

**STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION**

DOCKET NO. DE 20-161

EVERSOURCE ENERGY 2020 LEAST COST INTERGRATED RESOURCE PLAN

REDACTED

DIRECT JOINT TESTIMONY OF

**Jay E. Dudley
Utilities Analyst IV
New Hampshire Department of Energy**

**Ronald D. Willoughby
River Consulting Group, Inc.**

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1 **I. INTRODUCTION AND QUALIFICATIONS**

2 **Q. Mr. Dudley, please state your full name and business address.**

3 A. My name is Jay E. Dudley. My business address is 21 South Fruit Street, Suite 10,
4 Concord, NH 03301.

5 **Q. Please state your employer and your position.**

6 A. I am employed by the New Hampshire Department of Energy (“DOE” or the
7 “Department”) as a Utility Analyst for the Regulatory Support Division.

8 **Q. Please describe your professional background.**

9 A. I started at the New Hampshire Public Utilities Commission (“Commission” or “PUC”)
10 in June of 2015 as a Utility Analyst in the Electric Division. Effective July 1, 2021, the
11 Electric Division was transferred to, and became part of, the newly created New
12 Hampshire Department of Energy and I am presently employed by that agency. Before
13 joining the Commission, I was employed at the Vermont Public Service Board (now
14 known as the Vermont Public Utilities Commission, “VT-PUC”) for seven years as a
15 Utility Analyst and Hearing Officer. In that position I was primarily responsible for the
16 analysis of financing and accounting order requests filed by all Vermont utilities,
17 including review of auditor’s reports, financial projections, and securities analysis. As
18 Hearing Officer, I managed and adjudicated cases involving a broad range of utility-
19 related issues including rate investigations, construction projects, energy efficiency,
20 consumer complaints, utility finance, condemnations, and telecommunications. Prior to
21 working for the VT-PUC, I worked in the commercial banking sector in Vermont for
22 twenty years where I held various management and administrative positions. My most
23 recent role was as Vice President and Chief Credit Officer for Lyndon Bank in

1 Lyndonville, Vermont, where I was responsible for directing and administering the
2 analysis and credit risk management of the bank's loan portfolio, including internal loan
3 review, regulatory compliance, audit, and coordinating periodic bank examinations by
4 state and federal regulators.

5 **Q. Please describe your educational background?**

6 A. I received my Bachelor of Arts degree in Political Science from St. Michael's College.
7 Throughout my career in banking, I took advantage of numerous Continuing Professional
8 Education (CPE) opportunities involving college level coursework in the areas of
9 accounting, financial analysis, real estate and banking law, economics, and regulatory
10 compliance. Also, during my tenure with the VT-PUC I took advantage of various CPE
11 opportunities including the Regulatory Studies Program at Michigan State University
12 (sponsored by the National Association of Regulatory Utility Commissioners "NARUC"),
13 Utility Finance & Accounting for Financial Professionals at the Financial Accounting
14 Institute, Standard & Poor's seminars on credit ratings for public utilities, and Scott
15 Hempling seminars on Electric Utility Law and Public Utility Regulation.

16 **Q. Have you previously testified before the Commission?**

17 A. Yes. I previously submitted Staff testimony to the Commission in Docket No. DE 14-
18 238, Public Service Company of New Hampshire Generation Assets; Docket No. DE 15-
19 137, Energy Efficiency Resource Standard; Docket No. DE 16-383, Liberty Utilities
20 Request for Change in Rates; Docket No. DE 17-136, 2018-2020 NH Energy Efficiency
21 Plan; Docket No. DE 19-064, Liberty Utilities Request for Change in Rates; Docket No.
22 DE 19-057 Public Service Company of New Hampshire for Change in Rates; Docket No.
23 DE 20-092, 2021-2023 Triennial Energy Efficiency Plan; Docket No. DE 21-030 Unitil

1 Energy Systems, Inc. Request for Change in Rates; and Docket No. DE 22-026 Unitil
2 Energy Systems, Inc. Petition for Approval of Step Adjustment Filing.

3 **Q. Mr. Willoughby, please state your full name and business address.**

4 **A.** My name is Ronald D. Willoughby. My business address is 1007 Wolfs Bane Drive,
5 Apex, NC 27539.

6 **Q. Please state your employer and your position.**

7 **A.** I am employed by Willoughby Consultant as its Owner. I am performing this engagement
8 as a subcontractor to River Consulting Group, Inc.

9 **Q. Are you registered as a Professional Engineer?**

10 **A.** Yes, I hold a license as a Professional Engineer in Pennsylvania.

11 **Q. Do you hold any patents in power engineering?**

12 **A.** Yes, I hold a U.S. Software Patent for improving the reliability of electrical distribution
13 networks.

14 **Q. Please summarize your educational and professional background.**

15 **A.** I received a Bachelor of Science in Electrical Engineering from the University of
16 Missouri-Rolla and a Master of Science in Electrical Engineering (Power Engineering)
17 from Carnegie-Mellon University.

18 I am a senior life member of the IEEE (Institute of Electrical and Electronics Engineers);
19 a senior member of the IEEE Power Engineering Society; a senior member of the IEEE
20 Industrial Applications Society; and a member of the honorary societies Phi Kappa Phi,
21 Eta Kappa Nu, Tau Beta Phi and Kappa Kappa Psi.

22 I have published over 60 articles relating to electric power systems analysis and
23 operation.

1 **Q. Please summarize your consulting and employment experience.**

2 A. I have been actively engaged in the utility industry for over 45 years, during which I have
3 had extensive experience in the following areas:

- 4 ▪ Transmission and Distribution Planning – I have led engineering, procurement and
5 construction (EPC), and turnkey solutions for electric distribution automation,
6 medium voltage modular substations (distribution centers), and wind farm
7 distribution systems (from base of turbine towers through interconnection to utility
8 grid). I have also led distribution grid modernization planning efforts, focused on
9 systematic and incremental addition of smart grid devices, with technology,
10 performance, and cost central to the planning process.
- 11 ▪ Distribution Substation Design and Specification Review – I managed an engineering
12 group that designed modular distribution substations and specified all corresponding
13 equipment.
- 14 ▪ Advanced Protection, Automation & Control – I co-chaired (with the Director of
15 R&D at We-Energies) Distribution Vision 2010 LLC (DV2010), a consortium of
16 Investor-Owned Utility (IOU) companies to advance distribution automation and
17 equipment design.
- 18 ▪ Distribution Grid Modernization Planning – I was principal engineer on distribution
19 automation and volt-var optimization projects, with an emphasis on conservation
20 voltage reduction (CVR).
- 21 ▪ Renewable Energy Integration and the Impact on the Utility Grid - I was involved in
22 electric power system impact studies related to distributed energy resource

1 integration, including energy storage specification and integration, and related impact
2 studies.

- 3 ■ Conservation Voltage Reduction – I was the Project Manager and Technical Lead for
4 a major midwestern electric utility’s feasibility study to quantify energy and demand
5 savings using distribution Voltage Optimization techniques. Objectives: 1)
6 Minimize cost by initiating feeder upgrades to achieve minimum performance
7 thresholds. 2) Maximize energy savings by optimizing performance while staying
8 within Total Resource Cost (TRC) constraints. I also was the Co-founder of a CVR
9 Industry Consortium to guide CVR research, work with industry groups, develop
10 policy recommendations, promote implementation strategies, and document the
11 results.

12 I have participated in various international programs including:

- 13 ■ Invited by CEOs of Wind-2-Power-Systems (W2PS) and Hudson Energy to represent
14 the United States for a conference in Madrid to cover PV integration, grid integration,
15 energy storage, and DC infrastructure issues.
- 16 ■ Invited by CARILEC to chair two sessions on Transforming the Electricity Grid at
17 the Renewable Energy Forum, St Thomas, U.S. Virgin Islands.
- 18 ■ Invited by Prime Minister of Curacao to represent United States in 1st Annual
19 Durable Energy Conference to address renewables integration issues for the
20 transmission and distribution system.
- 21 ■ Conducted comprehensive seminar on electric power systems for the Ministry of
22 Water and Power in Peking, China.

- 1 ▪ Led projects sponsored by the Pacific Power Association (PPA) for power system
2 energy analysis and loss reduction on 20 islands in the South Pacific, 10 with U.S.-
3 style power systems, and 10 with European-style power systems.
- 4 ▪ Performed international power systems studies on power flow, transient stability,
5 shunt compensation, load shedding, motor starting, loss formula development, short
6 circuit, and protective device coordination.
- 7 ▪ Taught Westinghouse’s Advanced School on Power System Stability.
- 8 ▪ Managed commissioning and public relations for comprehensive distribution line
9 installation in the city of Smolensk, Russia.

10 **Q. Have you included a more detailed description of your qualifications?**

11 A. Yes. More detailed descriptions of my experience and qualifications are included as
12 Attachments RDW-1 and RDW-2.

13 **Q. Have you previously testified before the Commission?**

14 A. No.

15 **II. SUMMARY OF TESTIMONY**

16 **Q. Please describe the purpose of your testimony today.**

17 A. The purpose of our testimony is to provide the results of the Department’s review and
18 evaluation of Eversource Energy’s (“Eversource” or “the Company”) 2020 Least Cost
19 Integrated Resource Plan (“LCIRP or the Plan”) and the March 31, 2021 Supplement
20 (“Supplement”). This review and evaluation will determine whether Eversource’s LCIRP
21 is consistent with the provisions of RSA 378:37, :38, and :39, and whether the Company
22 has complied with the Commission’s Order No. 26,362 dated June 3, 2020 in Docket DE
23 19-139.

1 **Q. What is your general conclusion involving Eversource's LCIRP?**

2 **A.** We have concluded that the Company's 2020 LCIRP generally meets the requirements
3 set out in RSA 378:37 and RSA 378:38, but that Eversource did not specifically address
4 the criteria in RSA 378:39 in its Plan. Consequently, as discussed below, we recommend
5 that Eversource provide a supplemental filing addressing the criteria in RSA 378:39. We
6 further conclude that the Plan generally complies with the PUC's Order in Docket DE 19-
7 139. The Department also has several additional recommendations which are detailed at the
8 end of our testimony.

9 **III. REVIEW AND ANALYSIS OF EVERSOURCE 2020 LCIRP**

10 **Q. What does RSA 378:37 require Eversource to include in its LCIRP?**

11 **A.** RSA 378:37 New Hampshire Energy Policy requires utilities to comply with New
12 Hampshire's state energy policy in terms of meeting "the energy needs of the citizens and
13 businesses of the state at the lowest reasonable cost while providing for the reliability and
14 diversity of energy sources; to maximize the use of cost effective energy efficiency and
15 other demand side resources; and to protect the safety and health of the citizens, the
16 physical environment of the state, and the future supplies of resources, with consideration
17 of the financial stability of the state's utilities." New Hampshire utilities are expected to
18 demonstrate their compliance with these requirements through their planning process and
19 the content of their least cost integrated resource plans.

20 **Q. What does RSA 378:38 require Eversource to include in its LCIRP?**

21 **A.** RSA 378:38 requires LCIRPs to include, *as applicable*, the following:

22

23 I. A forecast of future demand for the utility's service area.

24 II. An assessment of demand-side energy management programs, including

25 conservation, efficiency, and load management programs.

1 III. An assessment of supply options including owned capacity, market
2 procurements, renewable energy, and distributed energy resources.

3 IV. An assessment of distribution and transmission requirements, including an
4 assessment of the benefits and costs of "smart grid" technologies, and the
5 institution or extension of electric utility programs designed to ensure a more
6 reliable and resilient grid to prevent or minimize power outages, including but
7 not limited to, infrastructure automation and technologies.

8 V. An assessment of plan integration and impact on state compliance with the
9 Clean Air Act of 1990, as amended, and other environmental laws that may
10 impact a utility's assets or customers.

11 VI. An assessment of the plan's long- and short-term environmental, economic,
12 and energy price and supply impact on the state.

13 VII. An assessment of plan integration and consistency with the state energy
14 strategy under RSA 12-P.

15 **Q. Are all of these requirements still applicable?**

16 A. The least cost planning statute was written and amended several times when Eversource
17 still owned large-scale electric generating facilities.¹ New Hampshire recently completed
18 its decades-long journey toward electric utility restructuring which included Eversource
19 divesting itself of its generating assets. This new context means the Commission must
20 review LCIRP filings using a different lens, one that recognizes the waning applicability
21 of some of the factors required in the statute. The statute recognizes the potential
22 evolution of least cost planning in New Hampshire, and qualifies the above enumerated
23 requirements by stating "Each such plan shall include, but not be limited to, the [above

1 enumerated factors], *as applicable*.” RSA 378:38 (emphasis added). In light of this
2 evolution, it would be an efficient allocation of resources for the Commission to shift the
3 focus of its LCIRP analyses to distribution planning processes and planned distribution
4 system investments.

5 **Q. Is the Department suggesting the provisions of RSA 378:38 focusing on energy**
6 **supply options are no longer relevant to the Commission’s review of LCIRP’s?**

7 **A.** No. While RSA 378:38 III is clearly intended to authorize the Commission’s
8 review of the supply portfolio of a vertically integrated utility, there are some scenarios
9 where it may still have relevance for restructured utilities. For example, RSA 374-G
10 allows for company ownership of distributed energy resources which, if deployed, might
11 bear relevance to RSA 378:38 III. Similarly, the New Hampshire Supreme Court
12 recently found that the “functional separation” of generation services from transmission
13 and distribution services should not be elevated above the other interdependent policy
14 principles in the restructuring statute. *Appeal of Algonquin Gas Transmission, LLC*, 170
15 N.H. 763, 774, 186 A.3d 865, 874 (2018). It is conceivable that this interpretation of the
16 restructuring statute might lead to electric distribution company investments which, if
17 deployed, might bear relevance to RSA 378:38 III.

18 In the instant case, no such scenarios are presented for the Commission to evaluate, so
19 RSA 378:38 III is not applicable. Therefore, the Department’s analysis of Eversource’s
20 LCIRP focuses on the other factors within the statute. The Department recommends that
21 Eversource’s next LCIRP should have a similar focus, unless facing a scenario where the
22 aforementioned provisions are somehow applicable. The Department also recommends
23 that the Company should participate in the processes set forth by the Commission’s

¹ The statute appears to have been enacted in 1990 and was most recently amended in 2021.

1 “guidance” in Docket IR 15-296, Order No. 26,575, to develop its next LCIRP, and that
2 the substance of that LCIRP should align with the expectations expressed by the
3 Commission in that Order.

4 **Q. Did Eversource consider the applicability of RSA 378:39 as part of its 2020 LCIRP?**

5 **A.** No. As part of the Department’s involvement in Docket DG 17-152 Liberty Utilities
6 (Energy North) LCIRP, the Department’s understanding of the issues associated with the
7 application of RSA 378:39 is that the Commission expects the utilities to file information
8 on the criteria that allows the Commission to perform an adequate assessment of those
9 areas. This expectation was expressed in Order No. 26,225 at 7 (March 13, 2019), in
10 Docket DG 17-152, where the Commission stated: “[w]e direct Liberty to submit a
11 supplemental filing, including supporting testimony, to address each of the specific
12 elements required under RSA 378:38 and RSA 378:39 that are not already addressed in
13 its LCIRP, with adequate sufficiency to permit the Commission’s assessment of potential
14 environmental, economic, and health-related impacts of each option proposed in the
15 LCIRP, as required by RSA 378:39.”² Given that Eversource’s LCIRP does not
16 specifically address the criteria in RSA 378:39, the Department finds that the Plan is not
17 fully compliant with the statutory requirements and recommends that the Company
18 provide a supplemental filing that complies with the expectation expressed in the
19 Commission’s Order in Docket DG 17-152. That is, Eversource is to provide the PUC
20 with sufficient information, especially as it relates to potential environmental, economic,
21 and health-related impacts, that allows the Commission to make an adequate assessment
22 of those criteria.

² See Docket No. DG 17-152, Liberty Utilities (Energy North) LCIRP, Tab No. 20, Order No. 26,225 at 7 (March 13, 2019), Denying Motion to Dismiss dated March 13, 2019, at 7.

1 **Q. Does the Company's 2020 LCIRP comply with the requirements set out in the**
2 **Settlement Agreement in Docket No. DE 19-139 and approved in the PUC's Order**
3 **No. 26,362 dated June 3, 2020?**

4 **A.** Yes, in part. As discussed further below, the LCRIP, taken together with the March 31,
5 2021 Supplement, constitutes a comprehensive plan as contemplated by the Settlement in
6 terms of containing the minimum level of detail. That is, the areas of planning and
7 budgeting processes, distribution operating procedures, distribution engineering manual,
8 equipment standards, planning criteria, load forecasts, future system needs, and planned
9 solutions were all addressed in the Plan.³ However, as discussed below, the Department
10 continues to have concerns involving the Company's deployment of NWS.

11 **RSA 378:38, I – Demand Forecast**

12 **Q. Does Eversource's LCIRP include a forecast of future demand for the utility's**
13 **service area?**

14 **A.** Yes. According to the Company's Plan, Eversource's system planning is a 10-year
15 timeframe forecast using historical peak load to establish a correlation for future
16 forecasting. An econometric model evaluates historical peak demand as a function of
17 peak day weather conditions and the economy. The econometric model utilizes two
18 different weather variables in forecasting summer peak demand: a three-day weighted
19 temperature humidity index and cooling degree days. The forecast assumes normal
20 weather conditions, which are based off the most recent 10-year period. Eversource
21 produces a 50/50 and a 90/10 peak demand forecast. The 50/50 forecast is based off
22 normal 10-year weather and has a 50 percent chance of being exceeded. The 90/10
23 forecast is the extreme weather scenario that has a 10 percent chance of being exceeded.

1 The economic history and forecast are provided by Moody's Analytics, an international
2 economic consulting company. Once the Eversource system level forecast is finalized,
3 bulk substation level forecasts are developed. Each bulk substation is forecasted using an
4 econometric model that evaluates substation historical demand as a function of the
5 Eversource system peak demand history and forecast.⁴

6 After a trend forecast is produced for each substation, the forecast is adjusted for energy
7 efficiency, distributed energy resources (DER), large customer projects, or other material
8 changes in load or supply. Company sponsored energy efficiency and behind-the-meter
9 solar PV are proportionally applied to each substation in proportion to historical peak
10 demand at each substation. Specifically identified large development projects or
11 expected changes in system operations that could not otherwise be predicted by the
12 econometric forecasts are applied to the affected substation. In addition, capacity
13 reserves are held for customer owned co-generation units which hold Standby Delivery
14 Service Contracts.⁵

15 **Q. Does the Department have any concerns about how the Company forecasts load on**
16 **its circuits?**

17 **A.** No. The Company's process to forecast its load is consistent with other utilities, and its
18 methodology to forecast the load at individual substations using an econometric model is
19 considered a leading practice.

20 **Q. What is the Department's assessment of Eversource's Plan in the areas of**
21 **equipment ratings, bulk substations, interconnected feeders, non-bulk substations,**
22 **and distribution circuit planning.**

³ Attachment JED/RDW-1 Data Request DOE 5-005.

⁴ LCIRP at Bates 19.

1 A. Eversource has adopted standard designs across Connecticut, Massachusetts, and New
2 Hampshire as much as practical, recognizing state-specific requirements can apply. The
3 Company's *Distribution System Planning Guide (DSPG 2020)*⁶ contains planning
4 criteria, asset rating criteria, planning methodology, and non-wires alternatives/solutions
5 (NWAs or NWSs). Current industry standards are referenced and applied and the
6 Company's equipment ratings, application guidelines, and system planning practices
7 appear to be consistent with these industry standard practices, e.g., ANSI, NERC, IEEE,
8 and EPRI.⁷

9 These design standards are contained in a set of on-line standards documents accessible
10 to Eversource staff referred to as a *T&D Engineering Standards Bookshelf*⁸. The
11 contents of the "Bookshelf" address equipment ratings and application guidelines, bulk
12 and non-bulk substations, distribution feeders, and system planning. Bookshelf
13 documents⁹ include the following: *Distribution System Engineering Manual (DSEM),*
14 *Specifications, System Planning, Transmission & Substation, Overhead, and*
15 *Underground.*

16 **Q. What is the Department's assessment of Eversource's revisions to its distribution**
17 **system planning criteria?**

18 A. Revisions to the distribution planning criteria (in DSPG 2020) were made by the
19 Company in part to address the concerns raised by PUC Staff and the OCA in Docket No.
20 DE 19-139 and to also proactively identify risks and potential mitigation alternatives. The

⁵ *Id.* at Bates 20.

⁶ LCIRP at Bates 28 and Appendix D.

⁷ LCIRP, Appendix D, at Bates 111

⁸ Attachment JED/RDW-2 Data Request DOE 6-003, Attachment DOE 6-003(a) and (b).

⁹ *Id.* Attachment DOE 6-003(b).

1 Company stated “DSPG 2020 is today’s primary document for system planning criteria,
2 rating, and planning methodology.”¹⁰

3 For bulk transformers, the change from 75% top nameplate rating to 95% will result in a
4 higher transformer loading before a criteria violation occurs, which will reduce available
5 capacity to serve unexpected loading conditions but reduce the number of transformer
6 upgrades due to criteria loading. Both bulk and non-bulk transformers have three ratings:
7 Normal (top nameplate), long-term emergency (LTE), and short-term emergency (STE).

8 “The most significant change in calculating bulk transformer ratings was the
9 methodology used to calculate long-term and short-term emergency ratings. The
10 methodology changed from a calculated loss of life method using a 24-hour load curve
11 (referred to as TFRAT by Eversource) to a method that determined the rating by using a
12 constant load for a fixed loading period (i.e., 12 hours summer, 4 hours winter for LTE)
13 while limiting the hottest spot winding temperature to 140 degrees C. Eversource
14 adopted this methodology based on guidance provided in the IEEE standard for loading
15 mineral-oil-immersed transformers.”¹¹ The electric utility industry recognizes IEEE as a
16 credible technical source for equipment application and protection. We agree with
17 Eversource revising its guidelines to conform with IEEE standards.

18 The next most significant change in bulk transformer (substation) planning criteria is not
19 allowing any load loss under N-1 contingency conditions instead of allowing 30MW load
20 loss for up to 24 hours. From the Company’s perspective, there was a need to modify the
21 criteria to meet higher performance expectations for today’s customers who have
22 transitioned from simple tasks such as lighting, refrigeration, cooking, and water heating

¹⁰ Attachment JED/RDW-3, Data Request DOE 4-029.

¹¹ LCIRP, October 1, 2020, Bates 27

1 to more complex and dependent energy needs.¹² Customers working from home are
2 highly dependent on reliable computer operation. Because household appliances also
3 come with computer chips to optimize operation, today’s consumer is further dependent
4 on continuous, high-quality electric power supply. While it is true customers can ensure
5 uninterruptible power through the use of UPS or whole-house back-up generator systems,
6 customer-specific situations may make this impractical due to fuel-supply or financial
7 reasons.

8 The “no loss of load” criteria will result in additional designs to maintain the desired
9 level of reliability. This is sometimes construed as overdesign. However, to resolve
10 criteria violations and satisfy reliability objectives, additional equipment and operating
11 practices are required. For example, for bulk substations, contingency criteria violations
12 can be resolved by implementing bus-tie breaker designs providing alternative source
13 feeds for distribution feeder loads. This results in increased capital investment to
14 implement the schemes, but in return, reliability objectives are met while making better
15 use of existing assets.

16 Eversource standard bulk substation design practices also call for automatic bus
17 restoration schemes (ABR) which “automatically isolate the secondary breaker of the
18 primary transformer supply to the bus and then close a normally open breaker to another
19 bus/transformer, restoring power to affected customers.”¹³ There are two standard
20 designs: 1) Double-Bus Switchgear, and 2) Ring Bus. Application and protection

¹² RCG’s anecdotal experience indicates customer tolerance of outages (even during major events) has markedly decreased.

¹³ Attachment JED/RDW-4, Data Request DOE 4-002, Attachment DOE 4-002(1), Distribution System Engineering Manual (DSEM) Section 2.8.

1 guidelines for each are provided in the referenced DSEM document. Both are consistent
2 with standard industry practice.

3 The use of covered conductor (tree wire) and spacer cable (3-phase application) is
4 defined in DSEM, Section 6.20.¹⁴ Covered wire is to be used in all cases except where
5 bare wire (not fully insulated) is allowed. Spacer cable is to be used where it is not
6 possible to get the necessary clearance for crossarm construction; or if required for
7 clearance when a secondary circuit is needed on the same pole. If reliability issues are
8 due to temporary tree limb contact, either cable option can be used, depending on
9 physical conditions. If reliability issues are due to mechanical damage from falling tree
10 limbs/trees, spacer-cable can help because of its inherent additional conductor strength.
11 However, spacer-cable is expensive to install and can result in pole damage under icing
12 conditions due to the weight of the cable. The better long-term fix is more aggressive
13 tree trimming if physical conditions allow. We reviewed several projects and found
14 Eversource to be applying spacer-cable only where needed and not broadly across the
15 system.

16 To summarize, the planning criteria revisions made by Eversource are reasonable and
17 consistent with industry standard practice. DSEM system design guidelines appear to be
18 reasonable and generally applied by Eversource engineers in the projects reviewed.

19 **Q. Did the Company estimate incremental costs associated with these criteria changes?**

20 **A.** The Company did not directly estimate the incremental costs associated with the changes
21 in its planning criteria. However, the Company noted “No projects were initiated solely
22 as a result of the adoption of SYSPLAN 010 from 2018 through 2020.”¹⁵

¹⁴ *Id.*

¹⁵ LCIRP at Bates 28

1 **Q. Are there other incremental costs related to these criteria and methodology?**

2 **A.** While the Company’s LCIRP did not explicitly address the cost implications of the
3 changes in criteria, the Department did explore projected cost impacts. In response to
4 Data Request DOE 4-16 the Company provided its 2021 five-year strategic plan as a
5 Confidential Attachment. This confidential attachment provided the five-year Eversource
6 NH Capital Forecast for 2022 through 2026 covering areas such as reliability, peak load
7 capacity, basic business, and new customers. While the capital forecast estimated
8 spending for these categories, it did not estimate the impact on customers. The
9 department followed up Eversource’s response to DOE 4-16 with DOE 5-009 to obtain
10 estimates of the impact on customers’ retail distribution rates. The Company’s response
11 indicated cumulative incremental revenue requirement of \$54.5 million over the period
12 2021-2026, or approximately \$9.1 million per year. While the impact would be subject
13 to decisions on interclass cost allocation to be made by the Commission in future rate
14 cases, the “...typical residential customer using 600 kWh in a month would see an
15 increase of \$5.89 or 4.4%.”¹⁶

16 **Q. Has the Company begun making investments based on these criteria changes?**

17 **A.** Since the Company has indicated the planning criteria are in place, we assume the
18 Company has started making investments driven (in part) by the updated planning
19 criteria. However, based on our review of Appendix C and D of the Supplement, many
20 projects are not planned for commencement until later in the forecast period (2024 –
21 2026).

22 In the 2020 planning study, Eversource developed a set of capital projects by region/area
23 required to resolve DSPG 2020 planning criteria violations according to the following

1 LCIRP guidelines: “When these criteria are violated, the system must be reinforced,
2 reconfigured, or upgraded to eliminate the constraints by the forecasted violation year.”¹⁷
3 Study results are summarized in a *2020 Design Violations Summary Report*¹⁸. For each
4 region (bulk) and area (non-bulk), planning violations are summarized by substation¹⁹.
5 Preferred alternative solutions are sometimes referred to by Eversource as “best overall
6 solution alternatives.”²⁰ Thirty-seven (37) bulk substation and twelve (12) non-bulk
7 substation projects were identified. Most violations were due to contingency conditions.
8 Preferred solutions (recommended by System Planning) involved load transfer switches,
9 bus-tie schemes, distribution automation implementation, selective capacity upgrades,
10 and equipment replacement/upgrades due to asset condition.

11 The Department did not detect any excessive construction trends. Corrective actions
12 were reasonable and appear to be according to Company’s standards/guidelines.
13 Consequently, it was clear to the Department that planned capital investments were being
14 based on the new planning criteria of DSPG 2020.

15 **Q. Is the Company planning any further revisions to its planning procedures?**

16 Yes. With respect to the integration of distributed energy resources (DERs), it is our
17 understanding that the Company plans to publish a comprehensive DER Planning Guide
18 by year-end 2022²¹ to serve as a supplement to DSPG 2020.

¹⁶ Attachment JED/RDW-5 Data Requests DOE 4-016 **REDACTED** and DOE 5-009.

¹⁷ LCIRP, Appendix D, Section 4.8.2, Bates 38.

¹⁸ Attachment JED/RDW-6 Business Process Audit, BPA 1-06 **REDACTED**.

¹⁹ All solutions are based on the yet-to-be-approved planning criteria outlined in DSPG 2020, and as a result, are subject to further study by System Planning as well as a critical review by the Eversource Solution Design Committee (SDC).

²⁰ Attachment JED/RDW-7, Data Request DOE 5-004.

1 **RSA 378:38, II – Demand Side Management**

2 **Q. Does Eversource’s LCIRP include a discussion of demand-side energy management**
3 **programs, including conservation, efficiency, and load management programs?**

4 **A.** The Company states that it has offered energy efficiency (EE) and other demand side
5 management (DSM) programs to its customers for the past twenty years. Since 2002,
6 Eversource has collaborated with the other New Hampshire utilities to deliver
7 coordinated energy efficiency solutions to customers, residential, municipal, commercial
8 and industrial throughout the state. These programs are offered under the NHSaves™
9 Programs (“NHSaves Programs”) brand. In 2016, Eversource was a party to a settlement
10 agreement filed with the Commission that lead to establishment of the state’s Energy
11 Efficiency Resource Standard (“EERS”). The EERS is the framework within which the
12 NHSaves Programs have been implemented since 2018. In 2022, HB 549 amended the
13 statute applicable to energy efficiency making the framework based on specific system
14 benefit charge rates instead of the EERS being the driving element of EE. In the current
15 LCIRP submittal, Eversource has provided extensive information regarding the
16 Company’s ratepayer funded EE programs, a description of the Active Demand
17 Reduction (ADR) pilot program offered to several of its Commercial and Industrial
18 customers, and discussion of a targeted approach to implementing Non-Wires Solutions
19 (NWS) using Eversource’s NWS/NWA (Non-Wires Alternative) screening tool for
20 system planning and for certain customers based on location and customer type.²²

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²¹ Attachment JED/RDW-8, Business Process Audit, Interview No. 62 at 4.

²² LCIRP at Bates 42-48.

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Q. What is the Department’s assessment of Eversource’s DSM and NWA efforts?

A. The LCIRP forecasts expected energy savings under the energy efficiency programs for 2021 through 2023.²³ The Company estimates the average cost of a saved lifetime kWh is 3.33 cents.²⁴

Eversource is also considering a behind the meter solar program but the program is still in the conceptual phase and the Plan offers no detail on how the new program would be implemented.²⁵ On March 31, 2021, the Company provided its Non-Wires Alternative (NWA) Framework Version 2.0 which is “designed to enable rapid initial screening of NWA options against traditional system upgrade projects.”²⁶ Our review of this NWA tool indicates it is reasonably complete and covers a wide range of alternatives and corresponding capital, operating, real estate and program costs.

The Company considers the following technologies suitable for potential NWA applications: Energy efficiency (EE), demand response (DR), photovoltaic (PV), battery energy storage systems (BESS), combined heat and power (CHP), conservation voltage reduction (CVR), fuel cell (FC), and emergency generation (EG).²⁷ The following Critical Suitability Criteria (CSC) is first applied to determine if NWA screening is appropriate: 1) Asset Health Index <0.5 (means potential transformer insulation failure); 2) Year of First Violation ≥ 2 (means violation has to appear within first 2 years of planning period). Any project that does not pass the CSC test will not be considered for

²³ *Id.* at Bates 43.
²⁴ *Id.* at Bates 44.
²⁵ Supplement Appendix A-1 at Bates 31.
²⁶ Supplement, NWA Framework at Bates 8.
²⁷ LCIRP, Supplement, Appendix A-1, at Bates 11.

1 NWA and the Company will automatically move forward with a traditional solution. In
2 our opinion, the technologies are reasonable as are the suitability criteria.

3 However, the Company needs to be more proactive and aggressive at looking for
4 competitive NWA solutions, and consider third-party ownership as well. To date, no
5 NWA solution has been implemented in New Hampshire. Now that the NWA
6 Framework tool is available for use by System Planning and Engineering, we believe
7 more comprehensive NWA assessments should be expected.

8 CVR has yet to be implemented in New Hampshire.²⁸ Given the relatively high content
9 of residential system load --- 44% kWh residential sales; 50% kW residential peak
10 demand²⁹, we believe CVR implementation should be given a higher priority.

11 We also believe not enough attention is being given to NWA solutions as a way to
12 encourage behind-the-meter distributed energy resource (DER) adoption; e.g., PV, or
13 energy storage.

14 However, the appropriate test of a screening tool is whether it is actually used by the
15 Company's personnel and how accurately the costs are evaluated. At this point, we
16 cannot determine if the NWA Framework will be applied against more traditional
17 alternatives and the quality of this application. Eversource's utilization of the tool has
18 been limited since it is a recent addition to the Company's planning and evaluation
19 process and has been used on only three potential projects: Loudon Station, Monadnock
20 Substation, and Dover Substation.³⁰ Based on the Department's review of the analysis,
21 Monadnock and Dover were rejected by the tool as unsuitable due to asset conditions,

²⁸ Attachment JED/RDW-9 Business Process Audit, Interview No. 19 at 15.

²⁹ New Hampshire Residential Baseline Study submitted by Itron to the New Hampshire Evaluation, Measurement, and Verification Working Group, June 11, 2020, pages ES-2 and ES-3.

³⁰ Attachment JED/RDW-10 Data Request DOE 4-020. Also see Supplement Appendix A-2.

1 however, Loudon was found to be a possible candidate and was extensively analyzed by
2 the Company. The resulting recommendation was deployment of mobile generation
3 during seasonal peak loading periods as the most cost-effective solution. Surprisingly, it
4 does not appear that Eversource intends to implement that recommendation since Loudon
5 is still earmarked as a part of the Company’s System Planned Projects (Group 4) for
6 transformer replacement.³¹ No other target projects for the NWA tool have been
7 proposed but Eversource has begun incorporating the tool as part of its project
8 assessment.

9 Consequently, the Department concludes that the Company needs to clearly communicate
10 in its documentation its corresponding actions and results on a regular basis. This should
11 include a statement on every project authorization form (PAF) as to the appropriateness
12 of potential NWA solutions. As with any new tool or planning method, increased
13 vigilance by both the Company and regulators is needed during the initial
14 implementation, application and use of the NWA Framework tool. The Company should
15 be prepared to respond to this increased vigilance in its next rate case.

16 **RSA 378:38, III – Supply Options**

17 **Q. Does Eversource’s LCIRP include an assessment of supply options including owned**
18 **capacity, market procurements, renewable energy, and distributed energy**
19 **resources?**

20 **A.** As stated earlier, Eversource presently does not own any generating assets in its NH
21 service territory. The Company addresses DER growth in their system planning by
22 applying an “adoption rate” forecast in its forecast model beginning in 2020 and 2021.
23 As a result, Eversource is able to conduct scenario-based planning specific to individual

³¹ Supplement, Appendix D at Bates 423.

1 bulk substations and to conduct customized scenarios based on location specifics. Two
2 base case scenarios have been developed: 1) High Load Scenario based on Peak Gross
3 Load Model, and 2) High DG Scenario based on the Minimum Load Growth Model.
4 Eversource believes the two base case scenarios will be particularly useful in assessing
5 areas with increased distributed generation adoption and related impacts on system
6 conditions when generation outpaces load.³²

7 **RSA 378:38, IV – Distribution and Transmission Requirements**

8 **Q. Does Eversource’s LCIRP include an assessment of distribution and transmission**
9 **requirements?**³³

10 **A.** Yes. The LCIRP includes an assessment of distribution and transmission requirements
11 as described in the summaries below.

12 **Transmission**

13 Eversource actively participates in ISO-NE’s Regional System Plan (RSP) development
14 performed according to the North American Electric Reliability Corporation (NERC) and
15 the Northeast Power Coordinating Council (NPPC) planning standards. ISO-NE and New
16 England Transmission Owners (TOs) conduct periodic system needs-assessment studies.
17 Included are market assessments, utility-scale generation, distributed generation, and
18 energy efficiency measures.³⁴

19 If a reliability-related issue is identified within a 3-year period of a needs assessment
20 study, ISO-NE and affected TOs develop solution alternatives for review by ISO-NE’s

³² LCIRP at Bates 21-22.

³³ The statute requires that the assessment should include, as applicable, an assessment of the benefits and costs of "smart grid" technologies, and the institution or extension of electric utility programs designed to ensure a more reliable and resilient grid to prevent or minimize power outages, including but not limited to, infrastructure automation and technologies. RSA 378, IV.

³⁴ LCIRP at Bates 33.

1 Planning Advisory Committee (PAC). The RSP (published biennially) is an integral part
2 of this process.³⁵

3 To comply with regulatory requirements, Eversource's transmission planning process is
4 similar to the RSP development process. Local reliability needs are identified along with
5 alternative solutions. Preferred alternatives are identified as such. Eversource's Local
6 System Plan (LSP) is included in ISO-NE's annual RSP and presented to ISO-NE's PAC
7 on an annual basis.³⁶

8 ISO-NE completed (May 2021) Eversource New Hampshire's 2029 Needs Assessment
9 Study and 2029 Solutions Study. Both studies are posted on ISO-NE's web site, however,
10 because the studies involve Critical Energy Infrastructure Information (CEII), security
11 clearance is required from ISO-NE before accessing the reports.³⁷

12 **Distribution**

13 Eversource conducts distribution planning studies using industry-accepted third-party
14 software and detailed system models based on latest load forecasts.³⁸ Substation &
15 Transmission Engineering works with System Planning to develop solution alternatives
16 as issues and/or planning needs arise for assets inside the substation fence. Distribution
17 Engineering follows a similar process for assets outside the substation fence.

18 Studies are based on DSPG 2020 planning criteria and guidelines. What-if simulations
19 identify needs and potential solutions. Before/after simulations verify solution
20 alternatives.³⁹

³⁵ *Id.*

³⁶ *Id.*

³⁷ <https://www.iso-ne.com/system-planning/key-study-areas/vt-nh/>

³⁸ LCIRP at Bates 23-24.

³⁹ *Id.*

1 Studies are conducted to ensure reliability performance is maintained and/or improved,⁴⁰
2 based on specific study objectives. Capacity needs, asset condition
3 replacements/upgrades, and safety considerations are integral to the planning process.
4 Eversource defines five broad categories of capital projects: 1) Basic business (customer
5 connections); 2) grid modernization; 3) equipment obsolescence; 4) distribution line
6 work; and 5) distribution substation work.⁴¹ When reviewing project documentation, it is
7 important to understand which of the following Eversource solution alternatives apply:
8 Alternative Solution (all reasonable solutions); Feasible Alternative Solution (satisfies all
9 constraints); Technically Feasible Alternative (no technical constraints); Least-Cost
10 Alternative Solution (lowest reasonable cost per RSA 378:37); and Best Overall
11 Alternative Solution (Eversource calls this the “Preferred Solution”) (best combination of
12 performance, cost, future expandability, and ability to meet needed timeframe).⁴²
13 Project documentation needs to clearly define which alternatives (defined above) are
14 being presented along with the decisions/recommendations/justifications for each
15 alternative, especially when Preferred Alternatives are selected over Least-Cost
16 Alternatives. It is also unclear whether NWA solutions are being (or have been)
17 considered or not. If NWA is not applicable, a statement should be included in the
18 documentation to that effect.

19 **Smart Grid Technology**

20 **Q. Has the Company invested in smart grid technology in recent years?**

⁴⁰ *Id.* at Bates 26.

⁴¹ Attachment JED/RDW-11 Business Process Audit, Interview No. 13 at 16.

⁴² Attachment JED/RDW-7, Data Request DOE 5-004.

1 Eversource categorizes smart grid technologies as follows: Enhanced system visibility,
2 automation technologies, and optimization technologies.⁴³

3 The Company has been making investments in enhanced system visibility technologies
4 (sensors) by systematically installing smart devices on distribution lines to allow system
5 operators to better optimize load control; identify power quality issues serving voltage
6 sensitive industrial/commercial facilities; and locate system faults.

7 Investments in distribution automation technologies (smart switches/controls) are
8 underway to create distribution circuit taps to create load transfer options and limit
9 customer exposure to outages. Looped distribution feeder ties exist around the system,
10 mostly in the Southern, Central, and Eastern areas. In Northern and Western areas, fewer
11 looped connections exist.

12 Volt-var optimization (VVO) is an automation technology under consideration in NH but
13 not yet implemented. If implemented, VVO has the potential to provide both
14 environmental and economic benefits to customers.

15 A distribution management system (DMS) is a system optimization technology in the
16 process of being implemented in NH. DMS depends on enhanced visibility and
17 automation technologies being in place. Benefits include better utilization of system
18 assets and increased DER hosting capabilities.

19 **Planned Investments**

20 **Q. Did the Department conduct a review of the planned distribution investments**
21 **described in the LCIRP?**

22 **A.** Yes. Unlike a rate case, specific rate proposals and revenue requirements are not at issue
23 in an LCIRP proceeding, therefore the review of capital investments for least cost

⁴³ *Id.* at Appendix J.

1 planning is not considered to be sufficiently rigorous or specific to support an
2 independent finding of prudence. As the Commission stated in its Order No. 26,362 in
3 Docket No. DE 19-139, an LCIRP “provides a regular snapshot of the factors supporting
4 a utility’s investment decisions, which can be helpful in a later rate case when the
5 Commission determines whether the costs of an investment were prudently incurred.”⁴⁴
6 As such, the Commission’s approval of the LCIRP does not represent a finding of
7 prudence with respect to any particular capital investment described in the Plan. Indeed,
8 many of the capital projects proposed under Eversource’s Plan are scheduled for
9 implementation two to five years into the future and are still in the design phase. While it
10 would be impractical to evaluate each of the planned distribution system investments
11 identified in the LCIRP, in response to discovery request DOE 4-001, Eversource divided
12 the projects into six main groups which helped to make the Department’s review more
13 efficient: Group 1 Line and Station projects >\$250,000, Group 2 Solution Selection
14 Forms (six projects), Group 3 Proposed Reliability Projects, Group 4 System Planning
15 Projects (twenty projects), Group 5 System Solution Forms (three projects), and Group 6
16 Distribution Projects in the 2021 Capital Plan.⁴⁵ Based on the documentation provided,
17 all of the projects reviewed by the Department appeared to be compliant with the
18 planning criteria and assessments outlined in the LCIRP.
19 In addition to the project documentation, the Department also reviewed the Company’s
20 planning documentation which included the *2020-2029 Load Flow Study*⁴⁶ and a follow-

⁴⁴ Docket DE 19-139, Order No. 26,362 dated June 3, 2020 at 8.

⁴⁵ See Attachment JED/RDW-12 Data Request DOE 4-001.

⁴⁶ Supplement, Appendix B System Planning Studies.

1 up companion *2020 Design Violations Summary Report*.⁴⁷ Those documents reflect the
2 Company's investment priorities as outlined in the LCIRP which are illustrated by the
3 project mix: 1) Reliability/resiliency improvement focusing on upgrading overhead
4 equipment and facilities; and systematic replacement of aging equipment based on
5 quantifiable metrics. 2) Grid modernization focusing on electromechanical devices being
6 replaced with digital devices capable of automatically sending real-time information to a
7 central station; and manual switches being replaced with smart switches capable of
8 automatically transferring load from one source to another.

9 Not included in the above documents are system optimization projects that include the
10 previously mentioned distribution management system (DMS) (scheduled for completion
11 in 2022⁴⁸) to optimize data collected from smart devices located on the distribution
12 system; and the planned development of distributed energy resource (DER) capacity
13 hosting maps to facilitate identification of potentially feasible DER development sites.⁴⁹
14 We did not see evidence of volt-var optimization (VVO) projects underway to augment
15 energy efficiency efforts. However, we were told VVO implementation is also
16 planned.⁵⁰

17 A review of the Company's investments in engineering software tools, including in-house
18 developed tools (e.g., NWA Framework), indicated reasonable software investments are
19 being made. The challenge for a utility implementing an expanded suite of software is to
20 maintain data integrity as transitions are made from one software tool to another.

⁴⁷ Attachment JED/RDW-6 Business Process Audit, Data Request BPA 1-006, Attachment BPA 1-006
REDACTED.

⁴⁸ Attachment JED/RDW-13 Business Process Audit, Interview No. 16 at 6.

⁴⁹ Attachment JED/RDW-11 Business Process Audit, Interview No. 13 at 6.

⁵⁰ Attachment JED/RDW-9 Business Process Audit, Interview No. 19 at 12.

1 **Q. Were any of the planned investments included in the LCIRP also included in the**
2 **Company's third step adjustment request in Docket No. DE 22-030?**

3 **A.** Yes. Most of the projects included in Group 6 referenced above were part of
4 Eversource's third step adjustment filing. The Department is currently conducting a
5 review of those capital investments in that docket.

6 **RSA 378:38, V – Environmental Compliance**

7 **Q. Does the Eversource LCIRP include an assessment of plan integration and impact**
8 **on state compliance with the Clean Air Act of 1990, as amended, and other**
9 **environmental laws that may impact a utility's assets or customers?**

10 **A.** As stated earlier, the applicability of this provision of the statute is questionable given the
11 Company no longer owns generating assets. We note, however, that Eversource does
12 provide limited consideration of environmental impacts, risks, and clean-up costs in its
13 capital investment planning and project authorization analysis.

14 **RSA 378:38, VI – Environmental, Economic, and Energy Price and Supply Impact**

15 **Q. Does the Eversource LCIRP include an assessment of the plan's long- and short-**
16 **term environmental, economic, and energy price and supply impact on the state?**

17 **A.** As referenced above, Eversource's system and project planning process includes the use
18 of econometric modeling to consider demand, reliability, feasibility, cost, DER options,
19 and value-added benefits involving planned investments and alternatives. Planning
20 forecasts are over a ten-year period. Environmental impacts and risks are also measured
21 in the project planning process.

22 **RSA 378:38, VII Consistency with State Energy Strategy**

1 **Q. Does the Eversource LCIRP include an assessment of plan integration and**
2 **consistency with the state energy strategy under RSA 12-P?**

3 **A.** Yes. In our assessment, Eversource’s 2020 LCIRP is generally consistent with the state
4 energy strategy then in effect at the time of the Company’s filing on October 1, 2020.
5 Since that time, the Department released a new and revised state energy strategy in July
6 2022. The policy goals and objectives outlined in the new plan are not significantly
7 different those provide in the prior plan; therefore, we find that Eversource’s 2020 LCIRP
8 still remains consistent with state policy.

9 **IV. CONCLUSIONS AND RECOMMENDATIONS**

10 **Q. Please summarize your recommendations.**

11 **A.** The Company’s LCRIP and its supplemental filings such as the NWA Framework and
12 the Loudon Substation provide the outlines of how the Company will evaluate and plan
13 its distribution system in the future. To understand those outlines, the Department had to
14 engage the Company through data requests and technical sessions. We reviewed the
15 Company’s standards in the context of the expectations of a modern customer. We
16 recognize that the LCIRP process does not pre-approve any projects and that projects
17 evolve or change over time. As we stated above, for any particular project, the point of
18 meticulous review is when the Company requests its inclusion in rate base during a rate
19 case. Therefore, the Department recommends:

- 20 • Eversource provide a supplemental filing addressing the criteria in RSA 378:39.
21 • Eversource should participate in the processes set forth by the Commission’s
22 “guidance” in Docket IR 15-296, Order No. 26,575, to develop its next LCIRP, and

1 that the substance of that LCIRP should align with the expectations expressed by the
2 Commission in that Order.

3 • Eversource should continually evaluate the balance achieved between tree trimming
4 and the use of covered wire and spacer-cable to ensure that the appropriate option is
5 selected to maximize reliability and resiliency.

6 • Eversource should be prepared to demonstrate that NWA alternatives have been
7 developed and evaluated within its framework including, when appropriate, third-
8 party alternatives.

9 **Q. Does that conclude your testimony?**

10 A. Yes, it does.

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12