195.82			
303.02	MISCELLANEOUS INTANGIBLE PLANT - 10 YEAR			5,489,895.89			
360.01	RIGHTS OF WAY			1,002,659.97			
360.02	RIGHTS OF WAY			1,674,812.39			
389.00	LAND			1,363,295.15			
392.00	TRANSPORTATION EQUIPMENT			1,073,516.64			
	TOTAL NONDEPRECIABLE PLANT AND ACCOUNTS NOT STUDIED			**17,330,146.50**			
	TOTAL ELECTRIC PLANT			**398,623,834.93**			

UNITIL ENERGY SYSTEMS, INC. DOE 5-12 Attachment 1

COMPARISON OF WHOLE LIFE AND REMAINING LIFE DEPRECIATION RATES AND ACCRUALS AS OF DECEMBER 31, 2020

			REMAINING LIFE (PROPOSED)				WHOLE LIFE				
	ACCOUNT	ORIGINAL COST AS OF DECEMBER 31, 2020	SURVIVOR CURVE	NET SALVAGE PERCENT	CALCULATED ANNUAL ACCRUAL AMOUNT	CALCULATED ANNUAL ACCRUAL RATE	SURVIVOR CURVE	NET SALVAGE PERCENT	CALCULATED ANNUAL ACCRUAL AMOUNT	CALCULATED ANNUAL ACCRUAL RATE	ACCRUAL DIFFERENCE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)=(9)-(5)
	ELECTRIC PLANT										
	PRODUCTION PLANT										
343.00	PRIME MOVERS	56,575.22	10-S3	0.0	10,559	18.66	10-S3	0	5,658	10.00	(4,901)
	TOTAL PRODUCTION PLANT	**56,575.22**			**10,559**	**18.66**			**5,658**	**10.00**	**(4,901)**
	DISTRIBUTION PLANT										
361.00	STRUCTURES AND IMPROVEMENTS	2,173,616.44	55-R4	(30)	52,132	2.40	55-R4	(30)	51,314	2.36	(818)
362.00	STATION EQUIPMENT	50,412,131.73	49-R1.5	(40)	1,492,423	2.96	49-R1.5	(40)	1,439,770	2.86	(52,653)
364.00	POLES, TOWERS AND FIXTURES	75,140,860.60	50-R1.5	(80)	2,709,085	3.61	50-R1.5	(80)	2,705,071	3.60	(4,014)
365.00	OVERHEAD CONDUCTORS AND DEVICES	92,313,722.86	45-R0.5	(65)	3,343,998	3.62	45-R0.5	(65)	3,381,452	3.66	37,454
366.00	UNDERGROUND CONDUIT	2,587,958.32	60-R2.5	(25)	55,787	2.16	60-R2.5	(25)	54,024	2.09	(1,763)
367.00	UNDERGROUND CONDUCTORS AND DEVICES	23,862,963.47	55-R2.5	(50)	679,570	2.85	55-R2.5	(50)	651,459	2.73	(28,111)
368.00	LINE TRANSFORMERS	29,259,308.24	40-R1.5	(10)	720,501	2.46	40-R1.5	(10)	804,398	2.75	83,897
368.01	LINE TRANSFORMER INSTALLATIONS	25,947,042.32	40-R1.5	0	596,350	2.30	40-R1.5	0	648,675	2.50	52,325
369.00	SERVICES	25,642,632.28	40-R2	(50)	623,537	2.43	40-R2	(50)	961,349	3.75	337,812
370.00	METERS	11,764,061.66	20-R1.5	0	1,030,664	8.76	20-R1.5	0	579,872	4.93	(450,792)
370.01	METER INSTALLATIONS	7,165,764.75	20-R1.5	0	395,098	5.51	20-R1.5	0	358,288	5.00	(36,810)
371.00	INSTALLATIONS ON CUSTOMERS' PREMISES	2,404,367.15	15-L0	(10)	193,076	8.03	15-L0	(10)	176,315	7.33	(16,761)
373.00	STREET LIGHTING AND SIGNAL SYSTEMS	3,580,954.49	20-L0	(10)	53,416	1.49	20-L0	(10)	196,953	5.50	143,537
	TOTAL DISTRIBUTION PLANT	**352,255,384.31**			**11,945,637**	**3.39**			**12,008,940**	**3.41**	**63,303**
	GENERAL PLANT										
390.00	STRUCTURES AND IMPROVEMENTS	19,114,262.13	55-R3	0	352,936	2.08	55-R3	0	347,880	1.82	(5,056)
391.01	OFFICE FURNITURE AND EQUIPMENT										
	FULLY ACCRUED	139,487.40			0	-			0	-	0
	AMORTIZED	1,150,389.44	15-SQ	0	76,687	6.67	15-SQ	0	76,731	6.67	44
	TOTAL OFFICE FURNITURE AND EQUIPMENT	1,289,876.84			76,687	5.95			76,731	5.95	44
393.00	STORES EQUIPMENT										
	FULLY ACCRUED	50,899.20			0	-			0	-	0
	AMORTIZED	39,757.34	25-SQ	0	1,590	4.00	25-SQ	0	1,590	4.00	0
	TOTAL STORES EQUIPMENT	90,656.54			1,590	1.75			1,590	1.75	0
394.00	TOOLS, SHOP AND GARAGE EQUIPMENT										

UNITIL ENERGY SYSTEMS, INC. DOE 5-12 Attachment 1

COMPARISON OF WHOLE LIFE AND REMAINING LIFE DEPRECIATION RATES AND ACCRUALS AS OF DECEMBER 31, 2020

			REMAINING LIFE (PROPOSED)				WHOLE LIFE				
	ACCOUNT	ORIGINAL COST AS OF DECEMBER 31, 2020	SURVIVOR CURVE	NET SALVAGE PERCENT	CALCULATED ANNUAL ACCRUAL AMOUNT	CALCULATED ANNUAL ACCRUAL RATE	SURVIVOR CURVE	NET SALVAGE PERCENT	CALCULATED ANNUAL ACCRUAL AMOUNT	CALCULATED ANNUAL ACCRUAL RATE	ACCRUAL DIFFERENCE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)=(9)-(5)
	FULLY ACCRUED	367,743.18			0	-			0	-	0
	AMORTIZED	2,062,148.55	25-SQ	0	82,572	4.00	25-SQ	0	82,486	4.00	(86)
	TOTAL TOOLS, SHOP AND GARAGE EQUIPMENT	2,429,891.73			82,572	3.40			82,486	3.39	(86)
395.00	LABORATORY EQUIPMENT										
	FULLY ACCRUED	245,174.17			0	-			0	-	0
	AMORTIZED	703,356.15	25-SQ	0	28,137	4.00	25-SQ	0	28,134	4.00	(3)
	TOTAL LABORATORY EQUIPMENT	948,530.32			28,137	2.97			28,134	2.97	(3)
397.00	COMMUNICATION EQUIPMENT										
	FULLY ACCRUED	1,747,454.08			0	-			0	-	0
	AMORTIZED	3,258,113.85	15-SQ	0	217,198	6.67	15-SQ	0	217,316	6.67	118
	TOTAL COMMUNICATION EQUIPMENT	5,005,567.93			217,198	4.34			217,316	4.34	118
398.00	MISCELLANEOUS EQUIPMENT										
	FULLY ACCRUED	83,715.14			0	-			0	-	0
	AMORTIZED	19,228.27	20-SQ	0	962	5.00	20-SQ	0	961	5.00	(1)
	TOTAL MISCELLANEOUS EQUIPMENT	102,943.41			962	0.93			961	0.93	(1)
	TOTAL GENERAL PLANT	**28,981,728.90**			**760,082**	**2.62**			**755,098**	**2.61**	**(4,984)**
	RESERVE ADJUSTMENT FOR AMORTIZATION				**86,569**				**89,516**		**2,947**
	TOTAL DEPRECIABLE PLANT	**381,293,688.43**			**12,802,847**	**3.36**			**12,859,212**	**3.37**	**56,365**

UNITIL ENERGY SYSTEMS, INC. **DOE 5-12 Attachment 1**

COMPARISON OF CALCULATED ACCRUED DEPRECIATION AND BOOK DEPRECIATION RESERVE
AS OF DECEMBER 31, 2020

	ACCOUNT	CALCULATED ACCRUED DEPRECIATION	BOOK DEPRECIATION RESERVE	THEORETICAL RESERVE IMBALANCE	
	(1)	(2)	(3)	(4)=(3)-(2)	
	DEPRECIABLE PLANT				
	PRODUCTION PLANT				
343.00	PRIME MOVERS	45,437	36,796	(8,641)	
	TOTAL PRODUCTION PLANT	**45,437**	**36,796**	**(8,641)**	
	DISTRIBUTION PLANT				
361.00	STRUCTURES AND IMPROVEMENTS	322,333	306,159	(16,174)	
362.00	STATION EQUIPMENT	11,484,456	10,134,156	(1,350,300)	
364.00	POLES, TOWERS AND FIXTURES	28,089,114	27,977,083	(112,031)	
365.00	OVERHEAD CONDUCTORS AND DEVICES	27,856,919	28,941,359	1,084,440	
366.00	UNDERGROUND CONDUIT	778,749	718,989	(59,760)	
367.00	UNDERGROUND CONDUCTORS AND DEVICES	8,120,399	7,132,135	(988,264)	
368.00	LINE TRANSFORMERS	9,851,934	11,295,662	1,443,728	
368.01	LINE TRANSFORMER INSTALLATIONS	5,358,557	6,633,459	1,274,902	
369.00	SERVICES	11,479,997	18,333,473	6,853,476	
370.00	METERS	6,622,460	5,127,986	(1,494,474)	
370.01	METER INSTALLATIONS	1,936,362	1,512,910	(423,452)	
371.00	INSTALLATIONS ON CUSTOMERS' PREMISES	659,122	539,998	(119,124)	
373.00	STREET LIGHTING AND SIGNAL SYSTEMS	1,348,847	3,017,725	1,668,878	
	TOTAL DISTRIBUTION PLANT	**113,909,249**	**121,671,094**	**7,761,845**	
	GENERAL PLANT				
390.00	STRUCTURES AND IMPROVEMENTS	1,979,075	1,878,592	(100,483)	
	TOTAL GENERAL PLANT	**1,979,075**	**1,878,592**	**(100,483)**	
	TOTAL DEPRECIABLE PLANT	**115,933,761**	**123,586,482**	**7,652,721**	
	AMORTIZED PLANT				
390.01	STRUCTURES AND IMPROVEMENTS - MISCELLANEOUS	0	863	863	*
391.01	OFFICE FURNITURE AND EQUIPMENT	276,871	(56,091)	(332,962)	*
391.03	OFFICE FURNITURE AND EQUIPMENT - COMPUTER EQUIPMENT	0	4,346	4,346	*
393.00	STORES EQUIPMENT	70,797	66,182	(4,615)	*
394.00	TOOLS, SHOP AND GARAGE EQUIPMENT	1,103,203	986,082	(117,121)	*
395.00	LABORATORY EQUIPMENT	501,082	499,182	(1,900)	*
397.00	COMMUNICATION EQUIPMENT	3,276,847	3,277,612	765	*
398.00	MISCELLANEOUS EQUIPMENT	99,898	102,943	3,045	*
	TOTAL AMORTIZED PLANT	**5,328,698**	**4,881,119**	**(447,579)**	

* RECOVERED THROUGH RESERVE ADJUSTMENT FOR AMORTIZATION OVER FIVE YEARS.

UNITIL ENERGY SYSTEMS, INC.
DEPRECIATION ANNUALIZATION USING WHOLE LIFE METHODOLOGY
12 MONTHS ENDED DECEMBER 31, 2020

Docket No. DE 21-030
DOE 5-12 Attachment 2
Page 1 of 1

LINE NO.	(1) DESCRIPTION	(2) PLANT BALANCE 12/31/2020	(3) ADJUSTMENTS	(4) LESS NON DEPRECIABLE	(5) DEPRECIABLE PLANT	(6) LESS ITEMS CHARGED TO CLEARING ACCOUNT	(7) DEPRECIABLE PLANT CHARGED TO DEPRECIATION EXPENSE	(8) WHOLE LIFE DEPRECIATION RATES [4]	(9) PROFORMED EXPENSE
1	Intangible Plant								
2	301-Organization	$ 380	$ -	$ 380	$ -	$ -	$ -	N/A	N/A
3	303-Misc Intangible Plant	21,916,840	-	21,916,840	-	-	-	N/A	N/A
4	Total Intangible Plant	21,917,220	-	21,917,220	-	-	-	N/A	N/A
5	Other Production Plant:								
6	343-Movers	56,575	-	-	56,575	-	56,575	10.00%	5,658
7	Total Other Production Plant	56,575	-	-	56,575	-	56,575	10.00%	5,658
8	Distribution Plant								
9	360-Land & Land Rights	2,677,472	-	2,677,472	-	-	-	N/A	N/A
10	361-Structures & Improvements	2,173,616	-	-	2,173,616	-	2,173,616	2.36%	51,297
11	362-Station Equipment	50,412,132	-	-	50,412,132	-	50,412,132	2.86%	1,441,787
12	364-Poles, Towers & Fixtures	75,140,861	-	-	75,140,861	-	75,140,861	3.60%	2,705,071
13	365-Overhead Conductors & Devices	92,313,723	-	-	92,313,723	-	92,313,723	3.66%	3,378,682
14	366-Underground Conduit	2,587,958	-	-	2,587,958	-	2,587,958	2.09%	54,088
15	367-Underground Conductors & Devices	23,862,963	-	-	23,862,963	-	23,862,963	2.73%	651,459
16	368.0-Line Transformers	29,259,308	-	-	29,259,308	-	29,259,308	2.75%	804,631
17	368.1-Line Transformer Installations	25,947,042	-	-	25,947,042	-	25,947,042	2.50%	648,676
18	369-Services	25,642,632	-	-	25,642,632	-	25,642,632	3.75%	961,599
19	370.0-Meters	11,764,062	-	-	11,764,062	-	11,764,062	4.93%	579,968
20	370.1-Meter Installations	7,165,765	-	-	7,165,765	-	7,165,765	5.00%	358,288
21	371-Installations On Customer Premises	2,404,367	-	-	2,404,367	-	2,404,367	7.33%	176,240
22	373-Street Lighting & Signal Systems	3,580,954	-	-	3,580,954	-	3,580,954	5.50%	196,952
23	Total Distribution Plant	354,932,857	-	2,677,472	352,255,384	-	352,255,384	3.41%	12,008,738
24	General Plant								
25	389-General & Misc. Structure [1]	1,363,295	(9,679)	1,353,616	-	-	-	N/A	N/A
26	390-Structures [1]	19,114,262	(482,234)	-	18,632,028	-	18,632,028	1.82%	339,103
27	391.1-Office Furniture & Equipment	1,289,877	76,307	-	1,366,184	-	1,366,184	5.95%	81,288
28	391.3-Computer Equipment	-	-	-	-	-	-	N/A	N/A
29	392-Transportation Equip	1,073,517	-	-	1,073,517	1,073,517	-	N/A	N/A
30	393-Stores Equip	90,657	4,536	-	95,192	-	95,192	1.75%	1,666
31	394-Tools, Shop & Garage Eq	2,429,892	-	-	2,429,892	-	2,429,892	3.39%	82,373
32	395-Laboratory Equipment	948,530	-	-	948,530	-	948,530	2.97%	28,171
33	397-Communication Equip	5,005,568	-	-	5,005,568	-	5,005,568	4.34%	217,242
34	398-Miscellaneous Equip	102,943	-	-	102,943	-	102,943	0.93%	957
35	Total General Plant	31,418,541	(411,070)	1,353,616	29,653,855	1,073,517	28,580,338	2.63%	750,800
36	Total Plant in Service	$ 408,325,192	$ (411,070)	$ 25,948,308	$ 381,965,814	$ 1,073,517	$ 380,892,297	3.37%	$ 12,765,196
37	Reserve Adjustment For Amortization [2]								
38	390-Structures								(173)
39	391.1-Office Furniture & Equipment								66,592
40	391.3-Computer Equipment								(869)
41	393-Stores Equip								923
42	394-Tools, Shop & Garage Eq								23,424
43	395-Laboratory Equipment								380
44	397-Communication Equip								(153)
45	398-Miscellaneous Equip								(609)
46	Total Reserve Adjustment for Amortization								89,515
47	Total Pro Forma Depreciation Expense (Line 36 + Line 46)								12,854,711
48	Annualized Test Year Expense [3]								13,589,503
49	Increase In Depreciation Expense								$ (734,792)

Notes
(1) Refer to Schedule RevReq-4-3 and Schedule RevReq-4-4
(2) Refer to DOE 5-12 Attachment 1
(3) Refer to Schedule RevReq-3-16, Page 1 of 2, Line 34
(4) Refer to DOE 5-12 Attachment 1

Unitil Energy Systems, Inc.
Docket No. DE 21-030
DOE Data Requests – Set 4

Date Request Received: 08/05/2021 Date of Response: 09/02/2021
Request No. DOE 4-65 Witness: Daniel J. Hurstak

REQUEST:

Reference Testimony of Daniel J. Hurstak and Attachments; Exhibits DJH 1, 2, and 3:

a. Please provide a calculation of the net lag days, using a Lead/Lag study, for transmission costs that were approved for recovery through UES's EDC in DE 21-121 at Exhibit 1, Bates 77-79, columns a, b, and c. Please describe any assumptions and calculations made in this analysis.

b. Please provide a working capital requirement for these transmission costs using these Lead/Lag results, and compare that requirement to what was approved for recovery in DE 21-121, Exhibit 1 at Bates 77-79, column d.

RESPONSE:

a. The assumptions used in preparing the transmission cost Lead/Lag study are generally consistent with the assumptions used in the cash working capital Lead/Lag study that was prepared in support of the Company's base distribution rates. The assumptions used in preparing the transmission cost Lead/Lag study include the following:

- Test year ending December 31, 2020 (consistent with the base distribution Lead/Lag study)
- The overall approach, revenue lag, and expense lag are consistent with the base distribution Lead/Lag study
- The lead/lag days for transmission costs, excluding the annual true-up invoice, are generally consistent month to month. The Company has excluded the annual Eversource transmission cost true-up invoice from the calculation of the net lag days. This annual transmission cost true-up invoice is generally received well after the end of the calendar year and could result in an increase or decrease in total transmission costs for the period.

As indicated by the data on page 1 of DOE 4-65 Attachment 1, the net lag for transmission costs for the test year ended December 31, 2020 is 0.47 days.

Unitil Energy Systems, Inc.
Docket No. DE 21-030
DOE Data Requests – Set 4

Date Request Received: 08/05/2021 Date of Response: 09/02/2021
Request No. DOE 4-65 Witness: Daniel J. Hurstak

b. The Company applied the 0.47 days to the total transmission expenses included in Exhibit 1, Bates 77-79, columns a, b, and c in DE 21-121 noting that the working capital requirement for the test year ended December 31, 2020 was calculated to be $4,610 ($35,400,175 transmission costs x 0.47 / 366 days * 10.14%). The amount of working capital included in DE 21-121 for the test year ending December 31, 2020 is $442,551.

The annual period for the Company's EDC mechanism is not a calendar year. The Company utilized the same period as base distribution rates to determine the net transmission costs lead/lag days with the assumption that a twelve month test year period should provide a net lag that is indicative of a normal year.

Unitil Energy Systems, Inc.
Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020
Summary of Transmission

Line No	Supplier		Transmission Expense	(Lead) Lag Days	Weighted Dollar Days
1					
2					
3	Eversource		$ 2,904,359	39.54	$ 114,848,703
4	Eversource_2		4,071,609	49.19	200,280,366
5	Independent System Operator		24,990,542	58.59	1,464,091,667
6	Independent System Operator _2		418,975	58.60	24,552,619
7	Independent System Operator _3		(4,899)	58.08	(284,581)
8	Independent System Operator _4		16,382	58.97	966,061
9	Utility Services, Inc.		3,896	62.43	243,230
10		Total	$32,400,864	55.70	$1,804,698,065
11					
12					
13					
14					
15					
16					
17			**Revenue (Lead) Lag Days**	**Expense (Lead) / Lag Days**	**Net (Lead) Lag Days**
18			56.17	55.70	0.47
19					
20					
21					
22					
23					
24					
25					

Unitil Energy Systems, Inc.
Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: Eversource
#10-29-13-32-565-00-01

Line No	Month	Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	$ 223,016	12/1/19 12:00 AM	1/1/20 12:00 AM	31	12/16/19 12:00 PM	1/27/20 12:00 AM	41.50	$ 9,255,149
3	February-20	218,971	1/1/20 12:00 AM	2/1/20 12:00 AM	31	1/16/20 12:00 PM	3/2/20 12:00 AM	45.50	9,963,172
4	March-20	213,596	2/1/20 12:00 AM	3/1/20 12:00 AM	29	2/15/20 12:00 PM	3/24/20 12:00 AM	37.50	8,009,857
5	April-20	213,596	3/1/20 12:00 AM	4/1/20 12:00 AM	31	3/16/20 12:00 PM	4/24/20 12:00 AM	38.50	8,223,453
6	May-20	213,596	4/1/20 12:00 AM	5/1/20 12:00 AM	30	4/16/20 12:00 AM	5/26/20 12:00 AM	40.00	8,543,848
7	June-20	235,195	5/1/20 12:00 AM	6/1/20 12:00 AM	31	5/16/20 12:00 PM	6/24/20 12:00 AM	38.50	9,054,991
8	July-20	275,644	6/1/20 12:00 AM	7/1/20 12:00 AM	30	6/16/20 12:00 AM	7/24/20 12:00 AM	38.00	10,474,475
9	August-20	318,203	7/1/20 12:00 AM	8/1/20 12:00 AM	31	7/16/20 12:00 PM	8/31/20 12:00 AM	45.50	14,478,218
10	September-20	311,950	8/1/20 12:00 AM	9/1/20 12:00 AM	31	8/16/20 12:00 PM	9/24/20 12:00 AM	38.50	12,010,073
11	October-20	235,110	9/1/20 12:00 AM	10/1/20 12:00 AM	30	9/16/20 12:00 AM	10/22/20 12:00 AM	36.00	8,463,968
12	November-20	222,741	10/1/20 12:00 AM	11/1/20 12:00 AM	31	10/16/20 12:00 PM	11/24/20 12:00 AM	38.50	8,575,547
13	December-20	222,741	11/1/20 12:00 AM	12/1/20 12:00 AM	30	11/16/20 12:00 AM	12/21/20 12:00 AM	35.00	7,795,952
14									
15		$ 2,904,359			366			39.54	$ 114,848,703
16									
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Unitil Energy Systems, Inc.
Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: Eversource
#10-29-13-32-565-00-00

Line No	Month	Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	$ 216,431	11/1/19 12:00 AM	12/1/19 12:00 AM	30	11/16/19 12:00 AM	1/3/20 12:00 AM	48.00	$ 10,388,688
3	February-20	218,333	12/1/19 12:00 AM	1/1/20 12:00 AM	31	12/16/19 12:00 PM	2/6/20 12:00 AM	51.50	11,244,150
4	March-20	322,861	1/1/20 12:00 AM	2/1/20 12:00 AM	31	1/16/20 12:00 PM	3/6/20 12:00 AM	49.50	15,981,620
5	April-20	324,601	2/1/20 12:00 AM	3/1/20 12:00 AM	29	2/15/20 12:00 PM	4/3/20 12:00 AM	47.50	15,418,548
6	May-20	325,954	3/1/20 12:00 AM	4/1/20 12:00 AM	31	3/16/20 12:00 PM	5/6/20 12:00 AM	50.50	16,460,677
7	June-20	324,794	4/1/20 12:00 AM	5/1/20 12:00 AM	30	4/16/20 12:00 AM	6/4/20 12:00 AM	49.00	15,914,906
8	July-20	325,954	5/1/20 12:00 AM	6/1/20 12:00 AM	31	5/16/20 12:00 PM	7/10/20 12:00 AM	54.50	17,764,493
9	August-20	340,227	6/1/20 12:00 AM	7/1/20 12:00 AM	30	6/16/20 12:00 AM	8/5/20 12:00 AM	50.00	17,011,350
10	September-20	327,307	7/1/20 12:00 AM	8/1/20 12:00 AM	31	7/16/20 12:00 PM	9/4/20 12:00 AM	49.50	16,201,697
11	October-20	333,767	8/1/20 12:00 AM	9/1/20 12:00 AM	31	8/16/20 12:00 PM	10/2/20 12:00 AM	46.50	15,520,166
12	November-20	336,018	9/1/20 12:00 AM	10/1/20 12:00 AM	30	9/16/20 12:00 AM	11/5/20 12:00 AM	50.00	16,800,900
13	December-20	337,681	10/1/20 12:00 AM	11/1/20 12:00 AM	31	10/16/20 12:00 PM	12/4/20 12:00 AM	48.50	16,377,529
14	December-20	337,681	11/1/20 12:00 AM	12/1/20 12:00 AM	30	11/16/20 12:00 AM	12/31/20 12:00 AM	45.00	15,195,645
15									
16		$ 4,071,609			396			49.19	$ 200,280,366
17									
18									
19									
20									
21									
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Unitil Energy Systems, Inc.
Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: Independent System Operator (ISO)
#10-29-13-32-565-01-00

Line No	Month	Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	$ 1,791,899	11/1/19 12:00 AM	12/1/19 12:00 AM	30	11/16/19 12:00 AM	1/13/20 12:00 AM	58.00	$ 103,930,151
3	February-20	1,942,974	12/1/19 12:00 AM	1/1/20 12:00 AM	31	12/16/19 12:00 PM	2/18/20 12:00 AM	63.50	123,378,832
4	March-20	1,852,565	1/1/20 12:00 AM	2/1/20 12:00 AM	31	1/16/20 12:00 PM	3/16/20 12:00 AM	59.50	110,227,644
5	April-20	1,769,972	2/1/20 12:00 AM	3/1/20 12:00 AM	29	2/15/20 12:00 PM	4/13/20 12:00 AM	57.50	101,773,391
6	May-20	1,587,658	3/1/20 12:00 AM	4/1/20 12:00 AM	31	3/16/20 12:00 PM	5/11/20 12:00 AM	55.50	88,115,028
7	June-20	1,479,807	4/1/20 12:00 AM	5/1/20 12:00 AM	30	4/16/20 12:00 AM	6/15/20 12:00 AM	60.00	88,788,400
8	July-20	2,029,298	5/1/20 12:00 AM	6/1/20 12:00 AM	31	5/16/20 12:00 PM	7/13/20 12:00 AM	57.50	116,684,663
9	August-20	2,315,580	6/1/20 12:00 AM	7/1/20 12:00 AM	30	6/16/20 12:00 AM	8/10/20 12:00 AM	55.00	127,356,880
10	September-20	3,153,591	7/1/20 12:00 AM	8/1/20 12:00 AM	31	7/16/20 12:00 PM	9/14/20 12:00 AM	59.50	187,638,654
11	October-20	2,962,462	8/1/20 12:00 AM	9/1/20 12:00 AM	31	8/16/20 12:00 PM	10/13/20 12:00 AM	57.50	170,341,578
12	November-20	2,291,770	9/1/20 12:00 AM	10/1/20 12:00 AM	30	9/16/20 12:00 AM	11/16/20 12:00 AM	61.00	139,797,965
13	December-20	1,812,965	10/1/20 12:00 AM	11/1/20 12:00 AM	31	10/16/20 12:00 PM	12/14/20 12:00 AM	58.50	106,058,481
14									
15		$ 24,990,542			366			58.59	$ 1,464,091,667
16									
17									
18									
19									
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24									
25									

Unitil Energy Systems, Inc.
Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: Independent System Operator (ISO)
#10-29-13-32-561-04-00

Line No	Month	Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	$ 31,552	11/1/19 12:00 AM	12/1/19 12:00 AM	30	11/16/19 12:00 AM	1/13/20 12:00 AM	58.00	$ 1,829,989
3	February-20	34,565	12/1/19 12:00 AM	1/1/20 12:00 AM	31	12/16/19 12:00 PM	2/18/20 12:00 AM	63.50	2,194,857
4	March-20	33,338	1/1/20 12:00 AM	2/1/20 12:00 AM	31	1/16/20 12:00 PM	3/16/20 12:00 AM	59.50	1,983,619
5	April-20	31,820	2/1/20 12:00 AM	3/1/20 12:00 AM	29	2/15/20 12:00 PM	4/13/20 12:00 AM	57.50	1,829,622
6	May-20	28,354	3/1/20 12:00 AM	4/1/20 12:00 AM	31	3/16/20 12:00 PM	5/11/20 12:00 AM	55.50	1,573,665
7	June-20	26,392	4/1/20 12:00 AM	5/1/20 12:00 AM	30	4/16/20 12:00 AM	6/15/20 12:00 AM	60.00	1,583,549
8	July-20	36,191	5/1/20 12:00 AM	6/1/20 12:00 AM	31	5/16/20 12:00 PM	7/13/20 12:00 AM	57.50	2,080,977
9	August-20	36,195	6/1/20 12:00 AM	7/1/20 12:00 AM	30	6/16/20 12:00 AM	8/10/20 12:00 AM	55.00	1,990,750
10	September-20	49,656	7/1/20 12:00 AM	8/1/20 12:00 AM	31	7/16/20 12:00 PM	9/14/20 12:00 AM	59.50	2,954,544
11	October-20	46,808	8/1/20 12:00 AM	9/1/20 12:00 AM	31	8/16/20 12:00 PM	10/13/20 12:00 AM	57.50	2,691,449
12	November-20	35,817	9/1/20 12:00 AM	10/1/20 12:00 AM	30	9/16/20 12:00 AM	11/16/20 12:00 AM	61.00	2,184,829
13	December-20	28,287	10/1/20 12:00 AM	11/1/20 12:00 AM	31	10/16/20 12:00 PM	12/14/20 12:00 AM	58.50	1,654,767
14									
15		$ 418,975			366			58.60	$ 24,552,619
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

Unitil Energy Systems, Inc.
Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: Independent System Operator (ISO)
#10-29-13-32-575-07-00

Line No	Month	Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	$ (2,445)	11/1/19 12:00 AM	12/1/19 12:00 AM	30	11/16/19 12:00 AM	1/13/20 12:00 AM	58.00	$ (141,825)
3	February-20	2,746	12/1/19 12:00 AM	1/1/20 12:00 AM	31	12/16/19 12:00 PM	2/18/20 12:00 AM	63.50	174,356
4	March-20	2,677	1/1/20 12:00 AM	2/1/20 12:00 AM	31	1/16/20 12:00 PM	3/16/20 12:00 AM	59.50	159,294
5	April-20	2,254	2/1/20 12:00 AM	3/1/20 12:00 AM	29	2/15/20 12:00 PM	4/13/20 12:00 AM	57.50	129,626
6	May-20	2,955	3/1/20 12:00 AM	4/1/20 12:00 AM	31	3/16/20 12:00 PM	5/11/20 12:00 AM	55.50	164,029
7	June-20	2,835	4/1/20 12:00 AM	5/1/20 12:00 AM	30	4/16/20 12:00 AM	6/15/20 12:00 AM	60.00	170,123
8	July-20	2,368	5/1/20 12:00 AM	6/1/20 12:00 AM	31	5/16/20 12:00 PM	7/13/20 12:00 AM	57.50	136,167
9	August-20	561	6/1/20 12:00 AM	7/1/20 12:00 AM	30	6/16/20 12:00 AM	8/10/20 12:00 AM	55.00	30,846
10	September-20	839	7/1/20 12:00 AM	8/1/20 12:00 AM	31	7/16/20 12:00 PM	9/14/20 12:00 AM	59.50	49,896
11	October-20	478	8/1/20 12:00 AM	9/1/20 12:00 AM	31	8/16/20 12:00 PM	10/13/20 12:00 AM	57.50	27,476
12	November-20	360	9/1/20 12:00 AM	10/1/20 12:00 AM	30	9/16/20 12:00 AM	11/16/20 12:00 AM	61.00	21,963
13	December-20	754	10/1/20 12:00 AM	11/1/20 12:00 AM	31	10/16/20 12:00 PM	12/14/20 12:00 AM	58.50	44,110
14									
15		$ 16,382			366			58.97	$ 966,061
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

Unitil Energy Systems, Inc.
Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: Utility Services Inc.
#10-29-12-32-561-05-00

Line No	Month	Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	325.00	12/1/19 12:00 AM	1/1/20 12:00 AM	31	12/16/19 12:00 PM	1/30/20 12:00 AM	44.50	$ 14,463
3	February-20	325.00	1/1/20 12:00 AM	2/1/20 12:00 AM	31	1/16/20 12:00 PM	2/20/20 12:00 AM	34.50	11,213
4	March-20	325.00	2/1/20 12:00 AM	3/1/20 12:00 AM	29	2/15/20 12:00 PM	3/19/20 12:00 AM	32.50	10,563
5	June-20	325.00	3/1/20 12:00 AM	4/1/20 12:00 AM	31	3/16/20 12:00 PM	6/4/20 12:00 AM	79.50	25,838
6	June-20	325.00	4/1/20 12:00 AM	5/1/20 12:00 AM	30	4/16/20 12:00 AM	6/4/20 12:00 AM	49.00	15,925
7	July-20	325.00	5/1/20 12:00 AM	6/1/20 12:00 AM	31	5/16/20 12:00 PM	7/30/20 12:00 AM	74.50	24,213
8	July-20	325.00	6/1/20 12:00 AM	7/1/20 12:00 AM	30	6/16/20 12:00 AM	7/30/20 12:00 AM	44.00	14,300
9	October-20	325.00	7/1/20 12:00 AM	8/1/20 12:00 AM	31	7/16/20 12:00 PM	10/29/20 12:00 AM	104.50	33,963
10	November-21	325.00	8/1/20 12:00 AM	9/1/20 12:00 AM	31	8/16/20 12:00 PM	12/3/20 12:00 AM	108.50	35,263
11	December-20	325.00	9/1/20 12:00 AM	10/1/20 12:00 AM	30	9/16/20 12:00 AM	12/3/20 12:00 AM	78.00	25,350
12	December-20	325.00	10/1/20 12:00 AM	11/1/20 12:00 AM	31	10/16/20 12:00 PM	12/3/20 12:00 AM	47.50	15,438
13	December-20	321.25	11/1/20 12:00 AM	12/1/20 12:00 AM	30	11/16/20 12:00 AM	1/7/21 12:00 AM	52.00	16,705
14									
15		$ 3,896			366			62.43	$ 243,230
16									
17									
18									
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23									
24									
25									

Unitil Energy Systems, Inc.
Docket No. DE 21-030
DOE Data Requests – Set 4

Date Request Received: 08/05/2021 Date of Response: 09/02/2021
Request No. DOE 4-66 Witness: Daniel J. Hurstak

REQUEST:

Reference Testimony of Daniel J. Hurstak and Attachments; Exhibits DJH 1, 2, and 3:

a. Please provide a calculation of the net lag days using a Lead/Lag study, for Other Flow-Through Operating Expenses Excluding Transmission costs that are approved for recovery through UES's EDC in DE 21-121, Exhibit 1 at Bates 77-79, columns f through q, and s, as applicable. Please describe any assumptions and calculations made in this analysis.
b. Please provide a working capital requirement for these Other Flow-Through Operating Expenses Excluding Transmission costs, using these Lead/Lag results, and compare that requirement to what was approved for recovery in DE 21-121, Exhibit 1 at Bates 77-79, column r.

RESPONSE:

a. The assumptions used in preparing the Other Flow-Through Operating Expenses Excluding Transmission Lead/Lag study are generally consistent with the assumptions used in the cash working capital Lead/Lag study that was prepared in support of the Company's base distribution rates. The assumptions used in preparing the Other Flow-Through Operating Expenses Excluding Transmission Lead/Lag study include the following:

   - Test year ending December 31, 2020 (consistent with the base distribution Lead/Lag study)
   - The overall approach, revenue lag, and expense lag are consistent with the base distribution Lead/Lag study

   As indicated by the data on page 1 of DOE 4-66 Attachment 1, the net lag for Other Flow-Through Operating Expenses Excluding Transmission for the test year ended December 31, 2020 is 5.32 days.

b. The Company applied the 5.32 days to the total Other Flow-Through Operating Expenses Excluding Transmission included in Exhibit 1, Bates 77-79, columns f through q, and s, as applicable, in DE 21-121 noting that the working capital requirement for the test year ended December 31, 2020 was calculated to be $9,351. The amount of working capital included in DE 21-121 for the test year ending December 31, 2020 is $79,506.

   The annual period for the Company's EDC mechanism is not a calendar year. The Company utilized the same period as base distribution rates to determine

Unitil Energy Systems, Inc.
Docket No. DE 21-030
DOE Data Requests – Set 4

Date Request Received: 08/05/2021 Date of Response: 09/02/2021
Request No. DOE 4-66 Witness: Daniel J. Hurstak

the net Other Flow-Through Operating Expenses Excluding Transmission lead/lag days with the assumption that a twelve month test year period should provide a net lag that is indicative of a normal year.

Docket DE 21-030
DOE 4-66 Attachment 1
Page 1 of 11

Unitil Energy Systems, Inc.
Non-Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020
Summary of Non-Transmission

Line No	Supplier		Non-Transmission Expense	(Lead) Lag Days	Weighted Dollar Days
1					
2					
3	Independent System Operator		$ (1,190)	58.09	$ (69,140)
4	Independent System Operator _2		(25,414)	57.98	(1,473,614)
5	Independent System Operator _3		12,480	74.00	923,520
6	Energy Services Group LLC		141,026	40.04	5,646,711
7	CGI Technologies and Solutions, Inc.		170,385	46.57	7,935,573
8	Connecticut Municipal Electric		15,000	(3.83)	(57,500)
9	North American Energy		2,000	(195.50)	(391,000)
10	Pierce Atwood LLP		2,824	85.00	240,082
11	Black & Veatch Corp.		5,190	32.94	170,970
12	State of New Hampshire		56,989	111.65	6,362,733
13		Total	$379,290	50.85	$19,288,335
14					
15					
16					
17					
18					
19					
20			**Revenue (Lead) Lag Days**	**Expense (Lead) / Lag Days**	**Net (Lead) Lag Days**
21			56.17	50.85	5.32
22					
23					
24					
25					

Unitil Energy Systems, Inc.
Non-Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: Independent System Operator (ISO)
#10-29-13-32-555-88-00

Line No	Month	Non-Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	(1,182.84)	11/1/19 12:00 AM	12/1/19 12:00 AM	30	11/16/19 12:00 AM	1/13/20 12:00 AM	58.00	$ (68,605)
3	February-20	0.03	12/1/19 12:00 AM	1/1/20 12:00 AM	31	12/16/19 12:00 PM	2/18/20 12:00 AM	63.50	2
4	March-20	(24.98)	1/1/20 12:00 AM	2/1/20 12:00 AM	31	1/16/20 12:00 PM	3/16/20 12:00 AM	59.50	(1,486)
5	April-20	0.10	2/1/20 12:00 AM	3/1/20 12:00 AM	29	2/15/20 12:00 PM	4/13/20 12:00 AM	57.50	6
6	May-20	9.42	3/1/20 12:00 AM	4/1/20 12:00 AM	31	3/16/20 12:00 PM	5/11/20 12:00 AM	55.50	523
7	June-20	0.14	4/1/20 12:00 AM	5/1/20 12:00 AM	30	4/16/20 12:00 AM	6/15/20 12:00 AM	60.00	8
8	July-20	7.79	5/1/20 12:00 AM	6/1/20 12:00 AM	31	5/16/20 12:00 PM	7/13/20 12:00 AM	57.50	448
9	August-20	9.02	6/1/20 12:00 AM	7/1/20 12:00 AM	30	6/16/20 12:00 AM	8/10/20 12:00 AM	55.00	496
10	September-20	(9.33)	7/1/20 12:00 AM	8/1/20 12:00 AM	31	7/16/20 12:00 PM	9/14/20 12:00 AM	59.50	(555)
11	October-20	0.02	8/1/20 12:00 AM	9/1/20 12:00 AM	31	8/16/20 12:00 PM	10/13/20 12:00 AM	57.50	1
12	November-20	0.02	9/1/20 12:00 AM	10/1/20 12:00 AM	30	9/16/20 12:00 AM	11/16/20 12:00 AM	61.00	1
13	December-20	0.36	10/1/20 12:00 AM	11/1/20 12:00 AM	31	10/16/20 12:00 PM	12/14/20 12:00 AM	58.50	21
14									
15		$ (1,190)			366			58.09	$ (69,140)
16									
17									
18									
19									
20									
21									
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23									
24									
25									

Unitil Energy Systems, Inc.
Non-Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: Independent System Operator (ISO)
#10-29-13-32-555-89-00

Line No	Month	Non-Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	$ (24,040)	11/1/19 12:00 AM	12/1/19 12:00 AM	30	11/16/19 12:00 AM	1/13/20 12:00 AM	58.00	$ (1,394,339)
3	February-20	8	12/1/19 12:00 AM	1/1/20 12:00 AM	31	12/16/19 12:00 PM	2/18/20 12:00 AM	63.50	501
4	March-20	(877)	1/1/20 12:00 AM	2/1/20 12:00 AM	31	1/16/20 12:00 PM	3/16/20 12:00 AM	59.50	(52,183)
5	April-20	(466)	2/1/20 12:00 AM	3/1/20 12:00 AM	29	2/15/20 12:00 PM	4/13/20 12:00 AM	57.50	(26,808)
6	May-20	(252)	3/1/20 12:00 AM	4/1/20 12:00 AM	31	3/16/20 12:00 PM	5/11/20 12:00 AM	55.50	(14,008)
7	June-20	(147)	4/1/20 12:00 AM	5/1/20 12:00 AM	30	4/16/20 12:00 AM	6/15/20 12:00 AM	60.00	(8,800)
8	July-20	166	5/1/20 12:00 AM	6/1/20 12:00 AM	31	5/16/20 12:00 PM	7/13/20 12:00 AM	57.50	9,524
9	August-20	(337)	6/1/20 12:00 AM	7/1/20 12:00 AM	30	6/16/20 12:00 AM	8/10/20 12:00 AM	55.00	(18,515)
10	September-20	(189)	7/1/20 12:00 AM	8/1/20 12:00 AM	31	7/16/20 12:00 PM	9/14/20 12:00 AM	59.50	(11,262)
11	October-20	(104)	8/1/20 12:00 AM	9/1/20 12:00 AM	31	8/16/20 12:00 PM	10/13/20 12:00 AM	57.50	(5,958)
12	November-20	(8)	9/1/20 12:00 AM	10/1/20 12:00 AM	30	9/16/20 12:00 AM	11/16/20 12:00 AM	61.00	(502)
13	December-20	833	10/1/20 12:00 AM	11/1/20 12:00 AM	31	10/16/20 12:00 PM	12/14/20 12:00 AM	58.50	48,736
14									
15		$ (25,414)			366			57.98	$ (1,473,614)
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

Unitil Energy Systems, Inc.
Non-Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: Independent System Operator (ISO)
#10-29-01-32-928-01-01

Line No	Month	Non-Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	$ -			-			-	$ -
3	February-20	-			-			-	-
4	March-20	-			-			-	-
5	April-20	-			-			-	-
6	May-20	-			-			-	-
7	June-20	-			-			-	-
8	July-20	-			-			-	-
9	August-20	-			-			-	-
10	September-20	12,480	1/1/20 12:00 AM	1/1/21 12:00 AM	366	7/2/20 12:00 AM	9/14/20 12:00 AM	74.00	923,520
11	October-20	-			-			-	-
12	November-20	-			-			-	-
13	December-20	-			-			-	-
14									
15		$ 12,480			366			74.00	$ 923,520
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

Unitil Energy Systems, Inc.
Non-Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: Energy Services Group LLC
#10-29-13-32-923-12-00

Line No	Month	Non-Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	$ 10,419	11/1/19 12:00 AM	12/1/19 12:00 AM	30	11/16/19 12:00 AM	1/9/20 12:00 AM	54.00	$ 562,626
3	January-20	10,419	12/1/19 12:00 AM	1/1/20 12:00 AM	31	12/16/19 12:00 PM	1/9/20 12:00 AM	23.50	244,847
4	February-20	10,419	1/1/20 12:00 AM	2/1/20 12:00 AM	31	1/16/20 12:00 PM	2/20/20 12:00 AM	34.50	359,456
5	March-20	10,523	2/1/20 12:00 AM	3/1/20 12:00 AM	29	2/15/20 12:00 PM	3/16/20 12:00 AM	29.50	310,414
6	April-20	1,020	3/1/20 12:00 AM	4/1/20 12:00 AM	31	3/16/20 12:00 PM	4/20/20 12:00 AM	34.50	35,190
7	April-20	10,370	3/1/20 12:00 AM	4/1/20 12:00 AM	31	3/16/20 12:00 PM	4/20/20 12:00 AM	34.50	357,765
8	June-20	10,370	4/1/20 12:00 AM	5/1/20 12:00 AM	30	4/16/20 12:00 AM	6/8/20 12:00 AM	53.00	549,610
9	June-20	10,574	5/1/20 12:00 AM	6/1/20 12:00 AM	31	5/16/20 12:00 PM	6/15/20 12:00 AM	29.50	311,933
10	July-20	1,020	6/1/20 12:00 AM	7/1/20 12:00 AM	30	6/16/20 12:00 AM	7/21/20 12:00 AM	35.00	35,700
11	July-20	10,574	6/1/20 12:00 AM	7/1/20 12:00 AM	30	6/16/20 12:00 AM	7/27/20 12:00 AM	41.00	433,534
12	September-20	1,020	7/1/20 12:00 AM	8/1/20 12:00 AM	31	7/16/20 12:00 PM	9/8/20 12:00 AM	53.50	54,570
13	September-20	10,574	7/1/20 12:00 AM	8/1/20 12:00 AM	31	7/16/20 12:00 PM	9/21/20 12:00 AM	66.50	703,171
14	October-20	10,676	8/1/20 12:00 AM	9/1/20 12:00 AM	31	8/16/20 12:00 PM	10/8/20 12:00 AM	52.50	560,490
15	October-20	1,020	9/1/20 12:00 AM	10/1/20 12:00 AM	30	9/16/20 12:00 AM	10/8/20 12:00 AM	22.00	22,440
16	October-20	10,676	9/1/20 12:00 AM	10/1/20 12:00 AM	30	9/16/20 12:00 AM	10/15/20 12:00 AM	29.00	309,604
17	November-20	10,676	10/1/20 12:00 AM	11/1/20 12:00 AM	31	10/16/20 12:00 PM	11/23/20 12:00 AM	37.50	400,350
18	December-20	10,676	11/1/20 12:00 AM	12/1/20 12:00 AM	30	11/16/20 12:00 AM	12/23/20 12:00 AM	37.00	395,012
19									
20		$ 141,026						40.04	$ 5,646,711
21									
22									
23									
24									
25									

Unitil Energy Systems, Inc.
Non-Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: CGI Technologies and Solutions, Inc.
#10-29-13-32-923-12-00

Line No	Month	Non-Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	$ 13,778	12/1/19 12:00 AM	1/1/20 12:00 AM	31	12/16/19 12:00 PM	2/3/20 12:00 AM	48.50	$ 668,220
3	February-20	13,793	1/1/20 12:00 AM	2/1/20 12:00 AM	31	1/16/20 12:00 PM	3/4/20 12:00 AM	47.50	655,153
4	March-20	13,810	2/1/20 12:00 AM	3/1/20 12:00 AM	29	2/15/20 12:00 PM	3/30/20 12:00 AM	43.50	600,718
5	April-20	13,880	3/1/20 12:00 AM	4/1/20 12:00 AM	31	3/16/20 12:00 PM	5/4/20 12:00 AM	48.50	673,189
6	May-20	14,333	4/1/20 12:00 AM	5/1/20 12:00 AM	30	4/16/20 12:00 AM	6/8/20 12:00 AM	53.00	759,655
7	June-20	14,342	5/1/20 12:00 AM	6/1/20 12:00 AM	31	5/16/20 12:00 PM	7/1/20 12:00 AM	45.50	652,554
8	July-20	14,348	6/1/20 12:00 AM	7/1/20 12:00 AM	30	6/16/20 12:00 AM	8/10/20 12:00 AM	55.00	789,148
9	August-20	14,356	7/1/20 12:00 AM	8/1/20 12:00 AM	31	7/16/20 12:00 PM	8/27/20 12:00 AM	41.50	595,782
10	September-20	14,368	8/1/20 12:00 AM	9/1/20 12:00 AM	31	8/16/20 12:00 PM	9/24/20 12:00 AM	38.50	553,173
11	October-20	14,399	9/1/20 12:00 AM	10/1/20 12:00 AM	30	9/16/20 12:00 AM	11/2/20 12:00 AM	47.00	676,744
12	November-20	14,477	10/1/20 12:00 AM	11/1/20 12:00 AM	31	10/16/20 12:00 PM	12/3/20 12:00 AM	47.50	687,646
13	December-20	14,502	11/1/20 12:00 AM	12/1/20 12:00 AM	30	11/16/20 12:00 AM	12/29/20 12:00 AM	43.00	623,592
14									
15		$ 170,385			366			46.57	$ 7,935,573
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

Unitil Energy Systems, Inc.
Non-Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: CT Municipal Electric
#10-29-13-32-556-00-00

Line No	Month	Non-Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	$ 1,250	1/1/20 12:00 AM	2/1/20 12:00 AM	31	1/16/20 12:00 PM	1/21/20 12:00 AM	4.50	$ 5,625
3	February-20	1,250	2/1/20 12:00 AM	3/1/20 12:00 AM	29	2/15/20 12:00 PM	2/10/20 12:00 AM	(5.50)	(6,875)
4	March-20	1,250	3/1/20 12:00 AM	4/1/20 12:00 AM	31	3/16/20 12:00 PM	3/4/20 12:00 AM	(12.50)	(15,625)
5	April-20	1,250	4/1/20 12:00 AM	5/1/20 12:00 AM	30	4/16/20 12:00 AM	4/8/20 12:00 AM	(8.00)	(10,000)
6	May-20	1,250	5/1/20 12:00 AM	6/1/20 12:00 AM	31	5/16/20 12:00 PM	5/14/20 12:00 AM	(2.50)	(3,125)
7	June-20	1,250	6/1/20 12:00 AM	7/1/20 12:00 AM	30	6/16/20 12:00 AM	6/15/20 12:00 AM	(1.00)	(1,250)
8	July-20	1,250	7/1/20 12:00 AM	8/1/20 12:00 AM	31	7/16/20 12:00 PM	7/9/20 12:00 AM	(7.50)	(9,375)
9	August-20	1,250	8/1/20 12:00 AM	9/1/20 12:00 AM	31	8/16/20 12:00 PM	8/13/20 12:00 AM	(3.50)	(4,375)
10	September-20	1,250	9/1/20 12:00 AM	10/1/20 12:00 AM	30	9/16/20 12:00 AM	9/3/20 12:00 AM	(13.00)	(16,250)
11	October-20	1,250	10/1/20 12:00 AM	11/1/20 12:00 AM	31	10/16/20 12:00 PM	10/8/20 12:00 AM	(8.50)	(10,625)
12	November-20	1,250	11/1/20 12:00 AM	12/1/20 12:00 AM	30	11/16/20 12:00 AM	11/23/20 12:00 AM	7.00	8,750
13	December-20	1,250	12/1/20 12:00 AM	1/1/21 12:00 AM	31	12/16/20 12:00 PM	12/21/20 12:00 AM	4.50	5,625
14									
15		$ 15,000			366			(3.83)	$ (57,500)
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

Unitil Energy Systems, Inc.
Non-Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: North American Energy
#10-29-01-32-928-03-00

Line No	Month	Non-Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	$ -			-			-	$ -
3	February-20	-			-			-	-
4	March-20	2,000	4/1/20 12:00 AM	4/1/21 12:00 AM	365	9/30/20 12:00 PM	3/19/20 12:00 AM	(195.50)	(391,000)
5	April-20	-			-			-	-
6	May-20	-			-			-	-
7	June-20	-			-			-	-
8	July-20	-			-			-	-
9	August-20	-			-			-	-
10	September-20	-			-			-	-
11	October-20	-			-			-	-
12	November-20	-			-			-	-
13	December-20	-			-			-	-
14									
15		$ 2,000			365			(195.50)	$ (391,000)
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

Unitil Energy Systems, Inc.
Non-Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: Pierce Atwood LLP
#10-29-01-32-928-03-00

Line No	Month	Non-Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	$ -			-			-	$ -
3	February-20	-			-			-	-
4	March-20	-			-			-	-
5	April-20	-			-			-	-
6	May-20	-			-			-	-
7	June-20	-			-			-	-
8	July-20	-			-			-	-
9	August-20	-			-			-	-
10	September-20	2,824	6/1/20 12:00 AM	7/1/20 12:00 AM	30	6/16/20 12:00 AM	9/9/20 12:00 AM	85.00	240,082
11	October-20	-			-			-	-
12	November-20	-			-			-	-
13	December-20	-			-			-	-
14									
15		$ 2,824			30			85.00	$ 240,082
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

Unitil Energy Systems, Inc.
Non-Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: Black & Veatch Corp.
#10-29-13-32-923-11-00

Line No	Month	Non-Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	January-20	$ -			-			-	$ -
3	February-20	3,000	1/1/20 12:00 AM	2/1/20 12:00 AM	31	1/16/20 12:00 PM	2/21/20 12:00 AM	35.50	106,500
4	March-20	900	2/1/20 12:00 AM	3/1/20 12:00 AM	29	2/15/20 12:00 PM	3/18/20 12:00 AM	31.50	28,350
5	April-20	-			-			-	-
6	May-20	1,290	4/1/20 12:00 AM	5/1/20 12:00 AM	30	4/16/20 12:00 AM	5/14/20 12:00 AM	28.00	36,120
7	June-20	-			-			-	-
8	July-20	-			-			-	-
9	August-20	-			-			-	-
10	September-20	-			-			-	-
11	October-20	-			-			-	-
12	November-20	-			-			-	-
13	December-20	-			-			-	-
14									
15		$ 5,190			90			32.94	$ 170,970
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

Unitil Energy Systems, Inc.
Non-Transmission - Calculation of (Lead) Lag
12 Months Ended Dec 31, 2020

Supplier: State of NH
#10-29-13-32-923-11-00

Line No	Month	Non-Transmission Expense	Service From	Service To	Total Days	Mid-Point Calculation Date	Payment Date	(Lead) Lag Days	Weighted Dollar Days
1									
2	February-20	$ 118	2/13/20 12:00 AM	2/14/20 12:00 AM	1	2/13/20 12:00 PM	2/27/20 12:00 AM	13.50	$ 1,597
3	February-20	4,472	7/1/19 12:00 AM	11/1/19 12:00 AM	123	8/31/19 12:00 PM	2/27/20 12:00 AM	179.50	802,692
4	March-20	8,114	10/1/19 12:00 AM	12/1/19 12:00 AM	61	10/31/19 12:00 PM	3/19/20 12:00 AM	139.50	1,131,934
5	March-20	2,434	10/1/19 12:00 AM	2/1/20 12:00 AM	123	12/1/19 12:00 PM	3/26/20 12:00 AM	115.50	281,081
6	March-20	4,902	2/1/20 12:00 AM	3/1/20 12:00 AM	29	2/15/20 12:00 PM	4/2/20 12:00 AM	46.50	227,963
7	May-20	10,356	12/1/19 12:00 AM	2/1/20 12:00 AM	62	1/1/20 12:00 AM	5/7/20 12:00 AM	127.00	1,315,179
8	May-20	3,718	3/1/20 12:00 AM	4/1/20 12:00 AM	31	3/16/20 12:00 PM	5/14/20 12:00 AM	58.50	217,481
9	July-20	7,407	5/1/20 12:00 AM	6/1/20 12:00 AM	31	5/16/20 12:00 PM	7/1/20 12:00 AM	45.50	337,024
10	July-20	3,952	4/1/20 12:00 AM	5/1/20 12:00 AM	30	4/16/20 12:00 AM	7/9/20 12:00 AM	84.00	332,006
11	August-20	-			-			-	-
12	September-20	-			-			-	-
13	November-20	11,515	6/1/20 12:00 AM	7/1/20 12:00 AM	30	6/16/20 12:00 AM	11/12/20 12:00 AM	149.00	1,715,777
14									
15		$ 56,989						111.65	$ 6,362,733
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									