Public Service Company of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-161

Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
Data Request No. DOE 5-001 **Page 1 of 1**

Request from: Department of Energy

Witness: Johnson, Russel D

Request:
Refer to Eversource's Response to data request (DR) DOE 4-010: Please identify which customer classes are residential, industrial, or commercial.

Response:

See Attachment DOE 5-001.

All residential rates are available to residential customers only. Residential customers can also elect to be billed under Rates G or G-OTOD, but this is rare. All non-residential customers could be potentially classified as industrial or manufacturing depending on their business type. Rate OL is available to all customer classes, while Rate EOL is a rate only available for municipal streetlighting.

Rate	Service Type	Residential	Industrial	Commercial
Residential, including Rates R and R-OTOD	Single-phase, 60 hertz, alternating current, normally threewire at a nominal voltage of 120/240 volts.	Yes	No	No
Rate G	Either (a) single-phase, normally three-wire at a nominal voltage of 120/240 volts, or (b) three-phase, normally at a nominal voltage of 120/208 or 277/480 volts. Three-phase, three-wire service at a nominal voltage of 240, 480 or 600 volts is available only to those Customers at existing locations who were receiving such service on February 1, 1986, and who have continuously received such service since that date. In underground secondary network areas, Delivery Service will be supplied only at a nominal voltage of 120/208 volts	Yes	Yes	Yes
Rate G Time of Day	Either (a) single-phase, normally three-wire at a nominal voltage of 120/240 volts, or (b) three-phase, normally at a nominal voltage of 120/208 or 277/480 volts. Three-phase, three-wire service at a nominal voltage of 240, 480 or 600 volts is available only to those Customers at existing locations who were receiving such service on February 1, 1986, and who have continuously received such service since that date. In underground secondary network areas, Delivery Service will be supplied only at a nominal voltage of 120/208 volts	Yes	Yes	Yes
Rate GV	Three-phase, 60 hertz, alternating current, at a nominal voltage determined by the Company, generally 2,400/4,160, 4,800/8,320, 7,200/12,470, or 19,920/34,500 volts.	No	Yes	Yes
Rate GV Backup	Three-phase, 60 hertz, alternating current, at a nominal voltage determined by the Company, generally 2,400/4,160, 4,800/8,320, 7,200/12,470, or 19,920/34,500 volts	No	Yes	Yes
Rate LG	Three-phase, 60 hertz, alternating current, at a nominal delivery voltage determined by the Company, generally 34,500 volts or higher.	No	Yes	Yes
Rate LG Backup	Three-phase, 60 hertz, alternating current, at a nominal delivery voltage determined by the Company, generally 34,500 volts or higher.	No	Yes	Yes
Streetlighting Rate OL	N/A	Yes	Yes	Yes
Streetlighting Rate EOL	N/A	No	No	No

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Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
Data Request No. DOE 5-002 **Page 1 of 3**

Request from: Department of Energy

Witness: Hebsch, Jennifer J

Request:

Refer to Eversource's Responses to DRs DOE 4-014 and 4-022, LCIRP at Bates 000016: Please define and explain the following abbreviations: CII, WO, and MED. How do the reliability statistics compare to Company annual reliability targets? How do the statistics relate to annual Institute of Electrical and Electronics Engineers (IEEE) benchmarking data? What are the "without storm" and "with storm" quartile rankings? How do the statistics relate to annual PSE&G confidential benchmarking data?

Response:

Question: Please define and explain the following abbreviations: CIII, WO and MED:

Response: CIII is the average number of **C**ustomers **I**nterrupted per **I**nterruption **I**ndex. This metric is used primarily at the circuit level to help identify those circuits where additional protective devices or automation of existing devices might be warranted in order to reduce the number of customers impacted for a single event. WO refers to Work Order event, which is a medium-sized storm day. The criteria for WO events are different for each company. For NH, the threshold is >=100 primary events. MED refers to Major Event Day, which is defined as a day which meets IEEE criteria for a major storm day. The IEEE criteria takes into account 5 years of all-in data (including all storms) and reaches a daily SAIDI threshold per year that needs to be exceeded in order to qualify as an MED. These MED days are then excluded from reliability metrics reporting, resulting in performance based on IEEE criteria.

Question: How do the reliability statistics compare to Company annual reliability targets?

Response: NH reliability statistics from the past 5 years are shown in the table below. Eversource does not have a SAIFI target; rather a target for MBI (Months Between Interruptions) is used, which is the number of months in the period divided by SAIFI (e.g. 12 / 0.9654 = 12.4 MBI).

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NH - ES Reportable Criteria - (IEEE Excl PI) - With Targets					ES Reportable Actuals/Targets							
					SAIDI		CAIDI			MBI*		
Year	# Parent Events	CI	CMI	Cust Served	Actual	Target	Actual	Target	SAIFI	Actual	Target	CIII
2017	8,949	502,996	56,981,288	525,227	108	104	113	99	0.96	13	11	56
2018	8,164	475,763	56,822,365	528,668	107	107	119	107	0.90	13	12	58
2019	6,033	296,872	36,594,457	531,399	69	102	123	115	0.56	21	14	49
2020	7,455	367,108	45,916,873	535,095	86	95	125	117	0.69	17	15	49
2021	7,615	361,472	45,162,030	539,189	84	93	125	122	0.67	18	16	47

Question: How do the statistics relate to annual IEEE benchmarking data?

Response: NH reliability from the past 5 years is compared to IEEE Quartile information in the table below. Using ES Reportable criteria (IEEE criteria and excluding Planned Interruptions), the main criteria used within Eversource, NH has performed between the first and second quartiles for most of the reliability metrics, and 2019 CAIDI in the third quartile.

NH - ES Reportable Criteria - (IEEE Excl PI) - With Targets					ES Reportable Actuals/Targets								ES Quartiles SAIDI			ES Quartiles CAIDI			ES Quartiles SAIFI			ES Quartiles MBI		
					SAIDI		CAIDI			MBI*														
Year	# Parent Events	CI	CMI	Cust Served	Actual	Target	Actual	Target	SAIFI	Actual	Target	CIII	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3
2017	8,949	502,996	56,981,288	525,227	108	104	113	99	0.96	13	11	56	95.8	105.4	135.9	101.7	132.0	147.8	1.00	1.09	1.28	12.0	11.0	9.4
2018	8,164	475,763	56,822,365	528,668	107	107	119	107	0.90	13	12	58	95.2	116.4	146.3	94.1	105.4	126.9	0.96	1.08	1.22	12.5	11.1	9.9
2019	6,033	296,872	36,594,457	531,399	69	102	123	115	0.56	21	14	49	93.2	112.0	134.7	94.1	102.9	122.9	0.91	1.07	1.20	13.2	11.2	10.0
2020	7,455	367,108	45,916,873	535,095	86	95	125	117	0.69	17	15	49	80.7	112.0	135.3	94.2	110.9	125.8	0.86	1.03	1.16	13.9	11.6	10.3
2021	7,615	361,472	45,162,030	539,189	84	93	125	122	0.67	18	16	47	80.7	118.5	144.1	96.1	111.4	130.8	0.87	1.01	1.23	13.8	11.9	9.8

Question: What are the "without storm" and "with storm" quartile rankings?

Response: The "without storm" IEEE quartile rankings exclude IEEE MED days. The "without storm" IEEE quartiles represent the range of reliability metrics which respondents experienced during non-major storm days (but includes minor storms data). The "with storm" IEEE quartile rankings include what we call all-in data, which includes IEEE MED days. The "with storm" IEEE quartile rankings include IEEE MED days and minor storms. The "with storm" IEEE quartile rankings represent the range of reliability metrics which respondents experienced during all days, major storm and non-major storm. Please refer to the tables below.

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2017 - 2021 NH Reliability Metrics - Targets - IEEE Quartiles (NE & Mid-Atlantic companies Medium sized companies 3 Yr Avg)

NH - IEEE Criteria - Without IEEE MED Storms									IEEE Quartiles SAIDI			IEEE Quartiles CAIDI			IEEE Quartiles SAIFI			IEEE Quartiles MBI		
Year	# Parent Events	CI	CMI	Cust Served	SAIDI	CAIDI	SAIFI	CIII	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3
2017	11,735	581,568	62,285,406	525,227	119	107	1.11	50	108.1	138.1	160.2	98.4	109.5	139.2	1.03	1.13	1.34	11.6	10.6	8.9
2018	10,303	565,301	63,373,060	528,668	120	112	1.07	55	97.1	120.3	148.2	94.8	105.3	125.8	1.01	1.12	1.25	11.9	10.7	9.6
2019	8,821	393,556	43,913,997	531,399	83	112	0.74	45	96.8	116.9	139.0	94.9	103.8	122.5	0.98	1.10	1.21	12.2	10.9	9.9
2020	8,830	431,124	51,247,908	535,095	96	119	0.81	49	81.3	118.5	139.6	94.7	108.2	124.6	0.93	1.06	1.20	12.9	11.3	10.0
2021	9,370	448,477	52,107,413	531,916	98	116	0.84	48	84.8	121.4	149.7	95.3	109.7	129.6	0.92	1.06	1.26	13.0	11.3	9.5

NH - With Storms - All-In									All-In Quartiles SAIDI			All-In Quartiles CAIDI			All-In Quartiles SAIFI			All-In Quartiles MBI		
Year	# Parent Events	CI	CMI	Cust Served	SAIDI	CAIDI	SAIFI	CIII	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3
2017	16,436	991,058	488,857,780	525,227	931	493	1.89	60	158.2	238.0	732.0	122.6	199.1	446.2	1.19	1.50	1.85	10.1	8.0	6.5
2018	14,903	990,643	200,596,779	528,668	379	202	1.87	66	123.5	166.8	256.0	109.9	137.5	192.4	1.12	1.25	1.54	10.7	9.6	7.8
2019	11,785	623,614	118,360,911	531,399	223	190	1.17	53	119.8	155.0	217.7	110.5	125.4	157.9	1.08	1.22	1.48	11.1	9.8	8.1
2020	13,485	785,235	240,072,600	535,095	449	306	1.47	58	118.4	149.7	217.9	110.9	132.4	161.7	1.00	1.18	1.46	12.0	10.2	8.2
2021	11,217	562,999	94,270,738	539,189	175	167	1.04	50	143.5	199.7	388.2	120.5	156.8	235.8	1.10	1.31	1.56	10.9	9.2	7.7

Question: How do the statistics relate to annual PSE&G confidential benchmarking data?

Response: Only 2018-2020 PSE&G Quartile information was available. Eversource NH reliability statistics fell within the following quartiles, respectively (2018-2020):
SAIDI: Q3, Q1, Q2 CAIDI: Q3, Q2, Q2 SAIFI: Q2, Q1, Q1 MBI: Q3, Q1, Q1. Please refer to the table below.

NH - ES Reportable Criteria - (IEEE Excl PI) - With Targets					ES Reportable Actuals/Targets								PSE&G Benchmarking Survey Quartiles - Confidential - Green indicates where NH metrics fall within the confidential quartiles											
					SAIDI		CAIDI			MBI*			ES Quartiles SAIDI			ES Quartiles CAIDI			ES Quartiles SAIFI			ES Quartiles MBI		
Year	# Parent Events	CI	CMI	Cust Served	Actual	Target	Actual	Target	SAIFI	Actual	Target	CIII	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3
2017	8,949	502,996	56,981,288	525,227	108	104	113	99	0.96	13	11	56												
2018	8,164	475,763	56,822,365	528,668	107	107	119	107	0.90	13	12	58												
2019	6,033	296,872	36,594,457	531,399	69	102	123	115	0.56	21	14	49												
2020	7,455	367,108	45,916,873	535,095	86	95	125	117	0.69	17	15	49												
2021	7,615	361,472	45,162,030	539,189	84	93	125	122	0.67	18	16	47												

MBI* - Months Between Interruptions - # of Months in dataset/SAIFI

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Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
Data Request No. DOE 5-003 **Page 1 of 1**

Request from: Department of Energy

Witness: Hebsch, Jennifer J

Request:

Refer to Eversource Response to DR DOE 4-022: With major events excluded, PSNH ranks in the 1st and 2nd reliability performance quartiles with its peers. However, if major events are included, PSNH ranks in the lower portion of the 3rd quartile, i.e., doing worse than many of its peers. Is this what is driving the need to improve system resiliency? If not, what is driving this need? Please explain and identify all factors.

Response:

Reliability and Resiliency are often used interchangeably. However, they are in fact very different. Reliability is commonly defined as the ability of the electric power system to deliver electricity to the end-customer. When looking at the reliability performance and calculating metrics, major events are excluded to focus on the day-to-day, blue-sky operation and performance of the system. Resiliency, on the other hand, is the ability for the electric power system to withstand and recover from those low probability, high impact, extreme and damaging conditions, including weather and other natural disasters.

Although PSNH ranks in the 1st and 2nd reliability performance quartiles with its peers when excluding major events, the fact that PSNH ranks in the lower portion of the 3rd quartile when major events are included highlights there are opportunities and the need to improve overall system resiliency, especially when coupled with an observable increase in frequency and intensity of storms in New England. There are two resilience goals of the distribution system: (1) system adaptation, which is to reduce the impact of events (both outage frequency and duration); and (2) system survivability, which is to maintain an adequate functionality during and after the event. The Company is building a more resilient system through projects and programs that include upgrading distribution poles to stronger classes or more resilient steel poles, reconductoring to more resilient conductor such as spacer cable, and installing distribution automation (automated switches) to reduce customer outage impacts. These resiliency projects and programs will provide a more resilient system by reducing the impact of events and enabling the Company can get its system back up and running as quickly as possible.

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Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
Data Request No. DOE 5-004 **Page 1 of 2**

Request from: Department of Energy

Witness: Labrecque, Richard C

Request:

Refer to April 1, 2022 Technical Session, (discussion --as remembered-- among Eversource employee Russel Johnson and the RCG Consultants about planning criteria and potential criteria violations)

a. Please define the following terms with respect to system solutions when resolving system planning criteria violations:
   i. Alternative Solution
   ii. Feasible Alternative Solution
   iii. Technically Feasible Alternative Solution
   iv. Least Cost Alternative Solution
   v. Best Overall Alternative Solution

b. Please identify authoritative sources (internal to Eversource or otherwise) where the definitions provided above may be found.

Response:

Eversource has not formally documented definitions for the requested terms. Our general understanding of each term is given below.

Alternative Solution – project initiators are instructed to consider all reasonable solutions that address the needs identified. The initiator will gather input from a team of individuals from numerous Eversource functional areas. Each alternative solution is discussed from a variety of perspectives, e.g., electrical performance, constructability, outage planning, siting and permitting, environmental impacts, community and external stakeholder impacts, procurement, property rights, and future system expandability.

Feasible Alternative Solution – a project is considered feasible if no constraints have been identified that would preclude construction or implementation.

Technically Feasible Alternative Solution - a project is considered technically feasible if no technical constraints have been identified that would preclude construction or implementation.

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Least Cost Alternative Solution – the alternative solution with the least cost. As set forth in RSA 378:37, it is New Hampshire's energy policy that "least cost planning" requires selection of solutions that represent the "lowest reasonable cost" based on consideration of factors other than cost including reliability and diversity of energy sources.

378:37 New Hampshire Energy Policy. **–** The general court declares that it shall be the energy policy of this state to meet the energy needs of the citizens and businesses of the state at the lowest reasonable cost while providing for the reliability and diversity of energy sources; to maximize the use of cost effective energy efficiency and other demand side resources; and to protect the safety and health of the citizens, the physical environment of the state, and the future supplies of resources, with consideration of the financial stability of the state's utilities.

The Company takes these considerations into account when planning the distribution system.

Best Overall Alternative Solution – Eversource typically refers to this as the "Preferred Alternative." This is the alternative with the best combination of electrical performance, cost, future system expandability and feasibility to comprehensively address all of the identified needs in the required timeframe.

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Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
Data Request No. DOE 5-005 **Page 1 of 3**

Request from: Department of Energy

Witness: Freeman, Lavelle A

Request:

Refer to the Settlement Agreement (March 11, 2020) in Dkt. No. DE 19-139 and both of the Company's LCIRP filings. In the Settlement Agreement (March 11,2020) in Dkt. No. De 19-139, the Company agreed that it would meet certain specifications (a/k/a responsibilities) for its next LCIRP submission(s). The specifications were described in the Settlement Agreement (S/A) at pp 4 through 6, approved by the Commission in Order No. 26, 362 at 5-6 (June 3, 2020) (referencing the Company's 2020 LCIRP commitments). Has the Company met all of the specifications? Please explain in detail. Please provide any matrix, summary, listing, checklist, or cross reference between the Company's responsibilities as described in the Settlement Agreement (3/11/2020) (Docket No. DE 19-139) pages 4 through 6, and the sections of the Company's LCIRP filing(s) to demonstrate that the Company's responsibilities/specifications were met. The specification/responsibility topics include:

a. Comprehensiveness of 2020 LCIRP
    i. Load Forecast
    ii. Assessment of Distribution System requirements
    iii. Assessment of Demand Side Management Programs
        1. NWS Candidates
        2. Detailed NWS Potential Analysis
        3. Incorporation of NWS into Utility Planning
b. Planning Criteria Revisions

Response:

Appendix A of the October 1, 2020 filing provides a summary of the Company's compliance with the LCIRP requirements set forth in RSA 378:38, RSA 4-E:1, and the Settlement Agreements approved by the Commission in Docket No. DE 19-139 and Docket DE 17-136.

As set forth in Appendix A, the Company complied with the Settlement Agreement approved in DE 19-139 as follows:

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Load Forecast
The forecast of future demand for the Company's service area is described in Section 5.1 of the LCIRP. Details are provided in Appendices B (regional level) and C (substation level).

Assessment of Distribution System Requirements
The October 1, 2020 LCIRP filing provides the following assessments: Equipment Ratings (Section 5.2), Bulk Substations and Feeders (Section 5.3), Non-Bulk Substations (Section 5.4), Distribution Circuit Planning (Section 5.5), Distribution System Planning Criteria (Section 5.6), and Smart Grid (Section 10 and Appendix J). The Distribution System Planning Guide is provided in Appendix D.

The October 1, 2020 LCIRP filing Appendix K (Grid Needs Assessment) includes information on the grid needs estimated at greater than $250,000 for Bulk Substations, Non-bulk Substations, and distribution lines.

The October 1, 2020 LCIRP filing Appendix L (Project Authorization Forms) provides approval documentation for non-bulk substation and distribution line projects approved by the New Hampshire Project Approval Committee or the Solution Design Committee.

The March 31, 2021 LCIRP Supplemental filing (Appendix B, C, D, E and F) provides planning studies and project approval documents related to numerous substation and line projects.

Assessment of Demand Side Management Programs

Demand Side Energy Management programs are described in the October 1, 2020 LCIRP filing (Section 11).

NWS Candidates
As described in the October 1, 2020 LCIRP filing Appendix A, Section 2 (Bates pages 55-56), the Company developed a list potential non-wire solutions candidate that was shared with Commission Staff and the Office of Consumer Advocate in August 2020.

Detailed NWS Potential Analysis
Following selection of the Loudon Substation as the location for the detailed NWS analysis, the Company included the NWS analysis as Appendix A-2 to March 31,2021 Supplemental filing (Bates pages 47-86). The Company also provided the Non-Wires Alternative Framework describing the screening tool used to conduct the Loudon Substation analysis as Appendix A-1 of its supplemental filing.

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Incorporation of NWS into Utility Planning
The October 1, 2020 LCIRP filing (Section 11.4) describes how NWS alternatives are incorporated into utility planning. See also the Distribution System Planning Guide (October 1, 2020 LCIRP filing Appendix D, section 4.8.3) and the NWA Framework provided in the March 31, 2021 LCIRP Supplemental filing (Appendix A-1).

Planning Criteria Revisions
The Planning Criteria Revisions are described in Section 5 of the LCIRP. Appendix D of the LCIRP also provides the newly developed Distribution System Planning Guide that will be the basis for distribution system planning at Eversource. As noted above, the Company's supplemental filing included a description of the non-wires alternative screening tool.

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Data Request No. DOE 5-006 **Page 1 of 1**

Request from: Department of Energy

Witness: Freeman, Lavelle A

Request:

Refer to Company LCIRP dated October 1, 2020. Please indicate how externalities are considered within the Company's various analyses of alternatives and indicate where in the Company's LCIRP filing(s) that consideration is noted or highlighted or described.

Response:

Project initiators consider all reasonable solutions that address the needs identified. The initiator will gather input from a team of individuals from numerous Eversource functional areas. Each alternative solution is discussed from a variety of perspectives, e.g., electrical performance, constructability, outage planning, siting and permitting, environmental impacts, community and external stakeholder impacts, procurement, property rights, and future system expandability.

The Distribution System Planning and Capital Approval Process (October 1, 2020 filing, Appendix F) concludes with the selection of a "Preferred Alternative." This is the alternative with the best combination of electrical performance, cost, future system expandability and feasibility to comprehensively address all of the identified needs in the required timeframe.

To the extent "externalities" refers to environmental emissions (e.g., CO2), Eversource clarifies that CO2 or other avoided emissions are not specifically considered in the above process.

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Request from: Department of Energy

Witness: Johnson, Russel D

Request:

Refer to the discussions (as remembered) during the April 1, 2022 Technical Session. Please confirm that the Company estimates that 15,000 residential customers would have an approximate peak load of 30 MW.

Response:

There can be a significant range in the electric demand of customers under the tariff Rate R - Residential, from a single room apartment compared with a 5,000 square foot home with central air conditioning, for example. The level of load diversity is also a significant factor.

The estimate provided during the Technical Session assumed an average of 2 kW per residence when considering the coincident demand of a large population of residential customers of varying size.

This figure seems reasonable based upon:

- the reported ISO-NE's Installed Capacity (ICAP) figure of 1.62 kW, which includes all accounts under Rate R and the maximum effect of load diversity; and
- engineering experience which indicates that circuit loading tends to fall between 2 and 2.5 kW per customer when reviewing circuits that serve a majority of residential customers with some small commercial customers included.

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Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
Data Request No. DOE 5-008 **Page 1 of 2**

Request from: Department of Energy

Witness: Peters, Katherine W

Request:

Refer to Company LCIRP dated March 31, 2021 Supplement Appendix A-1 Bates 00022, line 363. Please indicate if the Company considers electric water heating to be a significant load and if that load is considered among the NWA.

Response:

The Company considers any form of Demand Response ("DR") program and resources as part of an NWA, including hot water heaters. With known program parameters and resources, the NWA Framework and Toolset allow the evaluation of electric water heaters. However, there are several limiting factors around hot water heaters that limit their applicability.

The 2020 "New Hampshire Potential Study: Statement Assessment of Energy Efficiency and Active Demand Response Opportunities, 2021-2023" (the "2020 Potential Study")[1] indicates that approximately 30% of residential homes in the state use electricity for water heating and that the majority of those electric water heaters are conventional storage water heaters.[2] However, it also states that only a fraction of people would be willing to have their water heaters controlled by a utility. 2020 Potential Study at 3-39. Specifically, the 2020 Potential Study found that "the overall willingness to enroll in demand response programs is rather low, with only 7% of customers with electric storage water heaters stating a willingness to consider letting their utility control [their water heater] for DR events." Id A study conducted in Massachusetts seems to indicate that there is currently no DR-enabling technologies that result in a water heater DR measure that is cost-effective. [3]

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[1] https://www.puc.nh.gov/Electric/Monitoring%20and%20Evaluation%20Reports/20201016-NHSaves-Potential%20Study-Final%20Report-Volume%20III.pdf

[2] The 2020 Potential Study does acknowledge some tankless, indirect storage and heat pump storage water heaters.

[3] Cost-Effectiveness of Active Demand Response for Residential End-Uses (MA21DR01-E-Res End Use ADR Cost Effectiveness), Section 3.3. Available at https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/14155484

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Furthermore, the 2020 Potential Study does not provide insight on how many water heaters have existing wireless controls. Finally, the Company's Demand Response Program, as approved by the Commission, is in a pilot phase. This pilot phase does not currently include water heaters as a measure. If the pilot is expanded in the future to include water heaters the Company would consider them as part of an NWA analysis.

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Request from: Department of Energy

Witness: Paruta, Marisa B

Request:

Refer to Eversource's Response to DR DOE 4-016. Please provide any planning studies, calculations, estimates or evaluations of the impact on customers' retail distribution rates ($ per kWh, $ per customer-month or any other customer measure used by the Company) if the capital forecast included in Attachment DOE 4-016 Page 3 were completed, implemented and/or constructed by the Company, and the Company were to request recognition of these capital amounts in retail distribution rates at current, approved or expected ROI, depreciation, and customary recovery of taxes, O&M and other expenses. Please provide all supporting workpapers.

Response:

See Attachment DOE 5-009 for an illustrative presentation and calculation of the impact on revenue requirements if the capital forecast included in Attachment DOE 4-016, page 3, were completed, implemented and/or constructed by the Company. For purposes of this illustrative presentation, the Company used several assumptions that were based on: (1) historical information, including the capital structure, rate of return, whole life depreciation rates, property tax rates, income tax rates, plant retirements, and sales volume, consistent with the most recently filed Docket No. DE 19-057 2020 Step Adjustment (Step #2) for calendar year 2020 plant in service, approved on July 30, 2021, and the most recent base distribution rate case Settlement Agreement, approved on December 15, 2020, and (2) forecasted assumptions, including accumulated depreciation, that were developed using information available at the time the calculation was compiled.

In addition, the Company has developed a measure of the impact of these capital investments to base distribution rates, and to a typical residential bill. The cumulative incremental revenue requirements of $54.5 million over the period 2021-2026 (see Attachment DOE 5-009, page 1) if applied to current rates would result in an overall average increase of 0.388 cents/kWh, and would vary on a class basis, as shown in Attachment DOE 5-009, page 7. A typical residential customer using 600 kWh in a month would see an increase of $5.89, or 4.4% (see Attachment DOE 5-009, page 8).

ILLUSTRATIVE REVENUE REQUIREMENT

Line	Description	Year-Ending 12/31/2020 (A)	Year-Ending 12/31/2021 (B)	Year-Ending 12/31/2022	Year-Ending 12/31/2023	Year-Ending 12/31/2024	Year-Ending 12/31/2025	Year-Ending 12/31/2026	Reference
1	Total Utility Plant in Service	$ 2,345,505,174	$ 2,451,293,636	$ 2,556,772,098	$ 2,663,304,560	$ 2,770,613,023	$ 2,878,916,485	$ 2,994,162,947	Page 2, Line 1
2	Accumulated Provision for Depreciation	633,383,630	678,518,775	727,145,733	774,886,383	831,957,767	892,557,751	954,518,363	Page 2, Line 2
3	Net Utility Plant	$ 1,712,121,544	$ 1,772,774,861	$ 1,829,626,366	$ 1,888,418,178	$ 1,938,655,256	$ 1,986,358,734	$ 2,039,644,584	Line 1 - Line 2
4	Gross Plant Change (year over year)		$ 105,788,462	$ 105,478,462	$ 106,532,462	$ 107,308,462	$ 108,303,462	$ 115,246,462	Line 1 Current Col. - Line 1 Prior Col.
5	Net Plant Change (year over year)		$ 60,653,317	$ 56,851,504	$ 58,791,812	$ 50,237,078	$ 47,703,478	$ 53,285,851	Line 3 Current Col. - Line 3 Prior Col.
6	Rate of Return		6.87%	6.87%	6.87%	6.87%	6.87%	6.87%	Page 3, Line 8
7	Gross Revenue Conversion Factor		1.37142	1.37142	1.37142	1.37142	1.37142	1.37142	Page 4, Line 7
8	Return		$ 5,713,974	$ 5,355,816	$ 5,538,607	$ 4,732,690	$ 4,494,007	$ 5,019,906	Line 5 x Line 6 x Line 7
9	Depreciation Rate		3.15%	3.15%	3.15%	3.15%	3.15%	3.15%	Page 5, Line 71
10	Depreciation		$ 1,910,579	$ 1,790,822	$ 1,851,942	$ 1,582,468	$ 1,502,660	$ 1,678,504	Line 5 x Line 9
11	Property Tax Rate		2.06%	2.06%	2.06%	2.06%	2.06%	2.06%	Page 6, Line 3
12	Property Taxes		$ 2,174,903	$ 2,168,529	$ 2,190,199	$ 2,206,152	$ 2,226,609	$ 2,369,350	Line 4 x Line 11
13	Total Revenue Requirement		$ 9,799,456	$ 9,315,168	$ 9,580,747	$ 8,521,310	$ 8,223,275	$ 9,067,760	Line 8 + Line 10 + Line 12

ILLUSTRATIVE DISTRIBUTION PLANT

Line	Description	Year-Ending 12/31/2020	Year-Ending 12/31/2021	Year-Ending 12/31/2022	Year-Ending 12/31/2023	Year-Ending 12/31/2024	Year-Ending 12/31/2025	Year-Ending 12/31/2026	Reference
		(A)	(B)						
1	Total Utility Plant In Service	$ 2,345,505,174	$ 2,451,293,636	$ 2,556,772,098	$ 2,663,304,560	$ 2,770,613,023	$ 2,878,916,485	$ 2,994,162,947	Line 9 below
2	Accumulated Provision for Depreciation	633,383,630	678,518,775	727,145,733	774,886,383	831,957,767	892,557,751	954,518,363	Step 2/Company Forecast
3	Net Utility Plant	$ 1,712,121,544	$ 1,772,774,861	$ 1,829,626,366	$ 1,888,418,178	$ 1,938,655,256	$ 1,986,358,734	$ 2,039,644,584	Line 1 - Line 2
4	Gross Distribution Plant Change (year over year)		$ 105,788,462	$ 105,478,462	$ 106,532,462	$ 107,308,462	$ 108,303,462	$ 115,246,462	Line 1 Current - Line 1 Prior
5	Net Distribution Plant Change (year over year)		$ 60,653,317	$ 56,851,504	$ 58,791,812	$ 50,237,078	$ 47,703,478	$ 53,285,851	Line 3 Current - Line 3 Prior
6	Beginning Plant Balance	$ 2,250,917,651	$ 2,345,505,174	$ 2,451,293,636	$ 2,556,772,098	$ 2,663,304,560	$ 2,770,613,023	$ 2,878,916,485	Step 2/Prior Year Line 9
7	Additions	123,141,060	134,342,000	134,032,000	135,086,000	135,862,000	136,857,000	143,800,000	Step 2/Base Capital Forecast
8	Retirements	(28,553,538)	(28,553,538)	(28,553,538)	(28,553,538)	(28,553,538)	(28,553,538)	(28,553,538)	Step 2 Retirements
9	Ending Plant Balance	$ 2,345,505,174	$ 2,451,293,636	$ 2,556,772,098	$ 2,663,304,560	$ 2,770,613,023	$ 2,878,916,485	$ 2,994,162,947	Line 6 + Line 7 + Line 8

Public Service Company of New Hampshire
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COST OF CAPITAL PER DE 19-057

Line	Description	Fixed Percentage	Cost	Rate of Return	Reference
		(A)	(B)	(C) = (A) x (B)	
1	Short-Term Debt	2.44%	2.07%	0.05%	
2	Long-term Debt	43.15%	4.08%	1.76%	
3	Common Equity	54.41%	9.30%	5.06%	
4	Total Capital	100.00%		6.87%	Line 1 + Line 2 + Line 3
5	Weighted Cost of				
6	Debt			1.81%	Line 1 + Line 2
7	Equity			5.06%	Line 3
8	Cost of Capital			6.87%	Line 6 + Line 7

COMPUTATION OF GROSS REVENUE CONVERSION FACTOR

Line	Description	12/31/2020	12/31/2021	12/31/2022	12/31/2023	12/31/2024	12/31/2025	12/31/2026	Reference
1	Operating revenue percentage	100.000%	100.000%	100.000%	100.000%	100.000%	100.000%	100.000%	
2	Less: New Hampshire corporate business tax	7.700%	7.700%	7.700%	7.700%	7.700%	7.700%	7.700%	
3	Operating revenue percentage after state taxes	92.300%	92.300%	92.300%	92.300%	92.300%	92.300%	92.300%	Line 1 - Line 2
4	Federal income tax rate	21.000%	21.000%	21.000%	21.000%	21.000%	21.000%	21.000%	
5	Federal income tax	19.383%	19.383%	19.383%	19.383%	19.383%	19.383%	19.383%	Line 3 x Line 4
6	Operating income after federal income tax	72.917%	72.917%	72.917%	72.917%	72.917%	72.917%	72.917%	Line 3 - Line 5
7	Gross revenue conversion factor	137.142%	137.142%	137.142%	137.142%	137.142%	137.142%	137.142%	1 / Line 6

Note: Amounts shown above may not add due to rounding.

SUMMARY OF ESTIMATED SURVIVOR CURVES, NET SALVAGE PERCENT, ORIGINAL COST AND AND CALCULATED ANNUAL AND ACCRUED DEPRECIATION RELATED TO ELECTRIC PLANT AS OF DECEMBER 31, 2018 WHOLE LIFE DEPRECIATION - AMR RECOVERY OVER 9 YEARS

LINE	PLANT ACCOUNT	DESCRIPTION	SURVIVOR CURVE	NET SALVAGE PERCENT	ORIGINAL COST AS OF DECEMBER 31, 2018	CALCULATED ANNUAL ACCRUAL AMOUNT		CALCULATED ANNUAL ACCRUAL RATE		CALCULATED ACCRUED DEPRECIATION
1	(A)	(B)	(C)	(D)	(E)	(F)		(G)=(F)/(E)		(H)
2										
3		**ELECTRIC PLANT**								
4										
5		**INTANGIBLE PLANT**								
6										
7	303.00	MISCELLANEOUS INTANGIBLE PLANT	5-SQ	0	18,278,819.53	1,769,835		9.68		14,600,391
8	303.00	MISCELLANEOUS INTANGIBLE PLANT - AMR	5-SQ	0	2,864,448.00	95,483	*	3.33		2,660,846
9	303.20	MISCELLANEOUS INTANGIBLE PLANT - 10 YEAR	10-SQ	0	31,771,797.33	486,807		1.53	**	28,607,554
10										
11		**TOTAL INTANGIBLE PLANT**			**52,915,064.86**	**2,352,125**		**4.45**		**45,868,791**
12										
13		**DISTRIBUTION PLANT**								
14										
15	360.20	LAND AND LAND RIGHTS	75-R4	0	4,123,039.65	54,836		1.33		2,204,822
16	361.00	STRUCTURES AND IMPROVEMENTS	75-R3	(25)	26,387,975.26	438,700		1.66		6,187,652
17	362.00	STATION EQUIPMENT	55-S0.5	(25)	303,092,439.65	6,895,353		2.28		65,238,205
18	362.10	STATION EQUIPMENT - ENERGY MANAGEMENT SYSTEM	25-R2.5	0	3,155,937.71	126,238		4.00		1,015,444
19	364.00	POLES, TOWERS AND FIXTURES	53-R0.5	(90)	303,587,829.37	10,901,646		3.59		110,737,706
20	365.00	OVERHEAD CONDUCTORS AND DEVICES	55-R1	(35)	582,095,624.35	14,302,089		2.46		154,119,837
21	366.00	UNDERGROUND CONDUIT	60-R2	(40)	38,757,668.49	906,154		2.34		9,625,266
22	367.00	UNDERGROUND CONDUCTORS AND DEVICES	54-R1.5	(40)	133,741,822.05	3,463,913		2.59		42,368,714
23	368.00	LINE TRANSFORMERS	40-S0	(2)	262,481,157.73	6,693,270		2.55		73,140,846
24	369.10	OVERHEAD SERVICES	44-R2	(125)	81,721,434.74	4,173,922		5.11		47,501,588
25	369.20	UNDERGROUND SERVICES	55-R1.5	(125)	76,631,011.71	3,138,040		4.10		32,482,673
26	370.00	METERS	18-L1	0	44,821,891.75	2,479,416		5.53		19,961,157
27	370.00	METERS - AMR	18-L1	0	31,614,492.00	2,981,203	*	9.43		5,819,204
28	371.00	INSTALLATION ON CUSTOMERS' PREMISES	17-L0	(50)	6,563,781.88	578,892		8.82		3,082,834
29	373.00	STREET LIGHTING AND SIGNAL SYSTEMS	27-L0	(10)	5,130,537.46	208,813		4.07		2,083,777
30										
31		**TOTAL DISTRIBUTION PLANT**			**1,903,906,643.80**	**57,342,485**		**3.01**		**575,569,725**
32										
33		**GENERAL PLANT**								
34										
35	389.20	LAND AND LAND RIGHTS	65-R4	0	26,976.55	415		1.54		13,692
36	390.00	STRUCTURES AND IMPROVEMENTS	50-S0.5	(10)	84,363,470.03	1,854,713		2.20		20,052,815
37	390.10	STRUCTURES AND IMPROVEMENTS - LEASEHOLD	20-S0.5	0	50,859.53	2,543		5.00		19,095
38	391.10	OFFICE FURNITURE AND EQUIPMENT	20-SQ	0	9,755,154.62	487,758		5.00		4,695,337
39	391.20	OFFICE FURNITURE AND EQUIPMENT - COMPUTER EQUIPM	5-SQ	0	1,672,250.89	243,506		14.56		960,508
40										
41		*TRANSPORTATION EQUIPMENT*								
42										
43	392.00	OTHER	15-S4	15	30,225.00	1,714		5.67		14,507
44	392.10	CARS	6-L3	15	97,593.41	13,828		14.17		13,479
45	392.20	LIGHT TRUCKS	11-S1	15	8,605,166.97	664,878		7.73		2,687,250
46	392.30	MEDIUM TRUCKS	14-S3	15	2,764,714.96	167,791		6.07		767,426
47	392.40	HEAVY TRUCKS	15-S2.5	15	26,391,434.00	1,496,262		5.67		8,212,511
48	392.50	ROLLING EQUIPMENT	13-L2.5	15	1,321,753.47	86,396		6.54		235,242
49	392.60	TRAILERS	13-L3	15	4,958,571.11	324,117		6.54		1,661,871
50	392.70	ELECTRIC VEHICLE CHARGING STATION	10-R4	0	7,902.10	790		10.00		5,244
51										
52		*TOTAL TRANSPORTATION EQUIPMENT*			*44,177,361.02*	*2,755,776*		*6.24*		*13,597,530*
53										
54	393.00	STORES EQUIPMENT	20-SQ	0	3,257,904.89	162,895		5.00		1,109,379
55	394.00	TOOLS, SHOP AND GARAGE EQUIPMENT	25-SQ	0	14,194,677.76	567,787		4.00		4,037,342
56	395.00	LABORATORY EQUIPMENT	20-SQ	0	2,072,746.95	96,433		4.65		1,339,656
57	396.00	POWER OPERATED EQUIPMENT	15-L4	0	159,421.09	10,633		6.67		71,720
58										
59		*COMMUNICATION EQUIPMENT*								
60										
61	397.10	MICROWAVE	15-SQ	0	5,646,707.11	240,089		4.25		3,854,488
62	397.20	OTHER	15-SQ	0	22,098,802.35	1,279,811		5.79		10,667,691
63	397.30	GPS	5-SQ	0	443,487.30	54,399		12.27		366,151
64										
65		*TOTAL COMMUNICATION EQUIPMENT*			*28,188,996.76*	*1,574,299*		*5.58*		*14,888,330*
66										
67	398.00	MISCELLANEOUS EQUIPMENT	20-SQ	0	1,279,168.86	63,958		5.00		658,566
68										
69		**TOTAL GENERAL PLANT**			**189,198,988.95**	**7,820,716**		**4.13**		**61,443,970**
70										
71		**TOTAL DEPRECIABLE PLANT**			**2,146,020,697.61**	**67,515,326**		**3.15**		**682,882,486**
72										
73		**NONDEPRECIABLE PLANT**								
74										
75	301.00	ORGANIZATION			45,057.29					
76	360.10	LAND			5,830,013.57					
77	389.10	LAND			4,806,992.04					
78										
79		**TOTAL NONDEPRECIABLE PLANT**			**10,682,062.90**					
80										
81		**TOTAL ELECTRIC PLANT**			**2,156,702,760.51**	**67,515,326**				**682,882,486**
82										
83		* AMR METERS NET BOOK VALUE BEING DEPRECIATED OVER 9 YEARS								
84		** NEW ADDITIONS TO THIS ACCOUNT WILL BE DEPRECIATED USING A 10.00% RATE								
85										
86		Less Transportation Equipment				(2,755,776)				
87		**TOTAL ELECTRIC PLANT**				**64,759,550**				

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PROPERTY TAX RATE CALCULATION

Line	Description		Year-Ended 12/31/2020	Reference
1	Total Distribution Property Taxes	$	48,644,096	Step 2 CY 2020 Property Tax expense
2	Gross Distribution Plant In Service	$	2,366,075,567	Total Distribution Plant @ 12/31/2020
3	Gross Property Tax Rate		2.06%	Line 1 / Line 2

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Illustrative Distribution Revenue Allocation

		Source:
Current Rate Distribution Revenue	$ 417,434	Line 55, Column F
Estimated Requirements 2022-2026	$ 54,508	DOE 5 - 009 P1 Line 13
Proposed Distribution Revenue	$ 471,942	Line 11 + Line 13
Incremental Increase	$ 54,508	Line 15 - Line 11
Incremental Change	**13.06%**	Line 15 / Line 11

	A	B	C = B * Line 19	D = B + C	E	F = E - B	G = F / A	H = E / B
	Test Year 2018 Billed Sales	**Current Rate Distribution Revenue**	**D Change**	**Distribution Target**	**Proposed Rate Distribution**	**Difference Proposed vs Current**		
Rate	(MWh)	(Rev $000)	(Rev $000)	(Rev $000)	(Rev $000)	(Rev $000)	c/kWh	% Chg.
R	3,144,509	$ 236,433.4	$ 30,873.0	$ 267,306.5	$ 267,312.5			
R-TOD	462	40.6	5.3	46.0	40.6			
	3,144,971	236,474.1	30,878.3	267,352.4	267,353.2	$ 30,879.1	0.982	13.06%
R-WH	92,916	4,749.7	620.2	5,369.9	4,749.7			
G-WH	3,379	155.5	20.3	175.8	155.5			
LCS-R	36,777	781.2	102.0	883.2	781.2			
LCS-G	4,510	76.1	9.9	86.0	76.1			
	137,582	5,762.4	752.4	6,514.8	5,762.4	-	0.000	0.00%
G	1,715,822	100,361.8	13,105.0	113,466.9	100,361.8			
G-TOD	856	209.1	27.3	236.4	209.1			
	1,716,678	100,570.9	13,132.4	113,703.3	100,570.9	-	0.000	0.00%
G-SH	5,452	241.7	31.6	273.2	241.7	-	0.000	0.00%
GV	1,665,676	43,396.4	5,666.6	49,063.0	43,396.4	-	0.000	0.00%
LG	1,172,439	22,580.3	2,948.5	25,528.8	22,580.3	-	0.000	0.00%
B-GV	2,778	253.3	33.1	286.3	253.3			
B-LG	80,345	1,564.9	204.3	1,769.3	1,564.9			
	83,123	1,818.2	237.4	2,055.6	1,818.2	-	0.000	0.00%
EOL	11,371	2,149.1	280.6	2,429.7	2,149.1			
OL	17,130	4,441.0	579.9	5,020.9	4,441.1			
	28,501	6,590.2	860.5	7,450.7	6,590.2	0.0	0.000	0.00%
Total Retail	**7,954,422**	**$ 417,434.1**	**$ 54,507.7**	**$ 471,941.8**	**$ 448,313.2**	$ 30,879.1	0.388	7.40%

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Comparison of Rates Effective March 1, 2022 and Illustrative Rates for Residential Service Rate R

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
Effective Date	Charge	Distribution Charge	Transmission Charge	Stranded Cost Recovery Charge	System Benefits Charge	Regulatory Reconciliation Adjustment	Electricity Consumption Tax	Energy Service Charge	Total Rate
March 1, 2022	Customer charge (per month)	$ 13.81							$ 13.81
	Charge per kWh	**$ 0.05196**	$ 0.03046	$ 0.00458	$ 0.00743	$ (0.00032)	$ -	$ 0.10669	**$ 0.20080**
Illustrative	Customer charge (per month)	$ 13.81							$ 13.81
	Charge per kWh	**$ 0.06178**	$ 0.03046	$ 0.00458	$ 0.00743	$ (0.00032)	$ -	$ 0.10669	**$ 0.21062**

Calculation of 600 kWh monthly bill, by rate component:

	3/1/2022	Illustrative	$ Change	% Change in each Component	Change as a % of Total Bill
Distribution	$ 44.99	$ 50.88	$ 5.89	13.1%	4.4%
Transmission	18.28	18.28	-	0.0%	0.0%
Stranded Cost Recovery Charge	2.75	2.75	-	0.0%	0.0%
System Benefits Charge	4.46	4.46	-	0.0%	0.0%
Regulatory Reconciliation Adjutment	(0.19)	(0.19)	-	0.0%	0.0%
Electricity Consumption Tax	-	-	-	0.0%	0.0%
Delivery Service	$ 70.29	$ 76.18	$ 5.89	8.4%	4.4%
Energy Service	64.01	64.01	-	0.0%	0.0%
Total	$ 134.30	$ 140.19	$ 5.89	4.4%	4.4%

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Docket No. DE 20-161

Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
Data Request No. DOE 5-010 **Page 1 of 3**

Request from: Department of Energy

Witness: Paruta, Marisa B

Request:

Refer to Eversource's Response to DR DOE 4-016. Please provide any planning studies, calculations, estimates or evaluations that confirms or estimates that the Company can borrow, sell equity, raise, procure, or obtain the capital required (debt, equity, or other sources) to implement this capital investment plan.

Response:

PSNH's financial capability to execute its capital investment plan is based on the financial strength of PSNH and its parent, Eversource, and their combined experience financing, constructing, and operating distribution and transmission facilities throughout New England. PSNH has a proven track record of executing comparable levels of capital investment. For example, PSNH's annual distribution capital investments for the years 2019, 2020 and 2021 were $154.9M, $153.9M, and $160.M respectively.[1] As shown in Attachment A, which includes selected cash flow data from Eversource's 2021 Form 10-K (link provided below), PSNH financed its investments in distribution and transmission infrastructure with a combination of internally generated cash flows, long-term and short-term debt issuances and capital contributions from Eversource. Since 2019, PSNH has issued $800 million in first mortgage bonds.

Consistent with each of Eversource's subsidiaries, PSNH initially finances construction projects with internally generated cash and short-term borrowings from Eversource. As short-term debt accumulates, it is refinanced with long-term debt issued in the capital markets. While PSNH expects that most of its future funding needs will come from a combination of internally generated funds from operations and long-term and short-term debt issuances, PSNH also, from time to time, receives capital contributions from its parent, Eversource. These capital contributions allow PSNH to maintain an appropriate level of common equity to total capitalization, which helps ensure that PSNH will maintain its strong credit ratings that allow ongoing access to the capital markets at favorable rates. The Company's five-year capital investment plan provided in the response to Data Request DOE 4-016 will be financed consistent with the Company's past practice as described above.

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[1] See Eversource Energy 2021 Form 10-K, at 35. Eversource Energy's 2021 Form 10-K is available at https://www.eversource.com/content/nh/residential/about/investors/sec-filings/sec-filings-archive.

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Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
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Eversource is a public utility holding company subject to regulation by FERC under the Public Utility Holding Company Act of 2005. Eversource engages in the energy delivery business through the following regulated wholly-owned utility subsidiaries: The Connecticut Light and Power Company ("CL&P"), NSTAR Electric Company ("NSTAR Electric"), PSNH, NSTAR Gas Company ("NSTAR Gas"), Yankee Gas Services Company ("Yankee Gas"), Eversource Gas Company of Massachusetts ("EGMA"). Eversource also owns four water utilities in New Hampshire, Massachusetts and Connecticut and their holding company, Aquarion Company ("Aquarion"). Eversource's regulated subsidiaries combined serve over 4.4 million electric, gas and water customers.[2]

PSNH is rated by the three major credit rating agencies – Standard and Poor's ("S&P"), Moody's Investors Service ("Moody's") and Fitch Ratings ("Fitch") – with ratings of A (stable outlook), A3 (stable outlook), and A- (stable outlook), respectively. For all three rating agencies, PSNH's financial metrics position it comfortably at its current ratings. Eversource has corporate credit ratings of A- (stable outlook), Baa1 (negative outlook), and BBB+ (stable outlook) from S&P, Moody's, and Fitch, respectively. Eversource is consistently among the highest credit-rated U.S utility holding companies.

[2] Eversource Energy 2021 Annual Report, Company Profile, at 3. The 2021 Annual Report is available here: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.eversource.com/content/docs/default-source/investors/2021-annual-report.pdf

Public Service Company of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-161

Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
Data Request No. DOE 5-010 **Page 3 of 3**

ATTACHMENT A
PSNH SELECTED CONSOLIDATED CASH FLOWS DATA

(Millions of Dollars)	2019	2020	2021	Total
Cash from Operating Activities	$274	$219	$336	$829
Investments in Property, Plant, & Equipment	(309)	(343)	(326)	(978)
Capital contributions from Eversource Parent	225	25	160	410
Issuance of Debt:				
Long-term Debt *	300	150	350	800
Short-term Debt	(30)	19	64	54
Total Debt	$270	$169	$414	$854

Source: Eversource Energy 2021 Form 10-K, page 87

** Note: PSNH retired long-term debt of $150M and $282M in 2019 and 2021, respectively*

Public Service Company of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-161

Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
Data Request No. DOE 5-011 **Page 1 of 2**

Request from: Department of Energy

Witness: Johnson, Russel D

Request:

Reference Eversource Response to DR DOE 4-001, Group #3, Appendix C-1 at 1-3. For each of the following proposed reliability projects please provide the following information:

a. 5-year outage history for the affected circuit including cause of the outage.
b. Class of poles, number of poles, and type of crossarms to be used.
c. Solution Form, Initial Funding Request, or any other project documentation analyzing the problem, justifying the need, considering alternatives, and providing cost estimate information for the project.

Town	Project	Estimated Cost
Bedford	New 3 phase feed to New Boston	$2,289,000
Derry	Extend 3128X and 365X three phase	$ 861,000
Derry	Lowell Rd Windham conversion	$1,800,000
Derry	Fordway Extension Reconductor	$ 592,000
Hooksett	Conversion Charles Bancroft Hwy	$2,500,000
Hooksett	Conversion South Willow St.	$1,135,000
Lancaster	Spacer Cable Routes 3 and 115	$4,680,000
Lancaster	34 kV Spacer Cable Colebrook/Errol	$10,000,000
Newport	Alternate Feed to 316X1	$7,000,000

Response:

a) Five-year outage history (2016-2020) for each affected circuit is provided in Attachment DOE 5-011a. Projects impacting two circuits show the outage history for both circuits on the same project tab of the spreadsheet. Please note that six of the projects identified in this data request were initiated to address reliability performance, one project was initiated to eliminate a significant number of step-up and step-down transformers, one project was initiated to create an opportunity to retire a 1950s vintage 12 kV substation, and one project proposes reconductoring small copper conductor operating at 34.5 kV.

b) The projects provided in Appendix C-1 were conceptual proposals, were not selected for consideration in the following year's budget and, therefore, no detailed engineering was performed. In general, each of these proposed projects are street-side and, therefore, any new

Public Service Company of New Hampshire d/b/a Eversource Energy
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poles installed would be class 2 poles with composite crossarms with the exception of locations where it is determined that a higher class of pole is needed. The number of poles required for each project is not a known value because a detailed engineering has not been performed. The estimates provided were based on high level conceptual estimates.

c) As noted in part b, the projects included in Appendix C-1 did not progress through the capital project approval process and, therefore, there are no initial funding nor project authorization forms. The documentation that is available is typically "hit list" solution analysis and/or project forms prepared for internal review. These documents are provided in Attachments DOE 5-011b-h. Some projects were simply conceptual and no supporting documentation was developed.

New 3 phase feed to New Boston	Attachment DOE 5-011b
Extend 3128X and 365X three phase	No documentation
Lowell Rd Windham conversion	Attachment DOE 5-011c
Fordway Extension Reconductor	Attachment DOE 5-011d
Conversion Charles Bancroft Hwy	Attachment DOE 5-011e
Conversion South Willow St.	No Documentation
Spacer Cable Routes 3 and 115	Attachment DOE 5-011f
34 kV Spacer Cable Colebrook/Errol	Attachment DOE 5-011g
Alternate Feed to 316X1	Attachment DOE 5-011h

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Accounting Policy Statement No. 2
Operations Project Authorization

Capital Budget Challenge Session Project Form

General Information

Date Prepared: 08/26/2015	Project Title: 3108X1/360X7 Tie
Company: Eversource - NH	Project ID Number:
Organization: FE&D	Class(es) of Plant: Distribution
Project Initiator: Michael E Warren	Project Category: Reliability
Project Owner/Manager:	Project Purpose: part of regulatory tracked program?
Project Sponsor:	Project Type:
Estimated in service date: 12/01/2015	Capital Investment Part of Original Operating Plan?
If Transmission Project:	Supplement to Existing Authorization?
	O&M Expenses Part of the Original Operating Plan?

If Chief Executive Officer or subsidiary board approval is required, document the review by Enterprise Risk Management (ERM) and Financial Planning and Analysis (FP&A)

ERM: _____

FP&A: _____

Executive Summary

Create alternate source for two 34.5 kV radially fed circuits with over 1800 customers between them including the entire town of New Boston.

Project Costs Summary

($000)	Prior Authorized*	2015	2016	2017+	Totals
Capital Additions - Direct		$ -	$ -	$ -	$ -
Customer Contribution		$ -	$ -	$ -	$ -
Removals net of Salvage		$ -	$ -	$ -	$ -
Total - Direct Spending	$ -	$ -	$ -	$ -	$ -
Capital Additions - Indirect		$ -	$ -	$ -	$ -
Subtotal Request	$ -	$ -	$ -	$ -	$ -
AFUDC (half-year convention)		$ -	$ -	$ -	$ -
Total Request	$ -	$ -	$ -	$ -	$ -

* to be completed if supplemental authorization is required

EVERSOURCE

Accounting Policy Statement No. 2
Operations Project Authorization

Summary Project Description

Reconductor approximately 3.5 miles of line to three-phase 1/0 spacer cable to connect the west section of the 360X7 to the east end of the 3108X1 via Bedford Rd. Install at a minimum 5 Distribution Automation elements to facilitate automatic switching via radio control.

	Total Project Costs	Amount in Operating Plan	Difference
Capital	$1,652,400	$0	$
O&M	$183,600	$0	$
Total	$1,836,000	$0	$

Project Authorization

Project authorization below must be in accordance with the approval levels included in the Delegation of Authority Policy (DOA).

Approver	Approver Name	Approver Signature	Date
Project initiator	Michael E Warren		
Project manager	Eric Sutton		
Plant Accounting	Frank Errato, Jr.		
Director	James Eilenberger		
Vice President	Paul Ramsey		
Sr. Vice President	Peter Clarke		

Overall Justification

Justification for the project is based on two radially fed 34.5 kV circuits with over 1800 customers combined including the entire town of New Boston. Main line outages mean all customers on the circuit are out until the issue is repaired or in line DXs are cut in and the main line is energized up to that point. A tie between these two circuits would allow for an alternate feed for faster

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Accounting Policy Statement No. 2
Operations Project Authorization

restoration of customers and less outage time. With the addition of Distribution Automation we can limit the number of customers who suffer an outage at all.

In the past 4 years the 3108X1 has had 4 main line outages which affected the 1378 customers in New Boston for a total of 3,075,419 customer minutes lost. Though the 3108X1 circuit has 2 feeds currently they both come into the town of New Boston from the North via RTE 77. A new feed from the East of New Boston and Distribution Automation elements would have basically eliminated these outages.

In the past 4 years the 360X7 has seen 1 main line outage during a major storm event (10/29/11). If this back feed had been in place with various Distribution Automation elements the outage could have been reduced from 420 customers to approximately 232 customers.

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Accounting Policy Statement No. 2
Operations Project Authorization

Project Scope

Reconductor approximately 12,900 feet of single-phase 1/0 ACSR to three-phase 1/0 Hendrix spacer cable on the 360X7 west down Bedford Rd.
Reconductor approximately 5600 feet of single-phase #2 and #6 CU to three-phase 1/0 Hendrix spacer cable on the 3108X1 east down Bedford Rd.
Install 5 new radio controlled vipers.

Project Objectives

Create an alternate feed for two radially fed 34.5 kV circuits with DA elements allowing for radio controlled switching from one source to the other.

Business Process and / or Technical Improvements:

Quantitative and qualitative project benefits, including assumptions used to estimate benefits and customer impacts; describe the changes in performance to the business process or technology performance metrics that can be expected as a result of this project

4 main line outages over last 4 years affecting 6007 customers for 3,075,419 customer minutes lost. Back feed with DA elements in place would have saved 1030 customer interruptions, 465,031 customer minutes lost and reduced the overall COSAIDI for the past for years by .61 Minutes.

Assumptions

Assumes Radio installations for 1 existing Viper and 1 new Viper with radio unit.
Assume 1 pole every 175 ft and 18,500 feet over new line is 106 new poles.
Assume new poles and three-phase construction costs 16,000/pole
Assume 40,000 per mile for trimming.

Alternatives Considered

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Accounting Policy Statement No. 2
Operations Project Authorization

Already second feed for 3108X1 but town of New Boston is fed the same way by both feeds. This new feed would enter the Town of New Boston in a different direction.

Project Schedule

Describe the project schedule and milestones. Include estimated start and end dates.

Milestone/Phase Name	Estimated Completion Date

Financial Evaluation

Direct Capital Costs ($000)	Year 1	Year 2	Year 3+	Total
Straight Time Labor	$	$	$	$
Overtime Labor	$	$	$	$
Outside Services	$	$	$	$
Materials	$	$	$	$
Other, including contingency amounts (describe)	$	$	$	$
Total	$	$	$	$

Indirect Capital Costs ($000)	Year 1	Year 2	Year 3+	Total
Benefits / Loaders	$	$	$	$
Capitalized interest or AFUDC, if any	$	$	$	$
Total	$	$	$	$

Total Capital Costs	$	$	$	$

Total O&M Costs	$	$	$	$

Total Project Costs ($000)	$	$	$	$

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Accounting Policy Statement No. 2
Operations Project Authorization

Note: Explain unique payment provisions, if applicable

Regulatory Approvals

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Risks and Risk Mitigation Plans

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Accounting Policy Statement No. 2
Operations Project Authorization

Circuit Owner Name:	Michael E. Warren	Date:	08/26/2015

Div Ckt.Manager Signature:		Date:	

Circuit:	**3108X1/360X7**	**Year 2014 Rank:**	**Recommendation: 1**
Category:	**DR**	**Description:**	**Create tie between 3108X1 and 360X7**

System Configuration	Fault Location	Affected Customers	Affected Load (KW)	Frequency Outages/Yr	Duration (Minutes)	Customer Interruption	Customer Minutes	Kilowatt Hours	COSAIDI (Minutes)
Current Configuration	Weare Rd	1,550	4,650	0.25	1524	388	590,550	29,528	1.185324
	Twin Bridge	1,786	5,358	0.25	126	447	56,259	2,813	0.11292
	Beard Rd	1,363	4,089	0.25	150	341	51,113	2,556	0.102591
	Weare Rd	1,519	4,557	0.25	43	380	16,329	816	0.032775
				1.00		**1,555**	**714,251**	**35,713**	**1.75**
Proposed Recommendation	Weare Rd	172	516	0.25	1524	43	65,532	3,277	0.131533
	Twin Bridge	1,786	5,358	0.25	408	447	182,172	9,109	0.365647
	Beard Rd	0	0	0.25	0	0	0	0	0
	Weare Rd	141	423	0.25	43	35	1,516	76	0.003042
	Total			**1.00**		**525**	**249,220**	**12,461**	**0.61**
		Benefits:	**Saved**	**0.00**		**1,030**	**465,031**	**23,252**	**1.14**
Project Cost: $1,095,000			**Cost/Saved**			**$1,063.36**	**$2.35**	**$47.09**	**$958,426**

Category Options:
Maintence Trimming
Emergency Reliability Trimming
Budget
Permanent
Discount
No Recommendation
Work In Progress
Completed

4 main line outages last 4 years. See TRUPERs 359482, 358519, 335035, 362393. All outages affected New Boston. Time saved assumed DA elements in place to automatically reconfigure for 360X7 feed.

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Capital Budget Challenge Session Project Form

Date Prepared: 8/31/2020	**Project Title:** Lowell Rd. Conversion
Company: Eversource NH	**Project Number:**
Organization: Electric System Operations	**Class(es) of Plant:** D Line
Project Initiator: Julie Walsh	**Project Category:** Lines - General
Project Manager: **George Loura**	**Project Type:** Specific
Estimated in service date: 12/15/2021	**Project Purpose:** Remove excess overhead equipment
Total Request: $1,800,000	($130,000 itemized estimate, see cost details section)

Executive Summary

Lowell Rd. in Windham is a radial section of the 3133X circuit which has a set of step-down transformers feeding into the Rock Pond neighborhood and several smaller URD neighborhoods. This radial tap is bounded by Liberty Utilities' franchise area. In 2019, a failed cable on Princeton Rd. caused a lengthy outage to 134 customers because the URD had no 19.9 kV back feed. Since then, an overhead step-up transformer has been installed, but this should only be considered a temporary remedy. Converting the step-down bank on Lowell Rd. would result in a net gain of 7 step transformers removed, including three that step the voltage up to 19.9 for URDs. Converting may also enable removal of one or both of the line regulators in the Rock Pond area.

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Project Authorization Form

Technical Justification

Project Need Statement

Remove excess overhead equipment, especially step transformers, to improve reliability.

Project Objectives

Convert 12.47 kV step down area to 34.5 kV

Project Scope

Convert approximately 3200 feet of three-phase and 12,280 feet of single phase.

Background / Justification

URD systems were built to 34.5 kV in the past on the assumption that the overhead system would eventually be 34.5 kV. This area has not been converted, and because of this it has an excess of step transformers. Step transformer failures cause lengthy outages and typically affect large numbers of customers.

Business Process and / or Technical Improvements

Removal of excessive overhead equipment including step-up transformers. Better voltage to the end of the line customers.

Alternatives Considered with Cost Estimates

Convert the area in sections - $900,000 in 2021, $900,000 in 2022.

Project Schedule

Milestone/Phase Name	Estimated Date
100% Engineering Completion	10/15/2020
Construction Start	4/1/2021
Testing/Commissioning	
In Service Date	5/30/2021

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Project Authorization Form

Regulatory Approvals

Risks and Risk Mitigation Plans

Windham is a CCI set area

Contingency

References

Attachments (One-Line Diagrams, Images, etc.)

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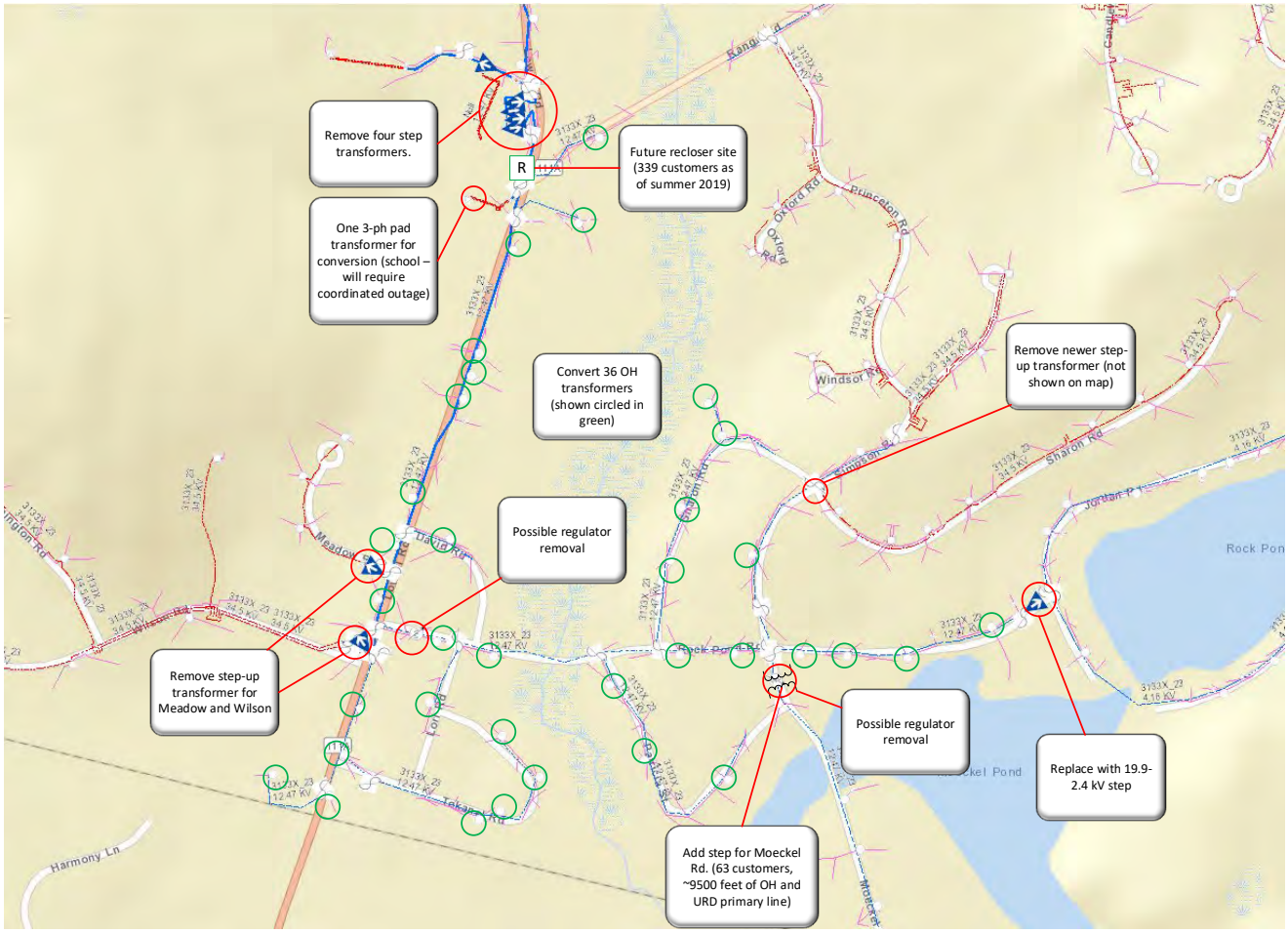
Project Authorization Form



Cost Estimate Backup Details

3200 ft. three-phase conversion at $160/ft = $512,000
12,280 ft. single-phase conversion at $106/ft = $1,301,680
Total: $1,813,680

*****Previous itemized estimate details:**
Cost total includes 35 single phase OH transformers ($61,200), 1 step bank removal ($14,000), 1 three phase pad conversion ($10,000), and an estimated 12 single phase pole replacements ($36,000).

Single phase OH transformer conversion (no pole replacement): $1700 (actual STORMS estimate)
Single phase pole replacement: $3000
Three phase pole replacement: $4700
Three phase pole with single transformer: $6400 (actual STORMS estimate)
Step transformer bank install or remove: $14,000
Three phase pad transformer conversion: $10,000

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Project Authorization Form

$130,000 total includes 35 single phase OH transformers ($61,200), 1 step bank removal ($14,000), 1 three phase pad conversion ($10,000), and an estimated 12 single phase pole replacements ($36,000).

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Capital Budget Challenge Session Project Form

Date Prepared: 8/31/2020	**Project Title:** Fordway Extension Reconductor #2 Copper
Company: Eversource NH	**Project Number:**
Organization: Electric System Operations	**Class(es) of Plant:** D Line
Project Initiator: Julie Walsh	**Project Category:** Lines - Conductor
Project Manager: **George Loura**	**Project Type:** Specific
Estimated in service date: 12/31/2021	**Project Purpose:** Prevent arcing fault burndown
Total Request: $592,000	

Executive Summary

Fordway Extension, Derry, has a large three-phase tap on the 12.47 kV 32W4 circuit that is built with #2 copper. The tap has 368 customers with an estimated 50 amps of loading and is fused with 80T cutouts. The maximum fuse size to avoid the potential of arcing fault burndown of the conductor is 30T. The 30T is too small to carry the loading on the entire tap. This project proposes reconductoring 3700 feet of the #2 copper wire with 1/0 spacer cable and fusing the remainder of the line with 30T.

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Project Authorization Form

Technical Justification

Project Need Statement

Loading on the three-phase tap exceeds fuse sizes allowable within arcing fault current burndown limits for the #2 copper conductor. Tap has 368 customers (113/135/119) with an estimate of around 50A of loading and is fused with 80T fused cutouts. The max fuse size to avoid arcing fault burndown on #2 copper is a 30T. The 30T fuse link is too small to carry the loading on the entire tap. This solution will replace #2 copper up to and beyond a point where 30T fuses will carry the load. The existing 80T fuses will carry the load on the main tap (and new 1/0 spacer cable), and the new 30T fuses will carry the load on the remaining #2 copper while also protecting against arcing fault burndown.

Project Objectives

Reconductor #2 copper with spacer cable for resiliency and reliability.

Project Scope

Install new pole plant and associated equipment, including 3700 feet of 1/0 spacer cable, along Fordway Extension in Derry.

Background / Justification

Old conductor is in an area that has seen growth over the years, along with system expansion and reconfigurations. The wire was visually inspected by an AWC supervisor and noted to be in poor condition due to age. The far end of this tap was formerly part of the 3133X circuit, and in around 2011 was transferred onto the 32W4 because of reliability issues.

Business Process and / or Technical Improvements

New 1/0 spacer cable will not be at risk for burndown beyond larger fuse sizes or slower protective relays. In addition, reliability will improve due to the new construction and protection of the wire covering and messenger.

Alternatives Considered with Cost Estimates

Reconductor the minimum of 2200 feet with 1/0 spacer cable. This is the point where the load drops just enough to install 30T fuses to protect the remaining #2 copper but does not provide for load growth. $352,000

Project Schedule

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Project Authorization Form

Milestone/Phase Name	Estimated Date
100% Engineering Completion	11/31/2020
Construction Start	3/15/2021
Testing/Commissioning	
In Service Date	5/15/2021

Regulatory Approvals

Risks and Risk Mitigation Plans

New pole licenses needed for spacer cable's shorter spans.

Contingency

References

Conductor burndown curves

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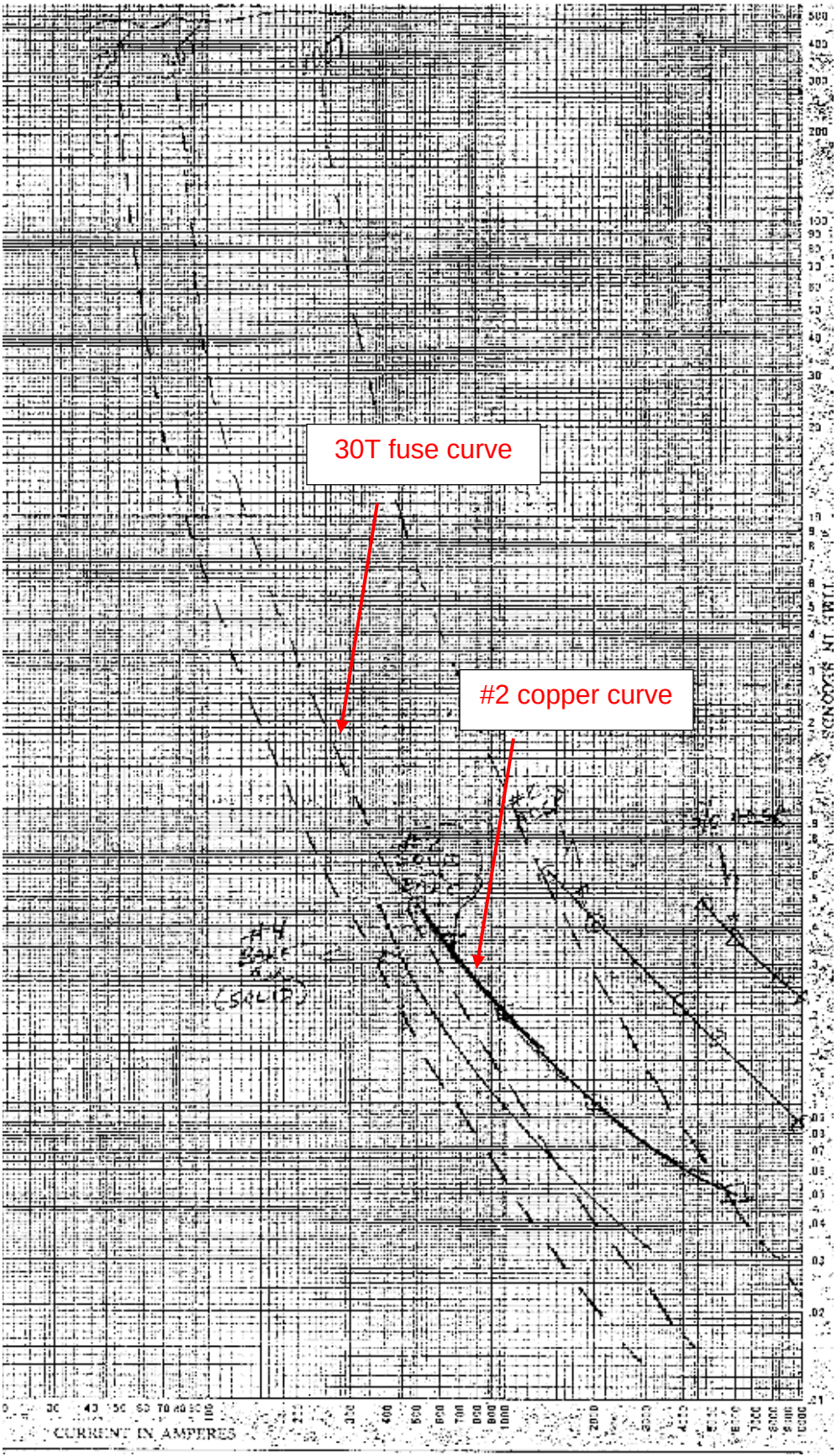
Project Authorization Form



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Project Authorization Form

Attachments (One-Line Diagrams, Images, etc.)

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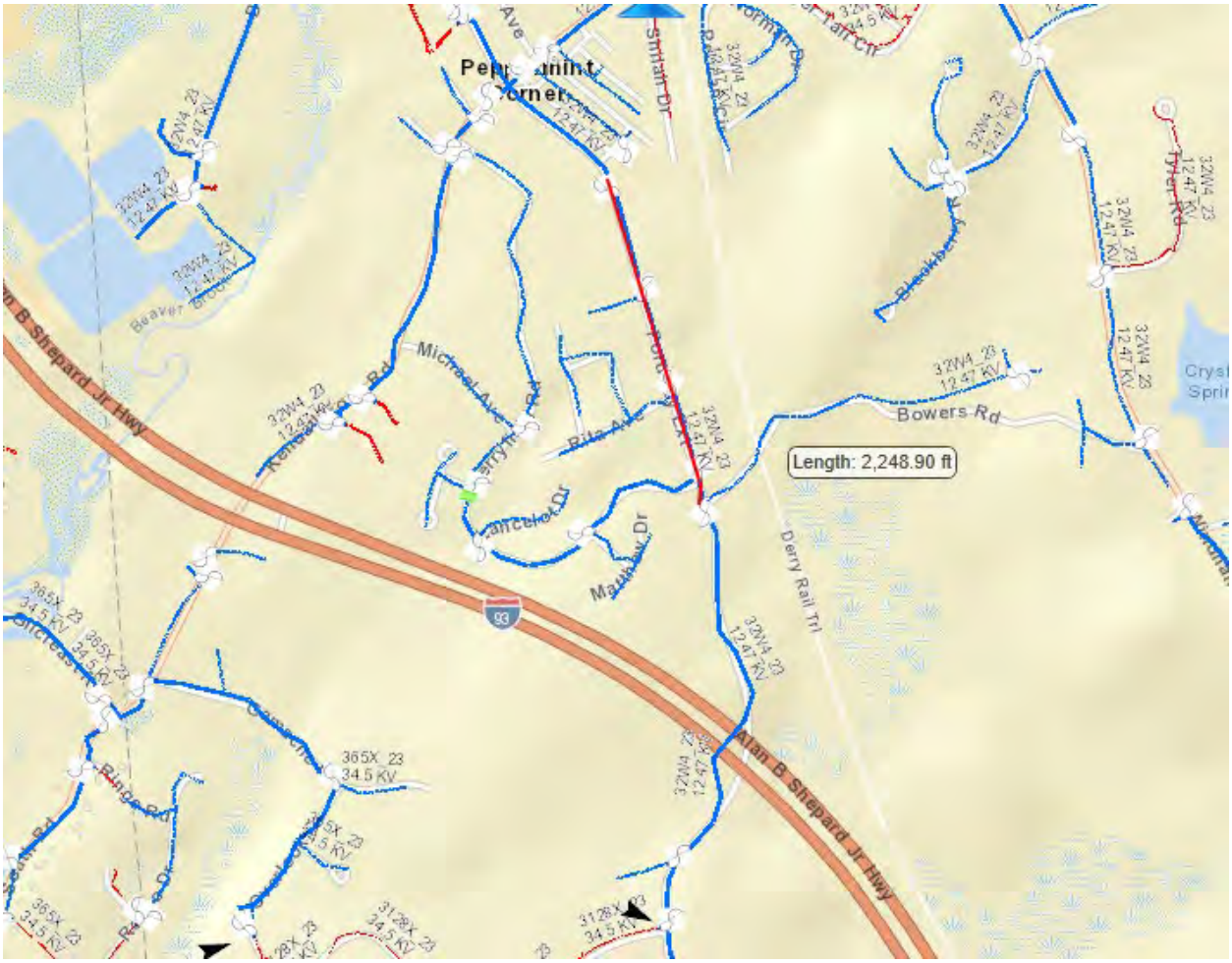
Project Authorization Form



Cost Estimate Backup Details

Estimate uses $160/foot for three-phase reconductoring.

DE 20-161
Exh. 13

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Project Authorization Form

Capital Budget Challenge Session Project Form

Date Prepared: 8/21/18	**Project Title: Merrimack 5W1/ 5W2 Circuit Conversion**
Company: Eversource NH	
Organization: Distribution Engineering	**Class of Plant: Distribution Line**
Project Initiator: Robert Krewson	**Project Category: Obsolete Equipment- Substation**
Project Manager: Marc Pilotte	**Project Type: Specific**
Project Sponsor: Jim Eilenberger	**Project Purpose: Line Conversion**
Estimated in service date: 12/15/2019	**If Transmission Project: N/A**
Total Request: $800,000 (Hooksett & Bedford line work)	

Technical Justification:

Project Need Statement

The Merrimack Substation 5W1/ 5W2 circuits are fed by older RE (2004) and WE (1999) reclosers having Form 3 controls, all in need of upgrading. In addition, the station needs to be SCADA equipped. Converting the 5W1/ 5W2 circuits to 34.5 kv enables Merrimack Substation to be retired, thus avoiding significant equipment and system upgrade expenses, as well as future maintenance costs.

Conversion of the 5W2 main line on Charles Bancroft Highway would also improve circuit reliability as it creates a tie between the 3750 and the 324X10. It thus provides a back-up source for the 950 customers on the Hooksett AWC portion of the 5W2 circuit (there is currently no alternate feed).

Additionally, a conversion eliminates the 2,300 feet of 4/0 spacer cable supplying the 5W2 circuit. This portion of the circuit runs across the Passaconaway golf course and is therefore extremely difficult to access and maintain.

Project Objectives

The conversion of two 12.47 kv circuits to 34.5 kv, the main line distance of which totals approximately 4.0 miles. This will enable the retirement of Merrimack substation.

Project Scope

This project involves the line conversion of both the 5W1 (Bedford AWC) and 5W2 (Hooksett AWC) distribution circuits.

Since the cost to convert the entire 5W2 main line along Charles Bancroft Highway would be around $2.6M, it seems best to approach this as a multi-year project. The proposal for first year project work is to install step transformers at three locations. This, along with conversion of the 5W1 on the west side of the river, would cost $800K. This allows Merrimack substation to be retired.

As part of the first-year work, approximately 2,000 feet of existing circuit would be converted to 34 kv. Additionally, a five-span pole line in the ROW feeding a commercial customer will be relocated to the underground. This is a significant improvement, as the present line has difficult access and vegetation management issues.

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Project Authorization Form

It is also proposed that three DA devices be installed in the first year. In addition to secondary side transformer protection, two could also be used to monitor step loading. All three are to be placed such that they will be optimally located when the full 34 kv conversion is later completed.

Background / Justification

Retirement of Merrimack substation (which dates to 1959) will eliminate the need to replace existing reclosers, their controls, and to add SCADA at the substation. There are also several GC&M maintenance concerns for this older substation (see appendix).

Business Process and / or Technical Improvements

Alternatives Considered with Cost Estimates

An alternative would be to replace the 5W1/ 5W2 reclosers in the substation, add SCADA, and make necessary modifications to the station, as well as address open Mx orders at a cost of $280,000 (see appendix for GC&C generated list of projected work at the station).

A second alternative would be to convert the entire 4.0 mile length of Charles Bancroft Highway and remove the present 4/0 spacer cable feed across the golf course. This creates a tie between the 324X10 and the 3750 circuits and is estimated to cost $2.60 M. This sizable expense eliminates it as a serious possibility as a one-year project.

Project Schedule (includes line work only)

Milestone/Phase Name	Estimated Completion Date
Design Complete	3/1/2019
Project in Service	7/31/2019

Regulatory Approvals

NHDOT approval of pole locations along Charles Bancroft Highway for 34 kv line extension work.

Risks and Risk Mitigation Plans

References

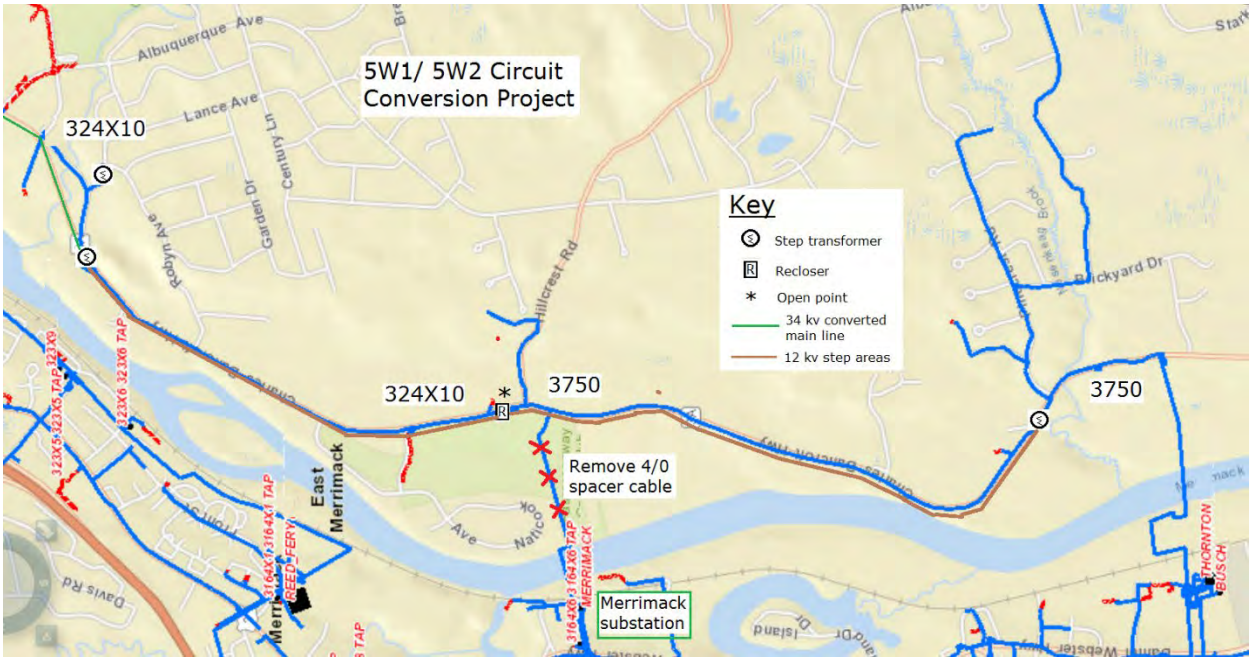
Estimation for the primary conductor work was calculated on a cost per foot basis. Other costs were determined on a per unit basis (step transformer installation, pad transformer conversion, etc.…)

Attachments (One-Line Diagrams, Images, etc.)

DE 20-161
Exh. 13

EVERSOURCE

Project Authorization Form



Appendix: GC&M list of projected work/ upgrades to Merrimack Distribution substation:

37 Railroad Ave, Merrimack, NH

Customers ~1039

Site has one 34.5kV Source that supplies two 12.47kV Circuits: 5W1, 5W2

Major Equipment

1 x 3.75MVA 34.5/12.47kV transformer

3 x 219A mixed vintage regulators

2 x reclosers- 1 WE w/Form 3 control, 1 RE w/Form 3 control

Station Upgrades needed

- 3.75MVA Transformer from 1959 that has an open MX order to repair an oil leak.
  - 7 work orders have been completed since 1998 (over the past 22 years) to repair moisture ingress/ oil weep correctives.
  - Transformer has high and low side brown glass bushings. These should be replaced if support engineering can find valid replacements.

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Project Authorization Form

    - Power factor testing show deterioration on all bushing at least one bushing needs to be investigated per Doble limits
  - Oil analysis conclude that there are contaminants in the tank. Next MX requires a particle analysis for potential internal arcing.
  - Transformer was moved from Jaffrey in NOV-2000
- Brown glass insulators/switches
  - Requires replacement air brake switches
- Regulators
  - Phase 3 has an open corrective to repair an oil weep (replace)
  - The regulator stand should be raised to increase clearance distances to meet the current standard for distance to live parts.
- Animal protection
  - Sections of bus should be covered to reduce phase to phase animal strikes
- Lightning Arrestors
  - Two sets of low side lightning arrestors made from brown glass should be replaced.
- Reclosers
  - 5W1 OCR WE needs rack height raised to increase clearance distances to meet the current standard for distance to live parts.
  - 5W1 OCR RE needs to be replaced and rack height raised to increase clearance distances to meet the current standard for distance to live parts.

Automation Required

- 5W1 Form 3 needs a form 6 for automation
- 5W2 Form 3 needs a form 6 for automation
- 3 x Beckwith Control Upgrade Kits for regulators needed

Fence + Ground Grid

- Fence is inadequate height and a ground grid study would need to be performed.

MX/Safety concerns

- Hot spot on switch 502
- Thermal meters are not functioning (would either remove or abandon as part of DA work)
- Concrete foundations are crumbling/cracking
- MAD is of concern while in the yard. Reclosers, regulators do not meet today's standard for height of live parts.
- Large amount of rust on structure that should be addressed
- Southern entrance cattle gate latch is broken
- Regulators

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Project Authorization Form

- Phase 2 has an open corrective to investigate a voltage delta
- Phase 3 has an open corrective to repair an oil weep

Based on past projects of similar scope the Ballpark cost of this work is:

Upgrades = $140,000 [Similar to Long Hill 12.47 kV yard upgrades that required brown glass, switches, fence, and ground grid]

Automation = $120,000 [Similar to Whitefield Automation effort recently

completed but would not include out of town rates]

Fence +Ground Grid =N/A [incorporated into upgrades]

MX repairs = $20,000 [Foundation, rust, gate, regulator repair/replacement]

Total =$280,000

Merrimack Substation

EVERSOURCE

Capital Budget Challenge Session Project Form

Date Prepared: 8/06/2019	**Project Title: 348X3 – 351X Circuit Tie**
Company/ies: Eversource NH	**Project ID Number:**
Organization: Distribution Engineering	**Class(es) of Plant: Distribution**
Project Initiator: Sam Bosse	**Project Category: Reliability**
Project Manager: Sam Bosse	**Project Type: Specific**
Project Sponsor: Paul Renaud	**Project Purpose: Enhance Reliability**
Estimated in service date: 12/15/20	**If Transmission Project: PTF?**
Eng. /Constr. Resources Budgeted?	**Capital Investment Part of Original Operating Plan?**
Authorization Type: Full Funding	**O&M Expenses Part of the Original Operating Plan?**
Total Request: $3,000,000	

Technical Justification:

Project Need Statement

The 348X3 is an annual visitor to the top 50 Hitlist. It is a long radial line, mostly narrow ROW through National Forest. Large/critical customers are at the end of the line, Bretton Woods Ski resort, Mt. Washington hotel/resort, Cog railroad & Mt. Washington observatory. This circuit tie provides a backup to these critical customers should the first half of the ROW portion experiences an outage. The tie also provides backup to the 351X1, with 44 customers, and Whitefield Power NUG (15MW). There have been 4 outages within the first half of the line to which this tie would restore the remainder of customers. These 4 outages averaged 939 customers, and 563 mins. There has been an additional 6 outages on the second half of the ROW, resulting in 10 outages to the large customers at the end of the circuit in the past 4 years. Also note the circuit tie would be built along a stretch of road that has seen 12 outages in the past 4 years serving 163 customers.

Project Objectives

Increase reliability on 348X3 by providing a backup source from the 351X, giving ESNH the ability to remotely restore customers ranging from 900 to 1500 customers depending on the faulted location

Project Scope

Run 477 SPCA from 351X via RT3 or RT115 to tie into 348X3 - about 29,250ft.

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Install associated DA equipment to provide remote switching capabilities

Background / Justification

Due to the radial design of the circuit, with most of the backbone in a narrow ROW, outages tend to be lengthy to locate, and repair the damage. Over the past 4 years, there have been 4 permanent outages to the mainline, and 2 temporary faults causing a trip/reclose on the circuit. The high level engineering estimate of $3,000,000 is based off the bids from the Laconia circuit tie. The resulting customer minute saved from the mainline outages, as well as outages along Rt. 115 is $5.17.

Business Process and / or Technical Improvements:

Alternatives Considered with Cost Estimates

Project Schedule

Milestone/Phase Name	Estimated Completion Date

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Circuit Owner Name:	Sam Bosse	Date:	08/06/2019

Div Ckt.Manager Signature:		Date:	

Circuit:	**348X3**	**Year 2018 Rank:**	**11**	**Recommendation: 1**
Category:	**Budget**	**Description:**	**Circuit Tie to the 351X circuit**	

System Configuration	Fault Location	Affected Customers	Affected Load (KW)	Frequency Outages/Yr	Duration (Minutes)	Customer Interruptions	Customer Minutes	Kilowatt Hours	COSAIDI (Minutes)
Current Configuration	ROW	939		1.00	563	939	528,657	0	
	Rt 115	163		3.00	140	489	68,460	0	
						0	0	0	
						0	0	0	
				4.00		**1,428**	**597,117**	**0**	**1.47**
Proposed Recommendation	ROW	939		0.00	563	0	0	0	
	Rt 115	163		0.75	140	122	17,115	0	
						0	0	0	
						0	0	0	
	Total			**0.75**		**122**	**17,115**	**0**	**0.04**
		Benefits:	**Saved**	**3.25**		**1,306**	**580,002**	**0**	**1.42**
Project Cost: $3,000,000			**Cost/Saved**			**$2,297.53**	**$5.17**	**#DIV/0!**	**$2,105,320**

Category Options:
Maintence Trimming
Emergency Reliability Trimming
Budget
Permanent
Discount
No Recommendation
Work In Progress
Completed

The 348X3 is an annual visitor to the top 50 Hitlist. It is a long radial line, mostly narrow ROW through National Forest. Large/critical customers are at the end of the line, Bretton Woods Ski resort, Mt. Washington hotel/resort, Cog railroad & Mt. Washington observatory. This circuit tie provides a backup to these critical customers should the first half of the ROW portion experiences an outage. The tie also provides backup to the 351X1, with 44 customers, and Whitefield Power NUG (15MW). There have been 4 outages within the first half of the line to which this tie would restore the remainder of customers. These 4 outages averaged 939 customers, and 563 mins. There has been an additional 6 outages on the second half of the ROW, resulting in 10 outages to the large customers at the end of the circuit in the past 4 years.

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Capital Budget Challenge Session Project Form

Date Prepared: 8/17/2020	**Project Title:** 348X3 – 351X Tie Line
Company: **Eversource NH**	**Project Number:**
Organization: Distribution Engineering	**Class(es) of Plant:** **D Line**
Project Initiator: Bill Steff	**Project Category:** **Lines - General**
Project Manager: Thomas Kane	**Project Type:** **Specific**
Estimated in service date: 9/15/2021	**Project Purpose:** Construct tie line between 348X3 and 351X.
Total Request: $4,680,000	

Executive Summary

The 348X3 is an annual visitor on the Top 50 Hit List. 1900 customers including Bretton Woods Ski Area, Mount Washington Resort, Cog Railway and the Mount Washington Observatory are located on the 348X3 Circuit.

Tie the 348X3 to 351X Circuit along Route 3 from Whitefield or Route 115 from Jefferson.

Run 477 SPCA 29,250 feet and install appropriate DA to perform circuit switching.

Estimated total cost of $4,680,000 at $8.06/CMS.

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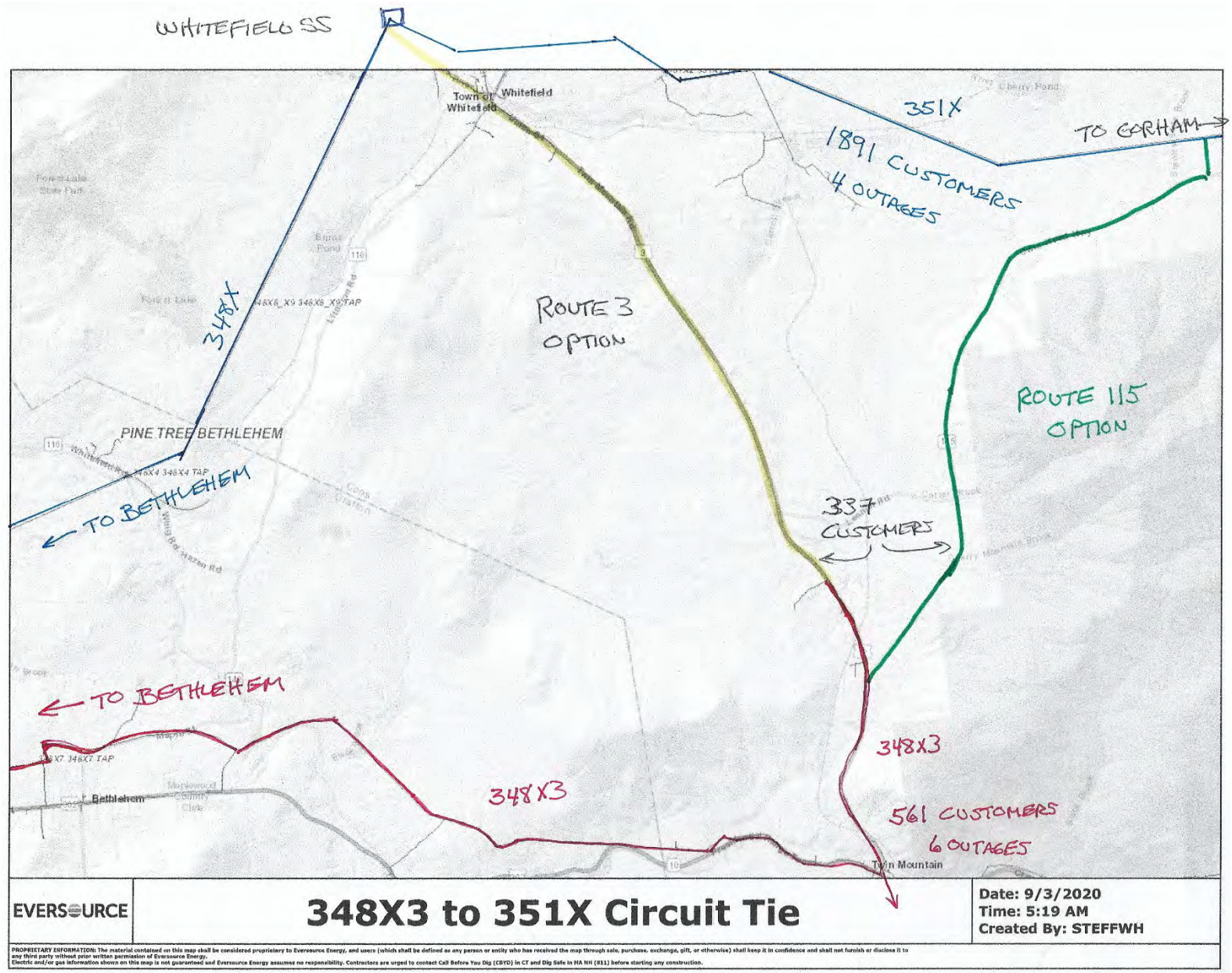
WHITEFIELD SS
Town of Whitefield
Whitefield
351X
1891 CUSTOMERS
4 OUTAGES
TO GORHAM
348X
ROUTE 3
OPTION
ROUTE 115
OPTION
PINE TREE BETHLEHEM
TO BETHLEHEM
337
CUSTOMERS
TO BETHLEHEM
348X3
348X3
561 CUSTOMERS
6 OUTAGES
Bethlehem
Twin Mountain
EVERSOURCE
348X3 to 351X Circuit Tie
Date: 9/3/2020
Time: 5:19 AM
Created By: STEFFWH
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Project Authorization Form

Technical Justification

Project Need Statement

The 348X3 is an annual visitor to the top 50 Hitlist. It is a long radial line, mostly narrow ROW through National Forest. Large/critical customers are at the end of the line, Bretton Woods Ski resort, Mt. Washington hotel/resort, Cog railroad & Mt. Washington observatory. This circuit tie provides a backup to these critical customers should the first half of the ROW portion experiences an outage. The tie also provides backup to the 351X1, with 44 customers, and Whitefield Power NUG (15MW). There have been 4 outages within the first half of the line to which this tie would restore the remainder of customers. These 4 outages averaged 939 customers, and 563 mins. There have been an additional 6 outages on the second half of the ROW, resulting in 10 outages to the large customers at the end of the circuit in the past 4 years. Also note the circuit tie would be built along a stretch of road that has seen 12 outages in the past 4 years serving 163 customers.

Project Objectives

Increase reliability on 348X3 by providing a backup source from the 351X, giving ESNH the ability to remotely restore customers ranging from 900 to 1500 customers depending on the faulted location

Project Scope

Run 477 SPCA from 351X via RT3 or RT115 to tie into 348X3 - approximately 29,250ft. Install associated DA equipment to provide remote switching capabilities.

Background / Justification

Due to the radial design of the circuit, with most of the backbone in a narrow ROW, outages tend to be lengthy to locate, and repair the damage. Over the past 4 years, there have been 4 permanent outages to the mainline, and 2 temporary faults causing a trip/reclose on the circuit. The cost estimate of $4,680,000 is based on estimated per foot construction cost of $160. The resulting $/customer minute saved from the

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Exh. 13

EVERSOURCE
Project Authorization Form

mainline outages, as well as outages along Rt. 115 is $8.06.

Business Process and / or Technical Improvements

Alternatives Considered with Cost Estimates

Project Schedule

Milestone/Phase Name	Estimated Date
100% Engineering Completion	
Construction Start	
Testing/Commissioning	
In Service Date	

Regulatory Approvals

None.

Risks and Risk Mitigation Plans

Contingency

References

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Exh. 13

EVERSOURCE
Project Authorization Form

Attachments (One-Line Diagrams, Images, etc.)

Cost Estimate Backup Details

Estimated length of conversion 29,250 feet x $160 per foot = $4,680,000.

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Capital Budget Challenge Session Project Form

Date Prepared: 08/27/2020	**Project Title:** New 35 kV line From North Newport to Grantham
Company: Eversource NH	**Project Number:**
Organization: Distribution Engineering	**Class(es) of Plant:** D Line
Project Initiator: Nate Duford	**Project Category:** Lines - General
Project Manager: Mark Fraser	**Project Type:** Specific
Estimated in service date: 12/1/2023	**Project Purpose:** Reliability
Total Request: $7,000,000	

Executive Summary

The 316X1 line is a 34.5 kV circuit that taps the 316 which originates at North Road Substation and feeds Grantham via a radial feed along Stoneybrook Road. This circuit feed serves 3,447 customers. The circuit is radial and there are no other 34.5 kV substation sources for this line to tie to. This circuit is perennially on the Hit List, finishing at #2 in 2019. This project proposes continuing north on Hwy 10 from the newly converted 44H1 34.5kV source. By extending 34.5kV approximately 8.2 miles, this would bring another strong source into the Eastman development and create a circuit tie with the 316X1.

This project is projected to save 1 million customer minutes per year. The cost per customer minute saved for this project is $7/cust min.

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Project Authorization Form

Technical Justification

Note: this is your opportunity to sell the project. Be sure to be complete in your description of why the project should be funded.

Project Need Statement

The 316X1 circuit is currently radially fed via Stoney Brook Rd. This radially feed serves approximately 2400 customers, which has experienced 24 outages on the backbone over the past four years. Currently, there are no other viable options to construct a circuit tie to back up this feed.

Project Objectives

Improve reliability on the 316X1 circuit, which is perennially atop the New Hampshire Hit List. (#2 in 2019)

Project Scope

- Extend 34.5kV spacer cable 8.2 miles along Hwy 10 North from North Newport to Grantham.

Background / Justification

- 316X1 Circuit (3,447 customers) is fed radially from the 316 line.
- Perennially finishes in the top 5 of the New Hampshire Hit List.
- Backbone trimming, fusing improvements, and extensive DA has been completed along this circuit already.
- Fully automated loop completed in Fall 2018 within the Eastman Development. (approx. 2400 customers)

Business Process and / or Technical Improvements

Construct 8.2 miles of spacer cable creating circuit tie with 316X1.

Alternatives Considered with Cost Estimates

(Note: in general “none” is not an option)

Several other alternatives have already been completed on this circuit.
No other options for circuit tie.

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Project Authorization Form

Project Schedule

Milestone/Phase Name	Estimated Date
100% Engineering Completion	12/1/21
Construction Start	5/1/22
Testing/Commissioning	11/1/23
In Service Date	12/1/23

Regulatory Approvals

We will need to work with the NH DOT for construction work along Hwy 10.

Risks and Risk Mitigation Plans

There are minimal risks to doing this project.

Contingency

References

EVERSOURCE
Project Authorization Form

Attachments (One-Line Diagrams, Images, etc.)

Public Service Company of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-161

Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
Data Request No. DOE 5-012 **Page 1 of 1**

Request from: Department of Energy

Witness: Freeman, Lavelle A

Request:

Reference Eversource Response to DR DOE 4-001, Group #4, Appendix D at 5, Garvins Reliability Project. Given that Garvins Substation was substantially renovated and upgraded in 2017/2018 at a cost of $5.4 million, i.e., new control system, new control house, new circuit switches, 115 kV bus differential, and three new transformers, please provide a more detailed explanation as to why the Company has concluded that this substation is in violation of the System Planning reliability criteria. Why was the violation not known or foreseen at the time of engineering and construction of the upgrade? (Please identify any renovations or upgrades not already identified in this DR)

Response:

The Distribution System Planning Guide, published in September 2020, expanded the definition of a single contingency from legacy planning criteria. The Distribution System Planning Guide now includes a bus section fault as part of the single contingency review. It was identified at Garvins that all customer load cannot be restored for a bus section fault, which has prompted the need for further study to address the design violation as noted in the 2020 Design Violations Summary Report (March 31, 2021 Supplement, Bates Page 207).

Public Service Company of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-161

Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
Data Request No. DOE 5-013 **Page 1 of 1**

Request from: Department of Energy

Witness: Freeman, Lavelle A

Request:

Reference Eversource Response to DR DOE 4-001, Group #4, Appendix D at 8, Jackman Reliability Project. Given that Jackman Substation was substantially renovated and upgraded in 2018 at a cost of $7.1 million, i.e., new control house, reconfiguration of bus work, and new electromechanical relays, please provide a more detailed explanation as to why the Company has concluded that this substation is in violation of the System Planning reliability criteria. Why was this violation not known or foreseen at the time of engineering and construction of the upgrade? (Please identify any renovations or upgrades not already identified in this DR)

Response:

The Distribution System Planning Guide, published in September 2020, expanded the definition of a single contingency from legacy planning criteria. The Distribution System Planning Guide now includes a bus section fault as part of the single contingency review. It was identified at Jackman that all customer load cannot be restored for a bus section fault, which has prompted the need for further study to address the design violation as noted in the 2020 Design Violations Summary Report (March 31, 2021 Supplement, Bates Page 306).

Public Service Company of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-161

Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
Data Request No. DOE 5-014 **Page 1 of 1**

Request from: Department of Energy

Witness: Freeman, Lavelle A

Request:

Reference Eversource Response to DR DOE 4-001, Group #4, Appendix D at 20, Webster Reliability Project. Given that Webster Substation underwent substantial renovations and upgrades in 2018 at a cost of $19 million, i.e., transformer replacements along with related upgrades of relays, circuit breakers, and bus sections, please provide a more detailed explanation as to why the Company has concluded that this substation is in violation of the System Planning reliability criteria. Why was this violation not known or foreseen at the time of engineering and construction of the upgrade? (Please identify any renovations or upgrades not already identified in this DR)

Response:

The Distribution System Planning Guide, published in September 2020, expanded the definition of a single contingency from legacy planning criteria. The Distribution System Planning Guide now includes a bus tie breaker failure as part of the single contingency review. In addition, it also states the "transmission system supplying distribution bulk stations shall be designed so that the outcome of any single contingency event at the transmission side does not result in a condition greater than a Single Contingency (N-1) at the distribution bulk substation." It was identified at Webster that a 115 kV bus tie breaker failure will cause an outage to four bulk distribution transformers, which has prompted the need for further study to address the design violation as noted in the 2020 Design Violations Summary Report (March 31, 2021 Supplement, Bates Page 263).

Public Service Company of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-161

Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
Data Request No. DOE 5-015 **Page 1 of 5**

Request from: Department of Energy

Witness: Hebsch, Jennifer J, Johnson, Russel D

Request:

Reference Eversource's Response to DR DOE 4-001, Group #6, Appendix F-5 at Bates 487, 317 Line ROW rebuild. Please respond to the following:

a. Please provide the 5-year outage history for this circuit including the cause for the outage(s).
b. Explain and quantify why steel poles, and not Class II poles, constitute the least cost option for this project. What is the accepted engineering standard that necessitates the use of steel poles for this type of project?
c. What are Eversource's costs for steel poles vs. Class II poles? Please re-work the Project Cost Summary and the Financial Evaluation at Bates 488 and 489 as if Class II poles had been selected for the project and provide your analysis. Please include a live Excel Spreadsheet showing formulas and calculations.

Response:

a. See Attachment DOE 5-015.

b. Project No. A20C46, titled "317 Line ROW Section Rebuild" targets the replacement of 27 aged and decayed wooden poles along with their deteriorated crossarms that were put in service in 1937. All 27 structures are planned to be replaced with light duty self-weathering steel monopoles. As stated in the Project Authorization Form ("PAF"), due to the existent line limitations, loss of normal feed to North Road Substation would result in approximately 9,000 customers stranded without power. The replacement process is consistent with the Company's right of way ("ROW") steel pole standards. Steel poles are only approved as standard in ROW construction applications.

Poles in ROW are typically inaccessible by bucket trucks and need to be climbed for any emergency repairs. Historically, poles treated with pentachlorophenol (or "penta") were used in ROW construction because they had a low decay rate, strong pest control, and were softer, which made them easier to climb. In 2020, the preservative was banned for environmental reasons, and the production of penta poles ended in 2021.

The Company, along with other utilities, evaluated alternatives and there were very few options that could survive the ROW environments and could be easily climbed if needed. Steel has

Public Service Company of New Hampshire d/b/a Eversource Energy
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Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
Data Request No. DOE 5-015 **Page 2 of 5**

emerged as a logical choice in ROW, while wood poles treated with chromated copper arsenate ("CCA") is the choice for roadside applications. Roadside poles are easily accessible by a bucket truck, so the CCA pole is a reasonable alternative to penta.

As a result, steel is becoming the predominantly used pole type across utilities in ROW construction. ROWs are often in environmentally sensitive areas or include difficult to access areas, both of which can result in complications or additional considerations required for maintenance planning, difficult repair practices and longer restoration times. The Company notes that a significant portion of our ROW line miles are within wetland soils, Natural Diversity Database Areas (locations of state and federal listed species and significant natural communities) or EPA Region 1 Environmentally Sensitive Areas, which reinforce the decision to use steel poles.

The Company worked with manufacturers to confirm product information and specification ratings and compared it to existing Eversource practices to validate that steel pole construction was the best option to improve resiliency within its ROWs. Based on the ROW geographical layout and extent of environmental sensitive areas, steel poles have the following advantages over wood that supports the Company's mission to improve resiliency:

1- Steel poles are engineered with precise strengths where wood is imperfect. The strength of wood can fluctuate from pole to pole and deteriorate over time.
2- Wood poles require more involved maintenance and inspection programs, which include chemical treatments to maintain strength. Poles that are not properly maintained can result in faster decay and reduced strength.
3- Steel poles have a useful life of a minimum of 60 years, on average. Compared to wood poles, the useful life of a wood pole is 30-40 years with regular maintenance and treatment.
4- When needing higher class poles for specific applications (more common in ROW construction), steel poles are more readily available through purchasing.

The actual wood pole service life is a function of many factors including the specification, the quality of treatment, the conditions to which the pole is exposed, and how well the pole is maintained during use. The higher, consistent strength of the steel pole is a more resilient option in inaccessible locations where regular maintenance can be difficult or locations where faster decay and reduced strength is possible due to environmental impacts.

c. The following table provides the unit costs of Class 1 self-weathering steel vs Class 2 wood poles at the time of drafting.

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Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
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The following table contains confidential competitively sensitive pricing information. Accordingly, consistent with Puc 203.08(d), the Company states that it has a good faith basis for protective treatment of the confidential information provided in this table. The Company will submit a motion for confidential treatment prior to the hearing in this proceeding.

Pole Height	Cost per unit Class 1 Steel	Cost per unit Class 2 Wood
60'	[redacted]	
55'		
50'		

Project Cost Summary and Financial Evaluation tables from Bates 488 and 489 updated using wood poles in place of steel are provided in the tables below.[1] Total initial cost estimate is reduced by 4.3% ($903K vs $944K).

Note: Dollar values are in thousands

Line item Category	Prior Authorized	Actuals to Date	2020-2021	Total
1. ROW / Easements / Land Acquisition	$	$	$	$
2. Environmental Approvals / Permits	$	$	$2	$2
3. Outreach	$	$	$2	$2
4. Siting Approvals / Permits	$	$	$2	$2
5. Engineering / Design	$	$	$65	$65
6. Materials (Eversource purchased)	$	$	$82	$82
7. Construction (incl matl's by contractors)	$	$	$385	$385
8. Testing / Commissioning	$	$	$	$
9. Project Mgmt Team	$	$	$14	$14
10. Removals	$	$	$	$
11. Other	$	$	$	$
12. Risks	$	$	$	$
SUBTOTAL DIRECTS W/ RISKS	**$**	**$**	**$552**	**$552**

[1] There is no Excel version of these tables.

Public Service Company of New Hampshire d/b/a Eversource Energy
Docket No. DE 20-161

Date Request Received: April 15, 2022 **Date of Response: April 27, 2022**
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Line item Category	Prior Authorized	Actuals to Date	2020-2021	Total
13. Indirects/Overhead	$	$	$327	$327
14. AFUDC	$	$	$4	$4
PROJECT TOTAL – BASELINE BUDGET	**$**	**$**	**$883**	**$883**
15. Contingency	$	$	$20	$20
TOTAL CAPITAL REQUEST	**$**	**$**	**$903**	**$903**
16. Reimbursables/Customer Contribution	$	$	$	$
PROJECT TOTAL (LESS REIMBURSABLES)	**$**	**$**	**$903**	**$903**
O&M	$	$	$	$
TOTAL REQUEST	**$**	**$**	**$903**	**$903**

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Note: Dollar values are in thousands

Direct Capital Costs	Year 1	Year 2	Year 3+	Total
Straight Time Labor	$14			$14
Overtime Labor				
Outside Services	$456			$456
Materials	$82			$82
Other, including contingency amounts (detailed below)	$20			$20
Total Direct Costs	$572	$0	$0	$572

Indirect Capital Costs	Year 1	Year 2	Year 3+	Year 1
Indirects/Overheads (including benefits)	$327			$327
Capitalized interest or AFUDC, if any	$4			$4
Total Indirect Costs	$331	$0	$0	$331

Total Capital Costs	$903	$0	$0	$903

Less Total Customer Contribution				

Total Capital Project Costs	$903	$0	$0	$903

Total O&M Project Costs				

2016 - 2020 - 317 Circuit - NH OMS Parent Events - No Exclusions - Permanent Outages

1=IEEE Criteria 0=MED

Year	CIRCUIT	Start Date	Parent Event ID	CI	CMI	CAIDI	Cause	Device Name	Fault Location (Route/Pole)	Isolating Device Location	Town	IEEE_RPT_IND
2018	317_64	5/4/2018	3648085	181	178,285	985	TREE-Tree/Limb Outside Trim Zone/Unknown	NLB_DSC_OH:317/928Y:317DX15	317/991	317/928Y	WARNER	0
2019	317_64	11/1/2019	4034455	145	20,010	138	TREE-Tree/Limb Outside Trim Zone/Unknown	SCADA_SW_OH:317/284:317J9	311/21	317/284	HOPKINTON	0
2020	317_64	3/24/2020	4110398	1,407	652,848	464	SNIC-Snow/Ice Loading	SCADA_SW_OH:317/225:317J8	311/285-7	317/225	HOPKINTON	0