

1 Attachment A

2 Education and Professional Background

3 Elizabeth R. Nixon

4
5 My name is Elizabeth R. Nixon. I am employed as a Utility Analyst with the New
6 Hampshire Public Utilities Commission (PUC). My business address is 21 S. Fruit St., Suite 10,
7 Concord, NH 03301.

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

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

21 I joined the PUC's Sustainable Energy Division in August 2012 where I managed
22 renewable energy incentive programs, determined compliance with the renewable portfolio
23 standard (RPS) program, and conducted analysis of and provided testimony and presentations on

1 the RPS program and rebate programs. In August 2016, I joined the PUC's Electric Division. I
2 completed electric utility rate training at New Mexico State University's Center for Public
3 Utilities.

4 I have testified in the energy efficiency program docket (DE 17-136) and Liberty's
5 battery storage pilot docket (DE 17-189). In addition, I have provided Staff recommendations in
6 the grid modernization docket (IR 15-296) and electric vehicle rate design docket (IR 20-004).

**Unitil Energy System, Inc.
 System Benefits Charge ("SBC") Calculation**

Unitil Energy Systems, Inc.
 NHPUC Docket No. DE 20-092
 Attachment H3 - (2021 - 2023 Plan)
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Residential Sector (includes Low-Income Residential)													(Jan 1, 21 & 22 & 23)
Year	EE Total Budget	RGGI Revenues	FCM Revenues	Other Revenues	Prior Year Deferral with Interest	Current Year Interest	SBC Requirement	Forecasted Distribution (kWh)	SBC Rate EE Portion (\$/kWh)	SBC Rate EAP Portion (\$/kWh)	SBC Rate LBR Portion (\$/kWh)	Total SBC Rate (\$/kWh)	
Col. A	Col. B	Col. C	Col. D	Col. E	Col. F	Col. G	Col. H	Col. I	Col. J	Col. K	Col. L	Col. M	
2021	\$ 4,677,524	\$ 56,687	\$ 168,524	\$ 963,228	\$ (465,753)	\$ (14,347)	\$ 3,008,984	489,122,763	\$0.00615	\$0.00150	\$0.00120	\$0.00885	
2022	\$ 5,158,548	\$ 54,463	\$ 140,137	\$ 1,239,115	\$ 879	\$ (727)	\$ 3,724,986	482,005,817	\$0.00773	\$0.00150	\$0.00145	\$0.01068	
2023	\$ 5,638,608	\$ 52,238	\$ 133,129	\$ 1,488,459	\$ (148)	\$ (715)	\$ 3,963,919	478,409,960	\$0.00829	\$0.00150	\$0.00186	\$0.01165	

Commercial & Industrial (C&I) Sector													Total SBC Rate
Year	EE Total Budget	RGGI Revenues	FCM Revenues	Other Revenues	Prior Year Deferral with Interest	Current Year Interest	SBC Requirement	Forecasted Distribution (kWh)	SBC Rate EE Portion (\$/kWh)	SBC Rate EAP Portion (\$/kWh)	SBC Rate LBR Portion (\$/kWh)	Total SBC Rate (\$/kWh)	
Col. A	Col. B	Col. C	Col. D	Col. E	Col. F	Col. G	Col. H	Col. I	Col. J	Col. K	Col. L	Col. M	
2021	\$ 4,891,985	\$ 228,000	\$ 393,222	\$ (963,228)	\$ 122,445	\$ (11,204)	\$ 5,345,233	616,422,193	\$0.00867	\$0.00150	\$0.00129	\$0.01146	
2022	\$ 6,187,942	\$ 228,000	\$ 326,985	\$ (1,239,115)	\$ 852	\$ 1,295	\$ 6,874,218	642,314,405	\$0.01070	\$0.00150	\$0.00121	\$0.01341	
2023	\$ 7,751,441	\$ 228,000	\$ 310,634	\$ (1,488,459)	\$ (14)	\$ 934	\$ 8,702,186	652,689,123	\$0.01333	\$0.00150	\$0.00130	\$0.01613	

- Col. A: Effective year
- Col. B: Company Forecast
- Col. C: Company Forecast
- Col. D: Company Forecast
- Col. E: Company Forecast, C&I Funding for Low-Income Program
- Col. F: Page 2, Line 15
- Col. G: Page 3, Line 14
- Col. H: Col. B - Col. C - Col. D - Col. E + Col. F + Col. G
- Col. I: Company Forecast
- Col. J: Col. H / Col. I
- Col. K: EAP Portion of SBC Rate
- Col. L: Page 4, Col. G
- Col. M: Col. J + Col. K + Col. L

Unitil Energy Systems, Inc.
 NHPUC Docket No. DE 20-092
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Bill Impacts of Changes in System Benefits Charge - Unitil Energy Systems, Inc.
 Rates Proposed for Effect January 1, 2021, January 1, 2022 & January 1, 2023

	2020	2021	2022	2023
System Benefits Charge (\$/kWh) Residential	\$ 0.00752	\$ 0.00885	\$ 0.01068	\$ 0.01165
System Benefits Charge (\$/kWh) C&I	\$ 0.00752	\$ 0.01146	\$ 0.01341	\$ 0.01613
<u>Bill per month, including UES Default Service Charge</u>				
Residential Rate R (625 kWh/month)	\$ 109.78	\$ 110.61	\$ 111.75	\$ 112.36
General Service Rate G, three-phase service (40 kW, 10,000 kWh/month)	\$ 1,479.39	\$ 1,518.77	\$ 1,538.33	\$ 1,565.52
<u>Change from previous rate level - \$ per month</u>				
Residential Rate R (625 kWh/month)		\$ 0.83	\$ 1.14	\$ 0.61
General Service Rate G, three-phase service (40 kW, 10,000 kWh/month)		\$ 39.38	\$ 19.56	\$ 27.18
<u>Change from previous rate level - %</u>				
Residential Rate R (625 kWh/month)		0.8%	1.0%	0.5%
General Service Rate G, three-phase service (40 kW, 10,000 kWh/month)		2.7%	1.3%	1.8%

Lighting Measures	Sector	2021 Plan					2022 Plan					2023 Plan				
		Annual kWh Savings	Lifetime kWh Savings	Annual MMBtu Savings	Lifetime MMBtu Savings	Total Incentive Costs	Annual kWh Savings	Lifetime kWh Savings	Annual MMBtu Savings	Lifetime MMBtu Savings	Total Incentive Costs	Annual kWh Savings	Lifetime kWh Savings	Annual MMBtu Savings	Lifetime MMBtu Savings	Total Incentive Costs
Eversource	Residential	10,930,661	31,674,847	-	-	\$3,685,866	4,539,948	12,878,563	-	-	\$2,061,949	1,698,859	3,492,288	-	-	\$839,792
	C&I	53,629,429	666,043,477	-	-	\$17,034,472	62,028,328	774,789,598	-	-	\$22,032,824	69,178,454	867,824,887	-	-	\$24,870,557
Liberty	Residential	2,678,327	8,077,847	-	-	\$355,477	1,669,890	5,155,220	-	-	\$241,529	400,135	830,775	-	-	\$92,765
	C&I	8,066,999	106,380,008	-	-	\$1,125,543	9,077,820	118,669,368	-	-	\$1,272,769	10,121,147	131,312,355	-	-	\$1,423,015
NHEC	Residential	4,906,902	16,183,027	-	-	\$575,592	2,473,044	7,315,868	-	-	\$294,136	455,695	956,659	-	-	\$72,633
	C&I	3,730,951	49,160,561	-	-	\$928,351	4,067,595	53,619,651	-	-	\$1,115,164	3,943,081	51,819,890	-	-	\$1,070,787
Unitil	Residential	2,163,579	5,999,375	-	-	\$581,963	1,111,868	3,080,059	-	-	\$427,222	452,236	869,295	-	-	\$238,531
	C&I	4,845,615	55,005,648	-	-	\$1,557,835	4,387,598	46,804,957	-	-	\$1,625,832	3,599,204	38,015,224	-	-	\$1,551,145

Non-Lighting Measures	Sector	2021 Plan					2022 Plan					2023 Plan				
		Annual kWh Savings	Lifetime kWh Savings	Annual MMBtu Savings	Lifetime MMBtu Savings	Total Incentive Costs	Annual kWh Savings	Lifetime kWh Savings	Annual MMBtu Savings	Lifetime MMBtu Savings	Total Incentive Costs	Annual kWh Savings	Lifetime kWh Savings	Annual MMBtu Savings	Lifetime MMBtu Savings	Total Incentive Costs
Eversource	Residential	7,980,099	125,537,941	87,540	1,814,814	\$18,373,707	9,653,855	151,372,400	99,635	2,073,810	\$23,433,170	11,512,315	179,663,291	109,566	2,286,381	\$28,524,345
	C&I	38,131,941	558,148,523	3,355	70,966	\$13,840,711	54,736,514	785,970,467	3,360	71,044	\$21,884,642	78,347,816	1,107,589,873	3,365	71,122	\$34,225,602
Liberty	Residential	2,140,754	20,441,683	5,383	118,249	\$1,658,510	2,725,789	24,394,568	6,459	141,810	\$2,014,306	3,750,739	29,376,974	7,731	168,756	\$2,390,091
	C&I	1,968,468	28,972,687	56	1,104	\$362,752	2,304,326	34,071,500	56	1,104	\$421,296	2,708,837	40,227,536	56	1,104	\$479,953
NHEC	Residential	1,715,969	26,563,299	12,492	277,148	\$2,098,349	1,653,087	25,456,385	12,871	286,262	\$2,246,069	1,705,389	26,393,910	13,201	293,570	\$2,531,796
	C&I	2,001,582	26,296,700	127	3,170	\$421,342	2,037,687	26,801,835	127	3,170	\$468,882	2,115,276	27,708,459	127	3,170	\$449,311
Unitil	Residential	3,255,359	20,707,056	8,727	170,129	\$2,214,962	3,874,970	24,556,833	10,906	211,296	\$3,264,895	5,222,645	29,488,346	12,588	239,035	\$3,733,251
	C&I	7,240,032	77,536,794	398	5,605	\$1,983,473	7,775,408	108,459,780	407	7,777	\$3,139,341	11,025,471	149,496,948	165	1,653	\$4,299,862

Lighting Measures	Sector	2021 Plan					2022 Plan					2023 Plan				
		Annual kWh Savings	Lifetime kWh Savings	Annual MMBtu Savings	Lifetime MMBtu Savings	Total Incentive Costs	Annual kWh Savings	Lifetime kWh Savings	Annual MMBtu Savings	Lifetime MMBtu Savings	Total Incentive Costs	Annual kWh Savings	Lifetime kWh Savings	Annual MMBtu Savings	Lifetime MMBtu Savings	Total Incentive Costs
Liberty	Residential	-	-	-	-	\$75	-	-	-	-	\$80	-	-	-	-	\$89
	C&I	-	-	-	-	\$0	-	-	-	-	\$0	-	-	-	-	\$0
Unitil	Residential	-	-	-	-	\$0	4,463	8,925	-	-	\$1,161	-	-	-	-	\$0
	C&I	-	-	-	-	\$0	-	-	-	-	\$0	-	-	-	-	\$0

Non-Lighting Measures	Sector	2021 Plan					2022 Plan					2023 Plan				
		Annual kWh Savings	Lifetime kWh Savings	Annual MMBtu Savings	Lifetime MMBtu Savings	Total Incentive Costs	Annual kWh Savings	Lifetime kWh Savings	Annual MMBtu Savings	Lifetime MMBtu Savings	Total Incentive Costs	Annual kWh Savings	Lifetime kWh Savings	Annual MMBtu Savings	Lifetime MMBtu Savings	Total Incentive Costs
Liberty	Residential	31,028	550,165	51,872	672,523	\$3,132,654	35,280	624,120	82,027	767,031	\$3,400,566	38,055	676,431	97,772	874,006	\$3,680,034
	C&I	9,506	152,173	102,013	1,366,661	\$1,892,649	9,699	155,570	109,692	1,503,913	\$2,110,787	9,917	159,339	121,802	1,658,558	\$2,338,502
Unitil	Residential	-	-	16,247	261,160	\$1,131,947	-	-	16,292	323,530	\$1,388,678	-	-	20,254	403,659	\$1,793,247
	C&I	497	7,458	27,903	403,286	\$956,606	621	9,322	41,467	587,247	\$1,423,220	-	-	55,559	787,081	\$2,163,421

**Public Service of New Hampshire d/b/a Eversource Energy
 Docket No. DE 20-092**

Date Request Received: 10/05/2020

Date of Response: 10/19/2020

Request No. STAFF 2-059

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Request from: New Hampshire Public Utilities Commission Staff

Witness: Katherine W. Peters, Eric Stanley, Mary Downes, Carol Woods

Request:

It appears that the NH utilities are using different net-to-gross assumptions for C&I midstream lighting. Eversource and NHEC use NTG of 70% NTG for midstream TLEDs and fixtures and 53% for lamps, while Liberty and Unitil use NTG of 84% for midstream TLEDs and fixtures and 73% for lamps. Please provide the source of the NTG assumptions that the NH utilities are using and explain why different NTG factors would be appropriate for different utilities.

Response:

The NH Utilities' BC models include consistent net-to-gross assumptions for C&I midstream lighting across the three years of the Plan. The values that are cited in the question for Eversource and NHEC are for 2023 and those that are referenced for Liberty and Unitil are for 2021. Below are the net-to-gross values used in the models for the utilities that have planned for midstream C&I lighting. It should be noted that only Unitil and Eversource are planning to offer midstream lighting for 2021-2023, but that Liberty electric and the NH Electric Cooperative may decide to offer measures through a midstream pathway in the future.

	2021	2022	2023
Midstream LED Downlight	73%	63%	53%
Midstream LED Exterior	84%	77%	70%
Midstream LED High Bay/Low Bay	84%	77%	70%
Midstream LED Linear Fixture	84%	77%	70%
Midstream LED Linear Fixture with Controls	84%	77%	70%
Midstream LED Linear Lamp	84%	77%	70%
Midstream LED Screw In	73%	63%	53%
Midstream LED Stairwell Kit	84%	77%	70%

Free-ridership and spillover are based on study results from CT—which is the nearby jurisdiction with programs and markets most similar to those in NH. Midstream lighting assumptions are described in detail in the draft NH Technical Reference Manual beginning on Bates 516.

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-092

Date Request Received: 10/05/2020

Date of Response: 10/19/2020

Request No. STAFF 2-060

Page 1 of 1

Request from: New Hampshire Public Utilities Commission Staff

Witness: Katherine W. Peters, Eric Stanley, Mary Downes, Carol Woods

Request:

Please provide an estimate, for each utility and for each plan year, of the proportion of C&I savings expected to come from custom vs prescriptive measures, including whether and how much this proportion is expected to vary from the 2018-2020 cycle.

Response:

The following table displays the planned share of annual savings in the BC models that are attributable to custom versus prescriptive savings measures. The Utilities note that planned values for prescriptive versus custom measures should be viewed as directional estimates, as it is not possible to know how many projects will actually go through a custom or prescriptive path. Therefore, it is difficult to predict “whether and how much this proportion is expected to vary from the 2018-2020 cycle.” In 2018, much of the C&I savings for the electric programs was prescriptive due to the predominance of lighting in the electric portfolio (lighting is typically processed as prescriptive). However, in 2019, the portfolio was a bit more diversified in its measure mix and there were a greater number of custom projects, which led to an increase in the proportion of ‘custom.’ The utilities expect that such year-to-year variations will continue. For the natural gas programs, custom projects accounted for 60-70 percent of total C&I savings in 2018 and 2019. We expect that the inclusion of more midstream program offerings and more widespread marketing of prescriptive offerings will impact the savings mix between custom and prescriptive in the next term.

Electric	2021		2022		2023	
	Custom	Prescriptive	Custom	Prescriptive	Custom	Prescriptive
Eversource	40%	60%	45%	55%	50%	50%
Liberty Electric	79%	21%	75%	25%	72%	28%
NHEC	99%	1%	99%	1%	97%	3%
Unitil Electric	42%	58%	53%	47%	52%	48%

Gas	2021		2022		2023	
	Custom	Prescriptive	Custom	Prescriptive	Custom	Prescriptive
Liberty Gas	55%	45%	57%	43%	54%	46%
Unitil Gas	46%	54%	48%	52%	70%	30%

Public Service of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-092

Date Request Received: 09/17/2020

Date of Response: 10/01/2020

Request No. STAFF 1-013

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Request from: New Hampshire Public Utilities Commission Staff

Witness: Katherine W. Peters, Mary Downes, Eric Stanley, Carol Woods

Request:

Reference Bates 212 and the program cost-effectiveness and benefits for each utility in Attachments E-J. Please provide supporting documentation for the non-energy impacts (NEIs) used in the secondary Granite State Test -2 benefit/cost analyses.

- a. Please provide a summary table showing the NEI value for each measure that was used as the basis for the NEIs used for each utility's Granite State Test -2 benefit/cost analysis.
- b. Please provide the supporting documentation that shows the basis for each utility's sector level NEI percentages.

Response:

- a. As reviewed by the EM&V Working Group, the database supporting the NEIs developed by third party evaluator DNV-GL is too complex to summarize by measure. Please reference the methodology memo describing how DNV-GL did the secondary research into NEI values elsewhere and adjusted them for NH
[<https://puc.nh.gov/Electric/Monitoring%20and%20Evaluation%20Reports/Final-NH-NEI-Methodology-Memo-20200409.pdf>] and the database that was developed as a deliverable in that comprehensive NEI evaluation
[<https://puc.nh.gov/Electric/Monitoring%20and%20Evaluation%20Reports/20200722-NH-NEI-Draft-Database-NHML-core.xlsm>]. The result of the analysis undertaken by DNV-GL at the request of the EM&V Working Group for the purposes of developing sector level adders for the 2021-2023 Plan is contained in Attachment Staff 1-013 A. The original version of the sector level adder analysis contained an error that is described in detail below. Attachment A discusses this error and updates the results of the original adder analysis.
- b. The NH Utilities apply an annual per participant NEI adder of \$405.71 to each unique HEA weatherization project. The adder is based on the Home Energy Assistance Program Evaluation Report 2016-2017
[<https://puc.nh.gov/Electric/Monitoring%20and%20Evaluation%20Reports/20200729-NHSaves-HEA-Evaluation-Report-FINAL.pdf>], published in July 2020. The NEI value in the model takes the total weatherization projects (equivalent to the number of planned Insulation projects, since most projects typically include this measure) and multiplies by the annual NEI adder at a 15-year (measure life of Insulation and Air Sealing measures) discounted rate. The NEI adder value is located in cell G69 in the Lookups tab of the EE models, and the calculation of lifetime benefits is made in the Calculations tabs, row 70, column DB (column DD for Liberty).

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For the non-low income Residential and C&I sectors, the NH Utilities included a non-energy impact (NEI) adder in their 2021-2023 BC Model that served as a proxy for participant benefits the program delivered beyond those derived from reduced energy use. The adder was in the form of a percentage applied to savings benefits. The following NEI percentages by sector were used in the secondary Granite State Test – 2 benefit/cost analyses:

	Residential Adder (Not Applied to HEA)	C&I Adder
Eversource	36.3%	17.6%
Liberty Electric	37.2%	21.3%
NHEC	10.0% (adder not updated for 9/1)	10.0% (adder not updated for 9/1)
Unitil	51.0%	17.0%
Liberty Gas	26.9%	21.9%
Unitil Gas	28.0%	25.0%

The supporting documentation that shows the basis for the sector level NEI percentages used in the secondary Granite State Test – 2 benefit / cost analysis is introduced here as Attachment Staff 1-013 A.

After submitting the 2021–2023 NH Statewide EE Plan, it was discovered that the original file utilized by the vendor for the NEI percentage calculations by sector included a pre-populated “NEI adder” column from the BC models provided. The inclusion of this column inflated NEI benefits impacting the Second Granite State Test results. Eversource, Liberty (Electric and Gas) and Unitil (Electric and Gas) were impacted by the inclusion of this column in the original submission. The low income and demand response programs were not affected. The error affected some residential programs and the C&I programs. The corrected NEI percentages by sector are below. These corrections will be made to the benefit / cost models in a compliance filing. Under the updated sector-level adders, calculated benefits under the secondary GST-2 test decrease by approximately 4%. This change does not cause any cost effective program to become not-cost effective under the GST-2.

	Residential Adder (Not Applied to HEA)	C&I Adder
Eversource	28.0%	10.8%
Liberty Electric	33.2%	14.7%
NHEC	27.4%	18.2%
Unitil	42.5%	11.5%
Liberty Gas	19.5%	14.0%
Unitil Gas	19.4%	16.7%

The supporting documentation for the corrected NEIs used in the secondary Granite State Test -2 benefit/cost analyses are introduced here as Excel Attachments Staff 1-013 B, C, D and E, and also discussed in Attachment Staff 1-013 A.

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In addition to the sector-level NEI adders, the NH Utilities claim benefits from reduced fossil emissions based on RGGI. As described in AESC 2018, some environmental costs are “embedded” in the price of the energy due to regulations that require expenditures by generators or other energy suppliers to reduce emissions (e.g., the Regional Greenhouse Gas Initiative or (“RGGI”). “Non-embedded” environmental costs are externalities associated with energy production and supply that are not directly reflected in energy prices. AESC 2018 electric energy avoided costs include embedded avoided emissions costs. However, there are not comparable embedded emissions values associated with fossil fuels. In order to treat electric and fossil fuel emissions consistently in benefit-cost screening, the EE model incorporates comparable fossil fuel avoided emissions with a conservative calculation based on the AESC 2018 forecast of RGGI values and standard emissions output factors for those fuels.

The values that we have in the Avoided Costs tab of the model for the Fossil Emissions based on RGGI come from Table 131 of AESC 2018. Table 131 provides the fuel oil emission values for SO₂, NO_x, and CO₂. The emission values are shown by year and by sector. For our model, we take the CO₂ in \$/MMBtu from the table and then convert it to a price per ton. We use the CO₂ emissions rate for Oil to make this conversion. We use these costs and apply them to each fossil fuel saving measure based on the converted tons of fossil fuel saved. For these conversion factors we use the values from Table 20 of AESC 2018. What this amounts to is an inflation-adjusted price per ton of \$12.95 in the first year for 2021, or a cumulative price per ton of \$283.74 for a measure installed in 2021 with a 15 year measure life.