



STATE OF CONNECTICUT

**PUBLIC UTILITIES REGULATORY AUTHORITY
TEN FRANKLIN SQUARE
NEW BRITAIN, CT 06051**

**DOCKET NO. 17-12- PURA INVESTIGATION INTO DISTRIBUTION SYSTEM
03RE08 PLANNING OF THE ELECTRIC DISTRIBUTION
COMPANIES – RESILIENCE AND RELIABILITY
STANDARDS AND PROGRAMS**

August 31, 2022

By the following Commissioners:

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DECISION

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DECISION

I. INTRODUCTION

A. SUMMARY

In this proceeding, pursuant to §§ 16-11 and 16-244i of the General Statutes of Connecticut (Conn. Gen. Stat.), and in accordance with the Interim Decision dated October 2, 2019, in Docket No. 17-12-03, PURA Investigation into Distribution System Planning of the Electric Distribution Companies (Interim Decision or Equitable Modern Grid decision), the Public Utilities Regulatory Authority (Authority or PURA) establishes reliability and resilience frameworks by which the electric distribution companies (EDCs or Companies) must plan and implement their reliability- and resilience-based capital programs. The Authority directs The Connecticut Light and Power Company d/b/a Eversource Energy (Eversource) and The United Illuminating Company (UI) to use these Frameworks in developing and submitting reliability and resilience program plans for Authority approval in their next general rate cases and other proceedings.

The Authority also reviewed the reports submitted by the EDCs pursuant to Conn. Gen. Stat. § 16-32n(b). The Authority finds that lineworker staffing levels must be considered in the context of an EDC's reliability and resilience programming. Therefore, final decisions regarding lineworker staffing increases must take place in each EDC's next rate case.

In addition, the Authority has reviewed the emergency response plans of the EDCs, and pursuant to Conn. Gen. Stat. § 16-32e, directs the EDCs to incorporate certain modifications as detailed herein.

B. BACKGROUND OF THE PROCEEDING

The Authority specified a series of reopened proceedings to further investigate a number of near-term topics integral to realizing the objectives outlined in its Framework for an Equitable Modern Grid. See, Interim Decision, pp. 24–25. In the Interim Decision, the Authority recognized the importance of the reliability and resilience initiatives that had been undertaken by the EDCs and how these had contributed to improved performance. Interim Decision, p. 20. However, the Authority noted that costs had increased dramatically and, thus, determined that there was a need to create a more structured approach to ensure that these programs were undertaken in the most cost-effective manner. Id. In particular, the Authority determined that these programs would benefit from a more data-driven approach, which would allow for a more rigorous evaluation of program effectiveness. Id.

In accordance with the Interim Decision, the Authority initiated the above-captioned proceeding on June 18, 2020, to examine existing reliability and resilience programs in Connecticut and other jurisdictions, and to develop frameworks to enhance the cost effectiveness of reliability and resilience investments moving forward.

In the Notice of Proceeding dated June 23, 2021, the Public Utilities Regulatory Authority (Authority) expanded the scope of this proceeding to include matters delegated to it by the General Assembly through Conn. Gen. Stat. § 16-32n.¹

The Authority stated that it intended to review the emergency response plans (ERPs) of the EDCs, building off of the updates ordered through the Decision dated April 28, 2021 in Docket No. 20-08-03, Investigation into Electric Distribution Companies' Preparation for and Response to Tropical Storm Isaias (Tropical Storm Isaias Decision). In that Decision, the Authority discussed, *inter alia*, the resources the EDCs should have on hand at the onset of a major storm and during restoration; the need to identify and track life support customers; the quantity of damage assessors needed to identify Make Safe locations and restoration duties; resource acquisition activities; the need to conduct stress testing of communications channels; the response efforts to the needs of major customers; the need to track line crew work; and efforts to enhance communications with municipalities. As such, the Authority directed revisions to the EDCs' ERPs to reflect the updated storm performance standards via compliance filings in Docket No. 20-08-03. Furthermore, Conn. Gen. Stat. § 16-32e requires that each public service company must file with the Authority every two years an updated ERP. Accordingly, the Authority reviewed the ERPs in this proceeding.

C. CONDUCT OF THE PROCEEDING

The Authority held technical meetings via remote access on: August 30, 2021; September 2, 2021; September 23, 2021; December 21, 2021; January 6, 2022; and March 29, 2022.

On January 10, 2022, the Authority issued a Notice of Public Comment Hearing for February 7, 2022. On February 7, 2022, the Authority held a public comment hearing.

On May 2, 2022, the Authority issued its Notice of Issuance of Straw Proposal and Request for Written Comment on its proposed Reliability and Resilience Frameworks.

On May 5, 2022, the Authority issued a Notice of Hearing scheduled for May 25, 2022, May 26, 2022, and May 31, 2022. On May 18, 2022, the Authority issued a Notice of Rescheduled Hearing, rescheduling the May hearing dates to June 22, 2023, and June 23, 2022. A hearing was held in this matter on June 22, 2022, and continued on June 23, 2022. A Late Filed Exhibit hearing was held on July 6, 2022.

The Authority issued a proposed final Decision in this matter on August 3, 2022. All Participants were provided the opportunity to submit Written Exceptions and to present Oral Argument on the proposed final Decision. Oral Argument was held on August 15, 2022.

¹ Section 12 of Public Act 20-5 (Act), An Act Concerning Emergency Response by Electric Distribution Companies, the Regulation of Other Public Utilities and Nexus Provisions for Certain Disaster-Related or Emergency-Related Work Performed in the State, signed into law on October 7, 2020.

D. PARTICIPANTS

The Authority recognized the following as Participants to the proceeding: The Connecticut Light and Power Company d/b/a Eversource Energy; The United Illuminating Company; the Office of Consumer Counsel; the Department of Energy and Environmental Protection; the Acadia Center; the Connecticut Industrial Energy Consumers; the Connecticut Green Bank; CT Fund for the Environment/Save the Sound; EVgo; FuelCell Energy, Inc.; NECEC; Renergy; Solar CT, Inc.; SunPower Corp.; Sunrun, Inc.; and Vivint Solar, Inc.

II. AUTHORITY ANALYSIS

A. REVIEW OF EDC REPORTS SUBMITTED PURSUANT TO CONN. GEN. STAT. § 16-32N(B)

Under Conn. Gen. Stat. § 16-32n(b), the EDCs are required to submit reports to the Authority containing the following two sets of analyses:

(1) A cost-benefit analysis identifying the resources expended in response to the last five storm events classified as a level three, four or five. Such analysis shall include a review of the number of line crew workers and shall distinguish between line crew workers (A) directly employed by the electric distribution company and working full time within the state, (B) directly employed by the electric distribution company working primarily in another state, and (C) hired as contractors or subcontractors.

(2) An analysis of any such company's (A) estimates concerning potential damage and service outages prior to the last five storm events classified as a level three, four or five, (B) damage and service outage assessments after the last five storm events classified as a level three, four or five, (C) restoration management after the last five storm events classified as a level three, four or five, including access to alternate restoration resources via regional and reciprocal aid contracts, (D) planning for at-risk and vulnerable customers, (E) communication policies with state and local officials and customers, including individual customer restoration estimates and the accuracy of such estimates, (F) infrastructure, facilities and equipment, which shall include, but not be limited to, an examination of (i) whether such infrastructure, facilities and equipment are in good repair and capable of meeting operational standards, (ii) whether such company is following standard industry practice concerning operation and maintenance of such infrastructure, facilities and equipment, (iii) the age and condition of such infrastructure, facilities and equipment, (iv) whether maintenance of such infrastructure, facilities and equipment has been delayed, and (v) whether such company had access to adequate replacement equipment for such infrastructure, facilities and equipment during the course of the last five storm events classified as a level three, four or five, and (G) compliance with any emergency response standards adopted by the authority.

On January 4, 2021, the EDCs filed the required reports pursuant to Conn. Gen. Stat. § 16-32n(b) (Eversource Storm Analysis Report; UI Storm Analysis Report). The Authority is required to review the reports provided by the EDCs and to submit its decision to a joint standing committee of the General Assembly.

1. Cost-Benefit Analysis

Conn. Gen. Stat. § 16-32n(c) directs the Authority to review the cost-benefit analysis provided by the EDCs regarding resources expended responding to the most recent storms classified by the Companies as either Event Level 3, 4, or 5. The statutory language directed the analysis to center primarily around lineworkers, with such analysis required to distinguish between: (1) lineworkers that are directly employed by the EDC and working full time within the state; (2) lineworkers directly employed but working primarily in another state; and (3) lineworkers hired as contractors or subcontractors.

The Storm Analysis Reports submitted by each EDC reflect the required cost-benefit analyses, which were broken down into three sub-parts. First, the Reports identified the five most recent storms that qualified as an Event Level 3, 4, or 5. Eversource Storm Analysis Report, p. 16; UI Storm Analysis Report, pp. 7-8. Second, the Reports then summarized the number of lineworkers utilized during the identified events and included the costs to retain the lineworkers during those events. Eversource Storm Analysis Report, pp. 22-23; UI Storm Analysis Report, pp. 20-26. Third, the EDCs provided an analysis that estimated the annual costs to increase the number of directly employed lineworkers to meet lineworker needs during storm events. Eversource Storm Analysis Report, p. 24; UI Response to Interrogatory RSR-11, Attachment 1.

Below, the Authority summarizes and reviews key portions of the cost-benefit analysis included in each EDC's Storm Analysis Report.

a. Eversource

In the cost-benefit portion of the Storm Analysis Report, Eversource provided an analysis of its response to the following five most recent major storms:

- Wind and Rain Event on October 29, 2017;
- Nor'easter on March 2, 2018;
- Nor'easter on March 7, 2018;
- Thunderstorms on May 15, 2018; and
- Tropical Storm Isaias on August 4, 2020.

Eversource Storm Analysis Report, p. 16.

Eversource's selection of these storms was based on its Event Level Matrix included in its emergency response plan (ERP). *Id.* The Event Level Matrix is a tool used by Eversource to assist in planning for and responding to emergency events of different intensities. *Id.*, pp. 6-7. The Event Level Matrix provides a set of parameters to classify storm intensity and response requirements and is used as one input – along with weather conditions, system characteristics and experience – to assist the company in planning resource needs (such as the number of lineworkers) to respond to damage locations and

outages and to restore service to customers. Id. Thus, the Event Level Matrix was specified in Conn. Gen. Stat. § 16-32n as the basis for the analysis.

Table 1 below reflects portions of Eversource's current Event Level Matrix related to storm characteristics and typical line resource needs.

Table 1. Eversource Event Level Matrix

| Event Level | Typical No. of Customers Out at Peak | Typical No. of Trouble Spots | Typical Line Crew² Resource Strategy at Storm Onset | Typical Line Crew Resource Strategy at Peak | Typical Restoration Duration |
|--------------------|---|-------------------------------------|---|--|-------------------------------------|
| 5 | less than 125,000 | less than 3,000 | 290 | 550 | 1-3 Days |
| 4 | 125,000 to 380,000 | 1,500 to 10,000 | 340 to 500 | 1,200 | 2-6 Days |
| 3 | 375,000 to 650,000 | 8,000 to 25,000 | 390 to 900 | 2,500 | 5-10 Days |
| 2 | 625,000 to 870,000 | 15,000 to 48,000 | 490 to 1,000 | 2,500 | 8-21 Days |
| 1 | more than 870,000 | more than 35,000 | 590 to 1,200 | 2,500 | More than 18 Days |

Eversource Response to Interrogatory RSR-53, Attachment 2, pp. 16-17.

The Event Level Matrix is a guide to provide parameters for the typical number of resources necessary to restore a certain number of damage locations and outages within a certain period of time. Id. As stated above, it is more than just a planning tool, however, as it can also be used to categorize storms and company response parameters after-the-fact, as was done here by Eversource for the purpose of conducting this analysis.

Table 2 below provides a number of key elements of the storms Eversource used for its cost-benefit analysis, including event level, outages, damage locations, and total resources deployed.

² A certain number of Eversource's lineworkers assigned to the Response Specialist Organization (RSO) are capable of working in one-person crews. Eversource Storm Analysis Report, p. 13. With the exception of RSO lineworkers, distribution line resources are generally comprised of two or more lineworkers. Id.

Table 2. Eversource Storm Data

| Storm Date | Storm Type | Event Level | Outages at Peak | Damage Locations | Total Line Crews Deployed | Total Tree Crews Deployed |
|------------------|-----------------------|-------------|-----------------|------------------|---------------------------|---------------------------|
| October 29, 2017 | Wind/Rain | 4 | 201,222 | 4,815 | 471 | 236 |
| March 2, 2018 | Nor'easter | 5 | 81,376 | 2,899 | 277 | 302 |
| March 7, 2018 | Nor'easter | 4 | 168,647 | 5,771 | 734 | 412 |
| May 15, 2018 | Thunderstorm | 5 | 139,581 | 5,356 | 760 | 365 |
| August 4, 2020 | Tropical Storm Isaias | 2 | 632,632 | 21,669 | 2,555 | 789 |

Eversource Storm Analysis Report, p. 16.

The data included in Eversource's cost-benefit analysis demonstrates the importance of lineworkers, as well as the extent of costs associated with these resources in storm response and restoration efforts. Table 3 below provides a summary of the incremental storm expenses for the five most recent storms.

Table 3. Eversource Summary of Storm Costs for Historical Events (in thousands)

| | Storms | | | | |
|--|-------------------|-------------------|-------------------|-------------------|-----------------------|
| | October 2017 | March 2, 2018 | March 7, 2018 | May 15, 2018 | Tropical Storm Isaias |
| Event Level | Level 4 | Level 5 | Level 4 | Level 5 | Level 2 |
| Labor – Internal | \$4,028.5 | \$3,947.8 | \$4,652.8 | \$6,799.1 | \$13,618.9 |
| Labor - Affiliate | \$1,299.1 | \$1,145.1 | \$1,983.7 | \$6,311.0 | \$16,342.0 |
| Payroll-Related Overheads | \$795.6 | \$415.8 | \$802.4 | \$3,830.7 | \$7,160.2 |
| Mutual Aid and External Contractors | \$26,979.1 | \$17,864.6 | \$26,247.6 | \$48,346.2 | \$206,256.8 |
| Vehicles | \$129.6 | \$73.6 | \$107.0 | \$241.8 | \$1,293.6 |
| Material | \$366.1 | \$694.1 | \$873.3 | \$2,887.3 | \$6,292.2 |
| Food and Lodging | \$1,246.3 | \$1,021.7 | \$1,662.7 | \$4,031.9 | \$13,275.4 |
| Employee Expenses/Other | \$196.9 | \$180.1 | \$243.0 | \$446.6 | \$880.1 |
| Total Incremental Storm Restoration Costs | \$35,041.2 | \$25,342.8 | \$36,572.6 | \$72,894.7 | \$265,875.0 |

Eversource Storm Analysis Report, pp. 16-22; Response to Interrogatory RSR-3, Attachment 1.

Of the five most recent major storms, Tropical Storm Isaias was the most severe and costly. Id. While the remaining four storms were similar in severity (i.e., all Event Level 4 or 5), the May 15, 2018 Storm was the most costly of this grouping. Id. The October 2017 Storm, the March 2, 2018 Storm, and the March 7, 2018 Storm each represented similar incremental storm restoration cost levels. Id.

As depicted in Table 3 above, labor costs (i.e., internal, affiliate, mutual aid, and external contractors) comprise the bulk of the incremental storm costs, accounting for more than 70% of storm costs in all storms. Id. Among labor costs, outside line contractors account for the vast majority of expenses, ranging from 63% to 72% of the total labor costs. Eversource Response to Interrogatory RSR-3, Attachment 1. Eversource's Connecticut-based internal line resources account for 7% to 18%, Eversource's Massachusetts and New Hampshire affiliate crews account for 4% to 10%, and outside tree contractors account for 12% to 14% of total labor costs. Eversource Response to Interrogatory RSR-3, Attachment 1.

Given the aforementioned data, Eversource also performed an analysis that considered high-level cost estimates for the Company to directly employ incremental lineworkers to meet the typical resource restoration strategies for the various event levels presented in Table 1. The Authority reproduces this information in multiple tables below for ease of interpretation. First, Table 4 summarizes Eversource's estimate of the total annual incremental labor costs for staffing line resources at each event level. These labor costs include incremental lineworker costs, as well as labor costs necessary to support the additional lineworkers, such as supervisory and administrative support costs. Eversource Storm Analysis Report, p. 23. In developing the numbers used in Table 4, Eversource assumed the cost of each additional lineworker to be \$153,015.60. Response to Interrogatory RSR-2.

Table 4: Eversource Estimate of Incremental Labor Cost of Adding Internal Resources to Meet ERP Event Levels

| Event Level Matrix | | | Lineworkers | | Supervisors | | Managers | | Directors | |
|--------------------|--------------|--------------------------------|-------------|----------------------|-------------|----------------------|----------|----------------------------|-----------|----------------------------|
| Event Type | Event Timing | Upper Limit ³ FTE's | FTE | Employee Cost (\$MM) | FTE | Employee Cost (\$MM) | FTE | Total Employee Cost (\$MM) | FTE | Total Employee Cost (\$MM) |
| 5 | Onset | 540 | 188 | \$30.5 | 24 | \$4.4 | 3 | \$0.7 | - | \$0.0 |
| | Peak | 1,200 | 848 | \$137.5 | 106 | \$19.3 | 15 | \$3.3 | 2 | \$0.5 |
| 4 | Onset | 1,050 | 698 | \$113.2 | 87 | \$15.9 | 12 | \$2.7 | 2 | \$0.5 |
| | Peak | 2,800 | 2,448 | \$396.9 | 306 | \$55.8 | 44 | \$9.8 | 6 | \$1.6 |
| 3 | Onset | 2,050 | 1,698 | \$275.3 | 212 | \$38.7 | 30 | \$6.7 | 4 | \$1.1 |
| | Peak | 6,000 | 5,648 | \$915.7 | 706 | \$128.7 | 101 | \$22.4 | 14 | \$3.8 |
| 2 | Onset | 2,300 | 1,948 | \$315.8 | 244 | \$44.5 | 35 | \$7.8 | 5 | \$1.4 |
| | Peak | 6,000 | 5,648 | \$915.7 | 706 | \$128.7 | 101 | \$22.4 | 14 | \$3.8 |
| 1 | Onset | 2,800 | 2,448 | \$396.9 | 306 | \$55.8 | 44 | \$9.8 | 6 | \$1.6 |
| | Peak | 6,000 | 5,648 | \$915.7 | 706 | \$128.7 | 101 | \$22.4 | 14 | \$3.8 |

Eversource Response to Interrogatory RSR-4SP01, Attachment 1.

Next, Table 5 presents the estimated non-labor costs necessary to support the additional lineworkers and related staff, such as vehicles, facilities, and equipment. Eversource Storm Analysis Report, p. 23.

³ "Upper Limit" FTEs are the number of line resources and associated employees needed to restore the high-range number of trouble spots for each event level within the designated restoration period. See, Eversource ERP in Response to Interrogatory RSR-53SP01, p. 17.

Table 5. Eversource Estimate of Incremental Supporting Costs of Adding Internal Resources to Meet ERP Levels

| Event Level Matrix | | | Other Costs | | | | |
|--------------------|--------------|-------------------|-------------------|------------------------|--------------------|---------------------------|-------------------------|
| Event Type | Event Timing | Upper Limit FTE's | Fleet Cost (\$MM) | Facilities Cost (\$MM) | Stores Cost (\$MM) | Admin Support Cost (\$MM) | Total Other Cost (\$MM) |
| 5 | Onset | 540 | \$9.5 | \$1.9 | \$1.6 | \$0.9 | \$13.9 |
| | Peak | 1,200 | \$42.9 | \$8.4 | \$7.2 | \$4.1 | \$62.6 |
| 4 | Onset | 1,050 | \$35.3 | \$6.9 | \$5.9 | \$3.4 | \$51.6 |
| | Peak | 2,800 | \$124.0 | \$24.3 | \$20.8 | \$11.8 | \$181.0 |
| 3 | Onset | 2,050 | \$86.0 | \$16.8 | \$14.4 | \$8.2 | \$125.5 |
| | Peak | 6,000 | \$286.0 | \$56.1 | \$48.1 | \$27.3 | \$417.5 |
| 2 | Onset | 2,300 | \$98.7 | \$19.3 | \$16.6 | \$9.4 | \$144.1 |
| | Peak | 6,000 | \$286.0 | \$56.1 | \$48.1 | \$27.3 | \$417.5 |
| 1 | Onset | 2,800 | \$124.0 | \$24.3 | \$20.8 | \$11.8 | \$181.0 |
| | Peak | 6,000 | \$286.0 | \$56.1 | \$48.1 | \$27.3 | \$417.5 |

Eversource Response to Interrogatory RSR-4SP01, Attachment 1.

Finally, Table 6 provides Eversource's estimate of the grand total of labor and other costs (as presented in the prior two tables) for each event level. Eversource contends that these cost estimates are conservative since they do not factor in other cost drivers, such as inflation, recruitment and training costs, annual wage increases, and so forth. Eversource Storm Analysis Report, p. 24.

Table 6. Eversource Estimate of Total Incremental Costs of Adding Internal Resources to Meet ERP Event Levels

| Event Level Matrix | | | Total Employees Cost | | Total Other Cost | |
|--------------------|--------------|-------------------|----------------------|----------------------------|-------------------------|--------------------|
| Event Type | Event Timing | Upper Limit FTE's | FTE | Total Employee Cost (\$MM) | Total Other Cost (\$MM) | Grand Total (\$MM) |
| 5 | Onset | 540 | 215 | \$35.5 | \$13.9 | \$49.4 |
| | Peak | 1,200 | 971 | \$160.7 | \$62.6 | \$223.3 |
| 4 | Onset | 1,050 | 799 | \$132.2 | \$51.6 | \$183.8 |
| | Peak | 2,800 | 2,804 | \$464.1 | \$181.0 | \$645.0 |
| 3 | Onset | 2,050 | 1,944 | \$321.7 | \$125.5 | \$447.2 |
| | Peak | 6,000 | 6,469 | \$1,070.6 | \$417.5 | \$1,488.1 |
| 2 | Onset | 2,300 | 2,232 | \$369.4 | \$144.1 | \$513.5 |
| | Peak | 6,000 | 6,469 | \$1,070.6 | \$417.5 | \$1,488.1 |
| 1 | Onset | 2,800 | 2,804 | \$464.1 | \$181.0 | \$645.0 |
| | Peak | 6,000 | 6,469 | \$1,070.6 | \$417.5 | \$1,488.1 |

Eversource Response to Interrogatory RSR-4SP01, Attachment 1.

Tables 4 through 6 above illustrate the magnitude of annual expenses required to retain incremental internal line resources, support staff, and equipment to respond to storms of various intensities. As an initial comparison, in order to respond to an Event Level 3 using only internal, directly-employed Eversource crews, Eversource would need to hire nearly 2,000 additional full-time employees, 1,700 of which are line resources and the remainder are administrative and supervisory staff, to meet the storm onset requirement for line resources according to the ERP. Doing so would cost an additional \$447 million per year. Eversource Response to Interrogatory RSR-4SP01, Attachment 1. By contrast, Eversource incurred \$206 million of incremental costs for mutual aid and external line contractors in Tropical Storm Isaias. *Id.*, pp. 22-24. Furthermore, the 1,700 additional line workers would be only those necessary within the first 48 hours, and the Company's response matrix calls for up to 6,000 lineworkers for an event similar in magnitude to Tropical Storm Isaias.

Considering events of lesser intensity, such as the more common level 4 events, also yields high incremental costs. In order to have sufficient internal line resources, support staff, and equipment for the initial response to an Event Level 4 (i.e., those staff necessary within the first 48 hours), Eversource would need to hire an additional 700 line

resources at an incremental annual cost of \$148 million. By contrast, Eversource incurred approximately \$197 million in external labor costs responding to Event Level 4 and 5 storms from January 2017 through December 2020. Response to Interrogatory RSR-17, Attachment 1. Had Eversource retained an incremental 700 line resources starting in 2017 and ending in 2020, it would have incurred \$592 million (\$148 million x 4 years). Even with the retention of those resources in this scenario, Eversource would have had to secure additional external contractors and mutual aid resources for some of those events, as Eversource used a total of 1,500 line resources for both the March 7, 2018 and May 15, 2018 events. Eversource Storm Analysis Report, pp. 19-20. Thus, external contractor costs would still need to be incurred above and beyond the incremental labor costs of adding those 700 lineworkers.

In conducting this cost-benefit analysis, Eversource nonetheless recognized that there is an opportunity for it to hire additional lineworkers. Response to Interrogatory RSR-2. In hiring additional line workers, Eversource first looks to ensure that there is sufficient day-to-day work planned on the system so that internal lineworkers are productive throughout the year. Response to Interrogatory RSR-2. As such, Eversource proposed that its day-to-day work plan could potentially support an incremental 50 to 150 internal lineworkers, which is generally what the Company uses for contract workers in a given year. Id. Eversource is currently seeking to hire additional line workers. Since 2016, Eversource has hired 176 new line workers. Response to Interrogatory RSR-1. The largest hiring effort in the last five years was in 2020, when the Company hired 46 new line workers. Id.

Eversource reports challenges to its hiring efforts due to a shortage of skilled craft workers in the current labor market and the preference of many skilled workers to seek employment with private contractors. Id., pp. 24-25. Eversource states that highly competitive wages and benefit packages for journeyman line workers make it less attractive to change from one organization to another. Response to Interrogatory RSR-1. Furthermore, there is a long period of time from the initial hiring date to become fully qualified as a lineworker. The timeline for hiring apprentice line workers is typically ten to twelve weeks, and the timeline to train apprentices to become fully qualified as a line worker is typically 4 to 5 years. Eversource Storm Analysis Report, p. 23; Response to Interrogatory RSR-1. The four-year apprentice program involves five weeks of classroom training, eighteen months of field training, and 30 months of working side-by-side with journeyman line workers. Response to Interrogatory RSR-1.

b. UI

In the UI Storm Analysis Report, UI selected the following five storms the Company considers to provide a useful comparison for its storm response cost-benefit analysis:

- Storm Irene in August 2011;
- Storm Sandy in October 2012;
- Ice Storm in January 2019;
- Tropical Storm Isaias in August 2020; and
- Tornado/Thunderstorm in August 2020.

UI Storm Analysis Report, pp. 7-9.

UI's selection of these storms was based on its ERP Event Level Matrix. Id. Similar to Eversource, UI's Event Level Matrix is one tool in the Company's ERP to help guide decision-making during emergency response efforts by categorizing weather conditions, damage locations, and outage expectations with resource needs to achieve timely restoration. Id., p. 13. The Event Level Matrix provides a set of parameters to classify storm intensity and response requirements and is used as one input – along with weather conditions, system characteristics, and technical experience – to assist the Company in planning resource needs (such as the number of lineworkers) to respond to damage locations and outages and to restore service to customers. Id.

Table 7 below reflects relevant portions of UI's current Event Level Matrix related to storm characteristics and typical line resource needs.

Table 7. UI Event Level Matrix

| Event Level | Customer Outages | Typical No. of Outage Orders | Typical No. of Non-Outage Orders | Typical Lineworker Needs at Storm Onset | Typical Lineworker Needs at Peak | Typical Restoration Duration |
|-------------------|--------------------|------------------------------|----------------------------------|---|----------------------------------|------------------------------|
| 5 minor | less than 5,000 | n/a | n/a | 6 to 12 | 6 to 18 | less than 12 hrs. |
| 5 moderate | 5,000 to 10,000 | 25 to 50 | more than 50 | 12 to 18 | 106 | 12 to 24 hrs. |
| 5 | 10,000 to 31,356 | 50 to 75 | 75 to 100 | 131 to 156 | 131 to 206 | 24 to 48 hrs. |
| 4 | 31,356 to 95,799 | 75 to 400 | 100 to 500 | 156 to 206 | 156 to 206 | 2 to 5 days |
| 3 | 95,800 to 159,967 | 400 to 1,000 | 500 to 1,000 | 216 to 271 | 216 to 556 | 5 to 7 days |
| 2 | 159,967 to 223,549 | 1,000 to 2,000 | 500 to 1,000 | 271 to 436 | 271 to 646 | 7 to 9 days |
| 1A | 223,549 to 287,421 | 2,000 to 3,000 | 1,000 to 2,500 | 436 to 601 | 436 to 706 | 9 to 14 days |
| 1 | more than 287,421 | more than 3,000 | more than 2,500 | 601 to 1,096 | 601 to 1,206 | more than 14 days |

UI Response to Interrogatory RSR-53, Attachment 1, pp. 40 and 43.

The Event Level Matrix is primarily used as a planning tool to anticipate damage and outages due to weather events and to identify typical response strategies. UI Storm Analysis Report, p. 13. Since the event level, and the Company's ERP as a whole, consider a number of factors when planning for storm response, no single indicator in the matrix establishes an event level classification. Id. A variety of other factors, including

experience and judgment, are used to apply the event level matrix during and prior to an event. Id. When using it to classify events for an after-the-fact analysis, as is done here, the same caveats apply.

Notably, in using the Event Level Matrix to identify the storms used to perform the cost-benefit analysis, UI removed some level 5 events from its the analysis, in favor of including larger, more impactful events. Id., p. 6. Specifically, UI did not include the 79 level 5 minor and level 5 moderate events it experienced from 2018 through 2020 in the analysis, since the events were limited in damage and duration and did not require a significant utilization of external line resources. Id.

Table 8 provides a summary of the five events relied on by UI in its analysis.

Table 8. UI Summary of System Impact by Storm Event

| | Irene | Sandy | Ice Storm | Isaias | Tornado |
|--------------------------|--------------|--------------|------------------|---------------|----------------|
| Event Classification | Level 3 | Level 3 | Level 5 | Level 3 | Level 4 |
| Start Date | 8/28/2011 | 10/29/2012 | 1/18/2019 | 8/4/2020 | 8/27/2020 |
| Days to Restore 99% | 8 days | 8 days | 3 days | 6 days | 4 days |
| Customers out at Peak | 158,130 | 160,561 | 10,379 | 113,433 | 20,753 |
| Wind (Sustained/ Gusts) | 44 / 65 | 47 / 63 | 40 / - | 42 / 62 | 40 / 100 |
| Restoration Steps | 1,500 | 1,600 | 147 | 1,450 | 330 |
| Dist. Circuits Affected | 263 | 259 | 81 | 325 | 104 |
| Broken Poles | 209 | 278 | 90 | 206 | 150 |
| Primary Conductor (ft) | 14,000 | 26,217 | <5,000 | 23,866 | <10,000 |
| Secondary Conductor (ft) | 136,000 | 86,668 | <15,000 | 59,633 | <25,000 |
| Approximate Cost | \$20M | \$40M | \$5M | \$25M | \$9M |

UI Storm Analysis Report, p. 13.

Of the five storms depicted above, Storm Irene, Storm Sandy, and Tropical Storm Isaias were the most severe and most costly. Id. Labor costs represent a significant portion of the incremental costs ascribed to each storm referenced above. For the five storms presented in Table 8, contractor line crews account for 47% to 72% of the total labor costs, compared to 13% to 29% for internal UI crews, 0.1% to 3.5% for affiliate crews, and 15% to 30% for tree contractor crews. UI Response to Interrogatory RSR-12.

To assist in the cost-benefit analysis, UI performed an analysis that considered high-level cost estimates for the Company to directly employ incremental lineworkers to meet the typical resource restoration strategies for the various event levels. Table 9 provides a summary of the FTE line costs at the onset and at the peak for each ERP Event Level. The annual labor costs shown in Table 9 are based on the fully loaded annual cost for a qualified lineman of \$157,461.26. UI Response to Interrogatory RSR-11.

Table 9: UI Summary of Line FTE Costs for ERP Event Levels (in millions)

| Event Level Matrix | FTE Line Costs | | | | | | Other Costs | | |
|--------------------|--------------------------|-------------------------|----------------|---------------|---------------|--------------|---------------------------------------|------------------------|-----------------------|
| | Total Line FTEs at Onset | Total Line FTEs at Peak | New FTEs Onset | Cost at Onset | New FTEs Peak | Cost at Peak | Stores, Damage Assessors, Wire Guards | Grand Total (at Onset) | Grand Total (at Peak) |
| 5 | 131 | 206 | 31 | \$4.9 | 106 | \$16.7 | \$0 | \$4.9 | \$16.7 |
| 4 | 156 | 256 | 56 | \$8.8 | 156 | \$24.6 | \$4.8 | \$13.6 | \$29.3 |
| 3 | 216 | 556 | 116 | \$18.3 | 456 | \$71.8 | \$10.0 | \$28.3 | \$81.9 |
| 2 | 271 | 646 | 336 | \$52.9 | 546 | \$86.0 | \$22.3 | \$75.2 | \$108.3 |
| 1A | 436 | 706 | 501 | \$78.9 | 606 | \$95.4 | \$40.3 | \$119.2 | \$135.7 |
| 1 | 601 | 1206 | 996 | \$156.8 | 1106 | \$174.1 | \$53.8 | \$210.6 | \$227.9 |

UI Response to Interrogatory RSR-11.

According to Table 9, the total line FTE costs at the onset increase from \$4.9 million for an Event Level 5, to \$156.8 million for an Event Level 1; the total line FTE costs at the peak increase from \$16.7 million for an Event Level 5, to \$174.1 million for an Event Level 1. Id. The additional FTE line costs shown in Table 9 are based on the fully loaded annual costs of a qualified lineman (\$157,461.26), a fleet mechanic (\$131,706.31), stores (\$89,080.73), administration (\$109,510.00), and an engineer (\$170,554.35). Id. UI did not include other costs that may be incurred with the retention of additional lineworkers, such as vehicle costs, facility costs, and so forth. Id.

Based on the Company's analysis, in order to address an Event Level 5 storm solely with internal line resources, UI would need an additional 31 FTEs at the onset and 106 FTEs at the peak, which would amount to annual expenses that range from \$5 million to \$16 million. Id. By contrast, UI incurred approximately \$19 million total of external line resources costs for all storms from 2017 through 2021, excluding only Tropical Storm Isaias. Response to Interrogatory RSR-17, Attachment 1. If UI had retained 31 to 106 additional line resources during that five-year window, it would have incurred, at a minimum, a total of \$25 (\$5 million x 5 years) to \$80 million (\$16 million x 5 years) in incremental costs.

For an event similar in magnitude to Tropical Storm Isaias, UI would need 116 new FTEs at the onset and 456 new FTEs at the peak. UI Response to Interrogatory RSR-11, Attachment 1. Considering only the smaller number of resources needed at storm onset (i.e., 116) would require that UI incur a minimum annual expense of \$28.3 million. Id. By contrast, UI incurred external labor costs during Tropical Storm Isaias of \$15.2 million. UI Response to Interrogatory RSR-17, Attachment 1.

According to the Company, its standard practice seeks to maintain enough internal lineworkers to perform day-to-day capital work, which is in turn supplemented with contractors for emergent needs. UI Response to Interrogatory RSR-10. UI asserts that hiring internal lineworkers beyond its projected capital needs could result in a shortage of meaningful work for the crews and/or layoffs. UI Response to Interrogatory RSR-10.

For additional context, Table 10 below provides an additional summary view of the annual labor costs for hiring additional internal lineworkers. The figures presented in Table 10 do not include costs associated with vehicles, facilities, and supervisory and administrative personnel necessary to support lineworkers and to ensure their productivity. Id.

Table 10. UI Annual Labor Costs for Additional Lineworkers

| Additional Line Workers | Annual Cost of Additional Line Workers |
|-------------------------|--|
| 50 | \$ 7,873,063.00 |
| 80 | \$ 12,596,900.80 |
| 90 | \$ 14,171,513.40 |
| 110 | \$ 17,320,738.60 |
| 120 | \$ 18,895,351.20 |
| 150 | \$ 23,619,189.00 |

UI Response to Interrogatory RSR-10.

Similar to Eversource, UI also faces challenges hiring additional lineworkers because the pool for fully qualified line workers is limited. UI Response to Interrogatory RSR-10. Additionally, once hired, apprentices must complete a five-year apprentice program to become a fully qualified lineworker. UI Response to Interrogatories RSR-1 and RSR-10. The program involves classroom training on electrical theory and construction tasks, as well as hands-on training to learn how to safely perform construction tasks. UI Response to Interrogatory RSR-1.

In addition to the five-year apprentice program described above, UI reports that it takes approximately three to six months to hire new line workers. UI Response to Interrogatory RSR-1. Another challenge facing UI is ensuring that the hired lineworkers can complete the apprentice program, since the Company only hires enough apprentices for open lineworker positions. Id. In the past five years, the Company has hired 18 lineworkers, including the most recent hiring effort in 2021 to fill six positions. Id.

c. Authority Review

There are a number of factors that must be considered when comparing and contrasting the costs and benefits of hiring incremental lineworkers to staff for emergency response efforts. These factors include:

1. Financial impact of incremental staffing above-and-beyond day-to-day needs;
2. Feasibility of finding a sufficient number of qualified lineworkers;
3. Timeline to train apprentice lineworkers; and
4. Trade-offs of reducing alliance contract lineworker pool.

Eversource Response to Interrogatory OCC-65.

A review of historical storm cost data and the EDCs' estimates of annual lineworker labor and associated expenses indicate that, from a purely cost perspective, the current model of maintaining a level of lineworkers to support day-to-day programs and relying

on external lineworkers to supplement internal staff is the more cost-effective approach for purposes of responding to large outage events. Extreme events, like Superstorm Sandy and Tropical Storm Isaias, are historically too infrequent to overcome the costs that would have been incurred to retain a level of internal resources necessary to respond to events of such magnitude; although, the Authority notes that such analysis will necessarily need to be repeated as the frequency and intensity of weather events increases due to climate change.

Beyond the strict evaluation of costs to retain incremental resources needed for storm response, it is also not realistic at this time to expect the EDCs to be able to find, recruit, train, and retain lineworkers at the level necessary to respond to significant emergency events using only internal resources. Fully qualified lineworkers are not generally available for recruitment in the numbers presented and analyzed herein. Eversource and UI Responses to Interrogatory OCC-78. Industry standard practice is to recruit, train, and retain apprentice lineworkers, and both EDCs have adopted this approach. UI Response to Interrogatory OCC-78. Both EDCs have active programs that recruit and provide new training for Connecticut-based recruits: UI has hired 18 lineworkers since 2017, eight in 2021 alone; Eversource has hired 176 new line workers since 2016, including 46 new lineworkers in 2020. UI and Eversource Responses to Interrogatory RSR-1.

Furthermore, the issue goes beyond the need to recruit an incremental number of trainees to increase the EDCs' line workforce, since the EDCs also have to replace lineworkers who retire or otherwise leave the company. Annual lineworker attrition rates for fully qualified lineworkers have ranged from 7% to 9% in recent years. Eversource and UI Responses to Interrogatory OCC-74. Since 2016, UI has lost 25 fully qualified lineworkers due to retirement, voluntary leave, or involuntary leave, UI Response to OCC-74, while Eversource has lost 114 lineworkers (96 of which were fully qualified) since 2016 due to retirement, voluntary leave, or involuntary leave. Eversource Response to Interrogatory OCC-74.

Nor is it a simple matter to train new lineworkers. Apprentice lineworkers or trainees require four to five years of training before they are fully qualified journeyman lineworkers. UI and Eversource Responses to Interrogatory OCC-1. Training consists of an initial onboarding training lasting approximately 12 weeks. Id. Subsequently, the apprentices are paired with journeyman lineworkers for 18 months for an intensive training program, followed by an additional four years of working alongside fully qualified journeyman lineworkers. Id. Not all apprentices remain with the Company during and after training, either leaving for another company or not completing the training. Id.

Another angle to consider is the impact of retaining additional internal resources on the available contractor pool across the state, as the record includes some evidence that the hiring of incremental internal resources may pull directly, at least in part, from existing in-state contractors. Currently, Eversource employs 266 internal lineworkers and 188 alliance contract lineworkers to handle day-to-day construction and maintenance programs. Eversource Response to Interrogatory OCC-66. The addition of incremental, fully qualified lineworkers will generally reduce the need for the EDCs to use contractors who are already based in Connecticut and already obligated to perform storm duties for the EDCs. Eversource Response to Interrogatory OCC-65. Local contractor resources

allow an EDC to scale its lineworker pool up or down based on variable construction programs. UI Response to Interrogatory OCC-66. The EDCs also contend that local contractor resources are also effectively much the same as internal line resources since they are Connecticut-based, work almost exclusively with the EDC (and thus are familiar with the service territory), and are under contract with the EDCs to perform storm restoration work when called. Eversource Storm Analysis Report, p. 10; UI Storm Analysis Report, p. 18. A key difference, however, is that the status of these resources as contractor-based provides the EDCs flexibility to increase or decrease its resource pool based on demand, allowing the EDCs to ensure the productive use of all resources. UI Response to Interrogatory OCC-66.

In light of the context provided above regarding the costs and challenges of increasing the internal lineworker count, there remains the question regarding what number of internal lineworkers is most cost-beneficial when factoring in the necessity for storm response. Before that question can be answered, however, there is a relationship that needs to be understood: the characterization of lineworkers as a resilience measure. Put simply, an increased number of lineworkers results in the EDC's ability to complete more resilience programs, which of course comes with increased costs associated with construction. Eversource Responses to Interrogatory RSR-2 and OCC-65. Indeed, the EDCs have undertaken an increasing amount of resilience-based construction programs in recent years. Eversource Response to Interrogatory OCC-65; Eversource and UI Responses to Interrogatory RSR-16.

Yet, even more impactful than the benefit conferred by incremental lineworkers on an EDC's ability to perform more day-to-day resilience work, is that an increased number of lineworkers available at the onset of a storm also enhances the ability of a utility to timely respond to extreme events and to ensure public safety. Therefore, the lineworker count is in and of itself a resilience measure. Tr. 08/30/21, pp. 90-91.

The importance of this was stressed by the Authority in the Decision dated April 28, 2021 in Docket No. 20-08-03, Investigation into Electric Distribution Companies' Preparation for and Response to Tropical Storm Isaias (Tropical Storm Isaias Decision), wherein the Authority highlighted the necessity of having sufficient lineworkers available within the early stages of storm response to respond to emergency situations (e.g., life-threatening situations, critical municipal and utility facility outages, blocked roads) in addition to restoring customer outages.⁴ Eversource conceded that increasing its internal lineworker pool, even at the expense of contractors, may enhance its ability to respond to such emergent situations. Eversource Response to Interrogatory OCC-65. Indeed, and in recognition of this benefit, Eversource shared its plan to increase the Company's internal lineworker pool over and above attrition rates moving forward. Id.

Therefore, in determining that internal lineworker resources are a type of resilience measure that can be leveraged by the EDCs, the Authority determines that the number of lineworkers that an EDC employs must be considered and evaluated alongside the evaluation of each EDC's resilience programs. The Authority implements a resilience

⁴ See, Tropical Storm Isaias Decision, Section IV.C. Field Response and Restoration Crews and Section IV.D. Municipal Liaisons and Make Safe Protocol.

framework in this Decision and incorporates an evaluation of lineworker staffing therein. See, Section II.B.4.e. Minimum Staffing Standards below for further discussion.

2. Analysis of Storm Response

In this section, the Authority reviews the EDCs' Storm Analysis Reports pursuant to Conn. Gen. Stat. § 16-32n(b)(2)(A-C). In these subsections, each EDC provided an analysis of its performance in the five storms noted in Section II.A.1 with respect to the following storm response activities:

(A) estimates concerning potential damage and service outages prior to the last five storm events classified as a level three, four or five, (B) damage and service outage assessments after the last five storm events classified as a level three, four or five, (C) restoration management after the last five storm events classified as a level three, four or five, including access to alternate restoration resources via regional and reciprocal aid contracts.

The Authority summarizes key portions of the Companies' reports and provides its own review below.

a. Eversource

Eversource included in its Storm Analysis Report an analysis of its damage prediction, damage assessments, and restoration management for the following five storms:

- Wind and Rain Event on October 29, 2017;
- Nor'easter on March 2, 2018;
- Nor'easter on March 7, 2018;
- Thunderstorms on May 15, 2018; and
- Tropical Storm Isaias on August 4, 2020.

The Authority previously conducted a review of the Company's response to these events in two separate dockets. The first four storms listed above were reviewed in the Decision dated April 7, 2019 in Docket No. 18-11-12, Petition of The Connecticut Light and Power Company d/b/a Eversource Energy for Approval to Recover its 2017-2018 Catastrophic Storm Costs, while the August 4, 2020 storm was reviewed through the lens of each EDC's storm preparation and response efforts in the Authority's Tropical Storm Isaias Decision. A detailed review of each component of Eversource's response to the delineated storms can be found in those Decisions.

For purposes of this focused analysis, the Authority will review the Company's damage predictions relative to these five storms, as well as how such predictions affected the associated preparation and response efforts. Table 11 provides a summary of the estimated impact for each weather event, compared to the actual impact for the five most recent storms noted above and discussed in the report.

Table 11. Eversource Damage Prediction of Five Most Recent Major Storms

| Date of Storm | Initial Expected Event Level | Expected Customer Outages | Estimated Damage Locations | Expected Number of Line Crews | Revised Event Level | Actual Outages on Peak | Actual Total Outages | Actual Number of Damage Locations | Actual Number of Line Crews Deployed |
|---------------|------------------------------|---------------------------|----------------------------|-------------------------------|---------------------|------------------------|----------------------|-----------------------------------|--------------------------------------|
| 10/29/2017 | 5 | <125,000 | <2,000 | 200-300 | 4 | 201,222 | 311,318 | 4,815 | 471 |
| 3/2/2018 | 5 | <125,000 | <2,000 | 200-300 | 5 | 81,376 | 179,211 | 2,899 | 277 |
| 3/7/2018 | 5 | <125,000 | <2,000 | 200-300 | 4 | 168,647 | 256,995 | 5,771 | 734 |
| 5/15/2018 | 5 | <125,000 | <2,000 | 200-300 | 4 | 139,581 | 193,624 | 5,356 | 760 |
| 8/4/2020 | 4 | <360,000 | 1,500-10,000 | 250-800 | 2 | 632,632 | 1,152,037 | 21,669 | 2,555 |

Eversource Storm Analysis Report, pp. 7, 16 and 27; Response to Interrogatory RSR-6.

As evidenced by Table 11 above, Eversource's initial predictions related to four of the five storms (i.e., all but the March 2, 2018 Nor'easter) initially grossly underestimated the actual impact of each event. The initial event level predictions did not accurately reflect the actual storm conditions and system damage that occurred, with the March 2, 2018 event predictions coming the closest to actual recorded data. Eversource Storm Analysis Report, p. 27. As discussed in an earlier section, the event level classification is used to aid in planning and responding to storm events by providing damage and outage predictions and informing typical resource strategies to ensure timely restoration. These event levels specify parameters derived from expected event conditions, including: (1) the number of customer outages resulting from the impact; (2) the number of damage locations expected for this kind of event; (3) the number and type of crews necessary to accomplish the restoration within the restoration duration specified for the event level; and (4) the duration of restoration efforts expected for the scale of the emergency event. Eversource Storm Analysis Report, pp. 26-27.

Eversource asserts that the ERP event level can and should be modified, if necessary, as weather conditions change, as expectations change, or as actual impact assessments become possible. *Id.*, p. 27. Eversource continues to allege that the initial incorrect event level predictions summarized above did not affect the effectiveness of the Company's storm response, and that it used the event level classification as it was intended. *Id.*, p. 28.

While the Authority acknowledges that ERP event level classifications may evolve leading up to and during storm preparation, response, and restoration efforts, there is a demonstrable trend of the Company underestimating a storm's impact on its system as shown in Table 11 above. The Authority remains concerned by this trend, since an initial underestimation of storm severity can lead to the Company not securing enough crews in the initial stages of an emergency event. Fortunately, this was not the result during the 2017 and 2018 storms listed above. Table 12 depicts the number and types of crews available in the first 24 hours (day 1) immediately following the five major storms discussed herein, as well as in the second 24 hours (day 2) after the storm. As visible in the table, the Company had sufficient line resources for an event level 4 for each 2017 and 2018 storm. An event level 4 calls for 250 to 800 crews; Eversource had secured close to or more than 250 within 24 hours for each 2017 or 2018 event, and more than 250 within 48 hours.

Table 12: Eversource Summary of Crews Available in Two Days Following Storms

| | Resource | 10/29/2017 | 3/2/2018 | 3/7/2018 | 5/15/2018 | 8/4/2020 |
|--------------|---------------|------------|----------|----------|-----------|----------|
| Day 1 | Internal Line | 131 | 139 | 137 | 102 | 161 |
| | External Line | 139 | 87 | 175 | 74 | 139 |
| | Service Crew | 36 | 26 | 43 | 0 | 25 |
| | Tree Crews | 84 | 162 | 230 | 60 | 235 |
| Day 2 | Internal Line | 138 | 137 | 162 | 246 | 167 |
| | External Line | 192 | 184 | 182 | 282 | 346 |
| | Service Crew | 38 | 34 | 43 | 62 | 55 |
| | Tree Crews | 234 | 154 | 185 | 269 | 235 |

Eversource Response to Interrogatory RSR-5.

Notably, this was not the case in Tropical Storm Isaias, as was discussed at length in the Tropical Storm Isaias Decision. The Authority found that Eversource had not secured sufficient crews in the first 48 hours of the event to meet its public service obligations, and that this was due, at least in part, to the Company's underestimation of the event level classification. Tropical Storm Isaias Decision, pp. 34-38. The Authority will investigate whether this trend has continued for storms that occurred after Eversource's Storm Analysis Report was conducted and will consider whether the storm damage prediction met standards of acceptable performance. This will take place when the Company seeks recovery of storm costs in its next general rate case.

Also illustrated by Table 12 is the Company's reliance on external resources. If additional crews are needed after utilizing affiliate crews, Eversource seeks mutual aid crews through its mutual aid organization, NAMAG, or other external crews through direct outreach to local, regional, and national contractors. *Id.*, pp. 11-12. Mutual aid crews, however, are typically not available prior to or immediately after a storm event, and therefore Eversource is more reliant on affiliate crews and other external crews. *Id.*

b. UI

UI included in its Storm Analysis Report an analysis of its damage prediction, damage assessments, and restoration management for the following five storms:

- Storm Irene in August 2011;
- Storm Sandy in October 2012;
- Ice Storm in January 2019;
- Tropical Storm Isaias in August 2020;
- Tornado/Thunderstorm in August 2020;

The Authority notes that it conducted a review of UI's response to three of these events in past dockets. A review of UI's performance in Storm Irene is documented in the Decision dated August 1, 2012 in Docket No. 11-09-09, PURA Investigation of Public Service Companies' Response to 2011 Storms (2011 Storms Decision). A review of UI's performance in Superstorm Sandy is detailed in the Decision dated August 21, 2013, in Docket No. 12-11-07, PURA Investigation into the Performance of Connecticut's Electric

Distribution Companies and Gas Companies in Restoring Service Following Storm Sandy (Storm Sandy Decision). In the Tropical Storm Isaias Decision, the Authority evaluated the performance of UI in its preparation for and response to the August 2020 event. A detailed review of each component of the Company's response to those storms can be found in the respective Decisions. The Authority intends to conduct a thorough review of the remaining storms when the Company requests recovery of associated costs in its next general rate case.

For purposes of this focused analysis, the Authority will review the Company's damage prediction relative to these five storms, as well as how such predictions affected UI's associated preparation and response efforts. Table 13 provides a summary of the estimated impact for each weather event, compared to the actual impact for the five most recent storms noted above and discussed in the report.

Table 13. UI Pre-Storm Resource Allocations for Five Major Storm Events

| | Line Personnel | Tree Personnel | Service Personnel | Damage Assessors | Est. Global Restoration |
|---------------------|----------------|----------------|-------------------|------------------|-------------------------|
| ERP Guidance | | | | | |
| Level 3 | 100-150 | 80-170 | 20-30 | 50-100 | 5-7 |
| -Isaias (Actual) | 165 | 136 | 15-30 | 70 | 6 |
| -Sandy (Actual) | 68 | 58 | 14 | 50 | 8 |
| -Irene (Actual) | 46 | 36 | n/a | 42 | 8 |
| Level 4 | 50-100 | 30-80 | 10-20 | Up to 50 | 2-5 |
| -Tornado (Actual) | 45 | 66 | 12 | 14 | 4 |
| Level 5 | 25-50 | 10-30 | Up to 10 | -- | 1-2 |
| -Ice Storm (Actual) | 45 | 60 | 6 | -- | 2-3 |

UI Storm Analysis Report, p. 19.

As depicted above, UI was able to provide personnel resources in quantities that mostly aligned with its ERP recommendations for Tropical Storm Isaias, the tornado, and the ice storm. Personnel resources for Storm Sandy and Storm Irene, however, were less than dictated by the ERP guidance, and as a result, the global restoration estimate was greater than the ERP guidance and more than the other reported event level 3, Tropical Storm Isaias, which had the recommended level of personnel and better pre-staging efforts. UI Storm Analysis Report, pp. 19-20. UI reported that, since the development of the ERP in 2012, the Company has followed the ERP with regard to its storm response and further, has provided PURA with after-action reports for qualifying events. *Id.*, pp. 10-12.

Table 14 provides a summary of the number and types of crews available in the first 24 hours (day 1) immediately following the five major storms discussed herein, as well as in the second 24 hours (day 2) after the storm.

Table 14. UI Summary of Crews Available in Two Days Following Storms

| | Resource | Irene | Sandy | Ice Storm | Isaias | Tornado |
|--------------|-----------------|--------------|--------------|------------------|---------------|----------------|
| Day 1 | Line Crews | 48 | 117 | 281 | 105 | 60 |
| | Service Crews | 30 | 28 | 22 | 7 | 7 |
| | Tree Crews | 48 | 92 | 104 | 72 | 88 |
| Day 2 | Line Crews | 56 | 117 | 408 | 117 | 165 |
| | Service Crews | 34 | 28 | 22 | 7 | 17 |
| | Tree Crews | 60 | 92 | 126 | 72 | 88 |

UI Response to Interrogatory RSR-8.

In responding to major storms, UI relies on external crews, including affiliate resources and contractor resources, in addition to its internal crews. Id., pp. 24-25. In 2015, UI and Iberdrola USA, Inc. merged, forming Avangrid, which now holds UI, New York State Electric & Gas (NYSEG), Rochester Gas and Electric (RG&E), and Central Maine Power (CMP). Id. As a result of the merger, UI can rely on affiliate crews in New York and Maine to aid in storm restoration. Id. Avangrid has worked to standardize processes across affiliates and increase access to support personnel. Id.

During large storm events, when additional crews beyond internal and affiliate resources are needed, UI seeks contractor resources from other utilities, contractors working for other utilities, and utility contractors, primarily through mutual assistance. Id. UI is a member of the North Atlantic Mutual Assistance Group (NAMAG), which follows the Edison Electric Institute's (EEI) process for mutual assistance among major electric utilities and utility contractors. Id. UI relies less on mutual assistance than affiliate crews for storm restoration because other utilities are typically reluctant to release crews prior to a storm event, and therefore mutual assistance crews are not usually available until after the storm has passed and the home utility has addressed their needs. Id.

Table 15 below provides a summary of the resources used in storm response, including internal, affiliate, and mutual aid resources, for the five storms discussed herein.

Table 15. UI Summary of Resources Used in Storm Response

| | Irene | Sandy | Ice Storm | Isaias | Tornado |
|-----------------------------------|--------------|--------------|------------------|---------------|----------------|
| Start Date | 8/28/2011 | 10/29/2012 | 1/18/2019 | 8/4/2020 | 8/27/2020 |
| UI Resources | | | | | |
| - Internal Line Workers | 100 | 109 | 99 | 99 | 96 |
| - Contract Line | 46 | 68 | 45 | 50 | 45 |
| - Contract Tree | 40 | 58 | 60 | 96 | 66 |
| - Total Direct Resources | 186 | 235 | 204 | 245 | 207 |
| <i>% of Total Storm Resources</i> | 43% | 28% | 62% | 27% | 40% |
| Affiliate Resources | | | | | |
| - Contract line | n/a | n/a | 58 | 219 | 146 |
| - Contract tree | n/a | n/a | 37 | 253 | 73 |
| - Total Affiliate Line/Tree | n/a | n/a | 95 | 472 | 219 |
| <i>% of Total Storm Resources</i> | 0% | 0% | 29% | 51% | 42% |
| Mutual Aid Resources | | | | | |
| - Line workers | 118 | 307 | 28 | 152 | 94 |
| - Tree workers | 128 | 286 | 0 | 56 | 0 |
| - Total Mutual Aid | 246 | 593 | 28 | 208 | 94 |
| <i>% of Total Storm Resources</i> | 57% | 72% | 9% | 22% | 18% |
| TOTAL FTEs Deployed | 432 | 828 | 327 | 925 | 520 |

UI Storm Analysis Report, pp. 23, 25, 27.

Since the Avangrid merger, UI has begun to rely more heavily on affiliate crews, i.e., those from New York and Maine affiliates, rather than mutual aid resources, in its storm response activities.

3. Planning for At-Risk and Vulnerable Customers

In this section, the Authority reviews each EDC's Storm Analysis Report pursuant to Conn. Gen. Stat. § 16-32n(b)(2)(D) regarding planning for at-risk and vulnerable customers.

a. Eversource

When severe weather is expected, Eversource sends outbound messaging to at-risk and vulnerable customers to alert them of the pending weather event, to communicate the Company's preparations, and to encourage customers to create a back-up plan in the event that they experience an outage. Eversource Storm Analysis Report, pp. 31-32. During and after the event, Eversource continues to communicate with the customers via telephone calls. *Id.* Additionally, Eversource provides a list of medically coded customers to municipalities that request such information. *Id.* Eversource also provides information on their website regarding medical coding and reminds customers throughout the year of their medically coded status to help customers prepare for future weather events. *Id.*

b. UI

UI serves 5,466 at-risk and vulnerable customers, as well as 180 critical facilities, across its service territory. UI Storm Analysis Report, pp. 14-15. The Company states

that it follows procedures established in its ERP to identify and contact at-risk customers during emergencies, and to identify and integrate facilities into the restoration process. Id. During the restoration process, UI states that it prioritizes critical facilities and restores them following Make Safe work, to the extent practicable. Id. To aid in restoration, UI allocates resources at the outset of the storm to help municipalities clear roadways (i.e., Make Safe crews). Id. Depending on the restoration needs, UI balances restoring at-risk customers and critical facilities with efforts to restore large sets of customers. Id.

c. Authority Review

In the Tropical Storm Isaias Decision, the Authority made a number of changes to how the EDCs communicate with vulnerable customers. Based on feedback from municipalities received during the investigation, the Authority directed the EDCs to begin tracking outages of medical hardship customers to share with municipalities. Tropical Storm Isaias Decision, p. 118. This information is crucial to towns so that they can identify and be prepared to help medical hardship customers during emergencies causing long duration outages. Id.

Furthermore, the Authority strengthened requirements that the EDCs communicate with medical hardship customers before, during, and after a major storm. Id. The EDCs are now required to contact all medical hardship customers at least 24 hours before the onset of a major storm and to communicate daily with them during the storm restoration process. Id.

4. Communications Policies

In this section, the Authority reviews each EDC's Storm Analysis Report pursuant to Conn. Gen. Stat. § 16-32n(b)(2)(E) regarding communication policies with state and local officials and customers, including through the provision of individual customer restoration estimates as well as the accuracy of such estimates.

a. Eversource

Communication with state and local officials and customers is managed by a communications officer. Eversource Storm Analysis Report, p. 32. During storm events, the communications officer is responsible for conducting initial and routine briefings, ensuring web pages are updated, preparing and issuing communications for the media and public statements, ensuring customer concerns are raised and escalated as needed, ensuring medical customers are alerted, ensuring effective support of inbound customer communications, and developing daily communications. Id. The communications officer also works with the Incident Commander during the storm event to tailor communications to the restoration effort. Id.

The Company relies on twelve different communication methods to communicate with officials and customers during storm events, including through automated messaging services, call center, website, social care team, social media, mobile app, text messaging, outbound email, outbound calls, media outreach, liaison outreach, and preparedness and emergency briefings. Id., pp. 33-35. During storm events, most communication with state and local officials and customers is conducted through automated channels, such as text

messages and social media updates, as opposed to phone calls. Id., p. 33. The Company adapts interactive voice response (IVR) messaging on its phone system to provide customers calling in with information prior to the storm as well as updates throughout restoration. Id. Eversource also relies on community liaisons for bi-directional communication between the Company and federal, state, and local officials as well as other stakeholders during the storm event. Id., pp. 35-36. Community liaisons are assigned to municipalities to provide real-time information, support, notification, coordination, and overall communication with Eversource. Id.

Throughout the restoration period, the Planning Chief develops and publishes global, town-level, and event-level Estimated Times to Restoration (ETRs). Id., pp. 36-37. Restoration projections are based on the number of trouble locations, the relative geographic scope of the locations, the condition of the transmission system, the number of circuit breakers and reclosers affected, and the number of service-related trouble spots. Id. As restoration progresses, the accuracy of the ETRs increases. Id. Global and town-level ETRs are developed using the Outage Management System (OMS) system, while event-level ETRs are developed based on information from crews dispatched to the work location. Id. ETRs are communicated to customers via IVR messaging, the website, and customer care representatives with the most granular detail possible – event-level first, if available, town-level next, and otherwise global. Id.

Of the town-level ETRs that were created, Eversource met 90% of the ETRs for the October 2017 storm as well as for the two March 2018 nor'easters. Eversource Response to Interrogatory RSR-7. For the May 2018 thunderstorms, 37 town-level ETRs were created, but Eversource only met 22 of them (59% success). Id. Eversource exceeded the ETR by approximately 40 hours on average for the May 2018 storm restoration. Id. For Tropical Storm Isaias in August 2020, 146 town-level ETRs were created and Eversource met 100 of them (68% success). Id. Eversource exceeded the ETR by approximately 9 hours on average in the Tropical Storm Isaias restoration. Id.

b. UI

UI refers to the ERP to manage its communications with customers, state agencies, and municipal officials during an active event. UI Storm Analysis Report, pp. 15-16. For the past eight years, UI asserts that it has focused on improving its communications, including through the municipal liaison program and by integrating internal systems to provide more robust outage information. Id. UI has invested in integrating the Outage Management System (OMS), Geographic Information Systems (GIS), and Advanced Metering Infrastructure (AMI), which aids in communication efforts between municipal liaisons and municipal emergency management personnel regarding outages and restoration efforts. Id. AMI, specifically, enables UI to identify customer outages without the need for customer verification or in-person line crew investigations. Id.

AMI has also enabled UI to develop customer-level ETRs, in addition to town-level ETRs. Id. Table 16 provides a summary of the ETRs developed for the five major storms discussed herein as well as the subsequent revisions to the ETRs, where applicable. UI Response to Interrogatory RSR-9.

Table 16. UI Summary of Storm ETRs

| | Irene | Sandy | Ice Storm | Isaias | Tornado |
|--------------------|------------------------------------|--------------|----------------------------------|---------------|------------------|
| Initial Global ETR | 11:59 p.m. September 4, 2011 | 9 days | 2:00 p.m. January 22, 2019 | 6 days | 24 – 48 hours |
| Revised Global ETR | n/a | n/a | 11:59 p.m. January 22 | n/a | 2 – 5 days |
| Town-level ETR | 11:59 p.m. September 4, 2011 | 9 days | Same as Revised Global | 6 days | 2 – 5 days |

UI Response to Interrogatory RSR-9.

As evidenced in Table 16, the initial global and town-level ETRs are not different; thus, the Authority questions the benefit of AMI in producing town-level ETRs, or the Company's methodology in doing so. *Id.* Furthermore, the initial global estimates were revised for two of the five major storms referenced above: the December 2019 Ice Storm and the August 2020 tornado. *Id.* UI reports that substantial completion of restoration (i.e., greater than 95% of those customers affected) was performed within the initial or revised global ETR for the five major storms. *Id.* UI attributed the extended recovery of the August 2020 event due to localized, but significant, damage due to a tornado that brought down entire trees and caused extensive damage. UI Storm Analysis Report, p. 8. UI attributed the extended recovery of the December 2019 ice storm due to continued damaging winds causing outages to continue to surface. Tr. 06/23/22, p. 202.

5. Infrastructure, Facilities, and Equipment

In this section, the Authority reviews each EDC's Storm Analysis Report pursuant to Conn. Gen. Stat. § 16-32n(b)(2)(F) regarding infrastructure, facilities, and equipment. The reports are required to analyze the following:

- i. Whether such infrastructure, facilities, and equipment are in good repair and capable of meeting operational standards;
- ii. Whether such company is following standard industry practice concerning operation and maintenance of such infrastructure, facilities, and equipment;
- iii. The age and condition of such infrastructure, facilities, and equipment;
- iv. Whether maintenance of such infrastructure, facilities, and equipment has been delayed; and
- v. Whether such company had access to adequate replacement equipment for such infrastructure, facilities, and equipment during the course of the last five storm events classified as a level three, four or five.

a. Eversource

Eversource asserts that its infrastructure, facilities, and equipment are in good repair, meet or exceed utility standards, and are capable of meeting operational standards. Eversource Storm Analysis Report, pp. 37-38. Nonetheless, attention and investment are required to maintain reliable infrastructure, and therefore, the Company

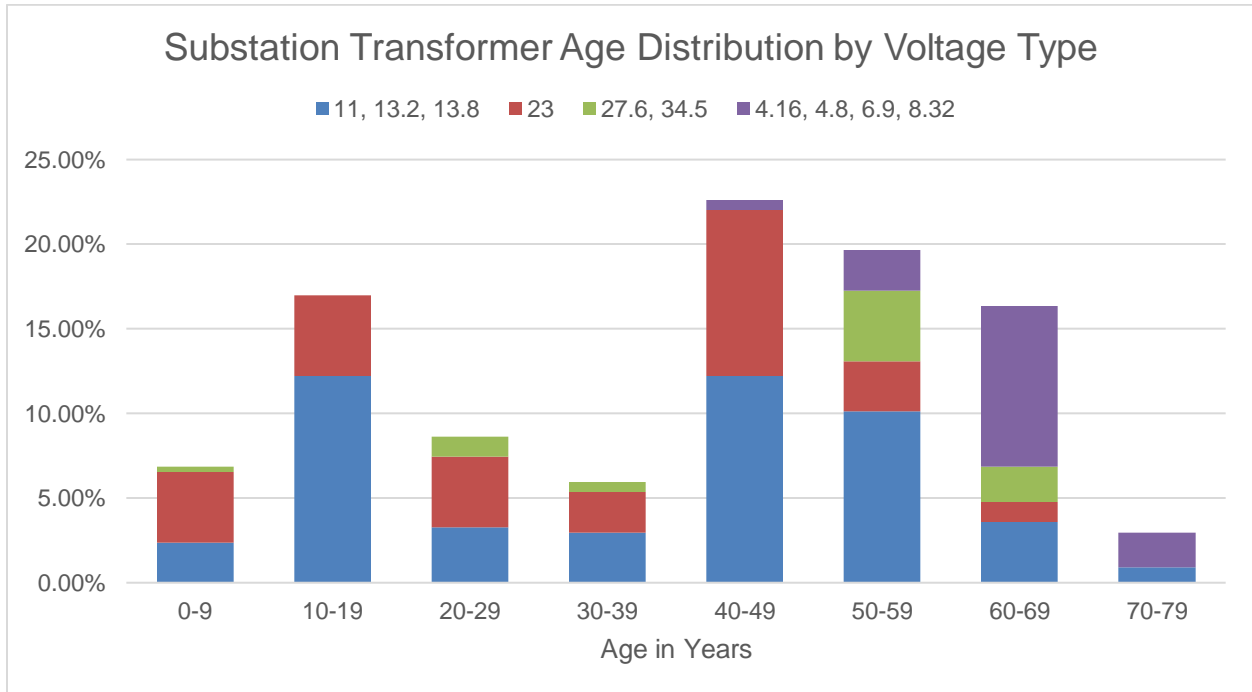
conducts routine resilience programs. Id. Eversource's current resilience efforts include rebuilding the distribution system with taller and stronger poles, stronger cable wire, and new pole-tops with lightning protection. Id. Eversource has also conducted extensive vegetation management, modified several substations to withstand 100-year flood levels, and hardened communication towers. Id. The Company reports that resilience investments since 2015 have reduced non-major event outages by 50%. Id. In addition to resilience investments, Eversource has also made investments in modernizing its system with automated line sensors and smart switches. Id.

Eversource maintains its transmission and distribution infrastructure through an inspection, testing, and maintenance program. Id., pp. 38-42. The Eversource Maintenance Program (EMP) seeks to: prevent or mitigate service interruptions; extend the useful life of equipment; avoid future, more costly maintenance and repairs; and assure compliance with safety rules and regulations, legal requirements, and contractual agreements. Id. The EMP addresses the following major topics:

- Direct buried equipment and facilities;
- Capacitor banks;
- Pole top automatic voltage regulating equipment;
- Reclosers;
- Network and Underground Transformers;
- Street lighting;
- Underground System Cable, Vaults, and Manholes;
- Infrared inspection;
- Distribution wood pole inspection and treatment; and
- Three-phase group operated switches.

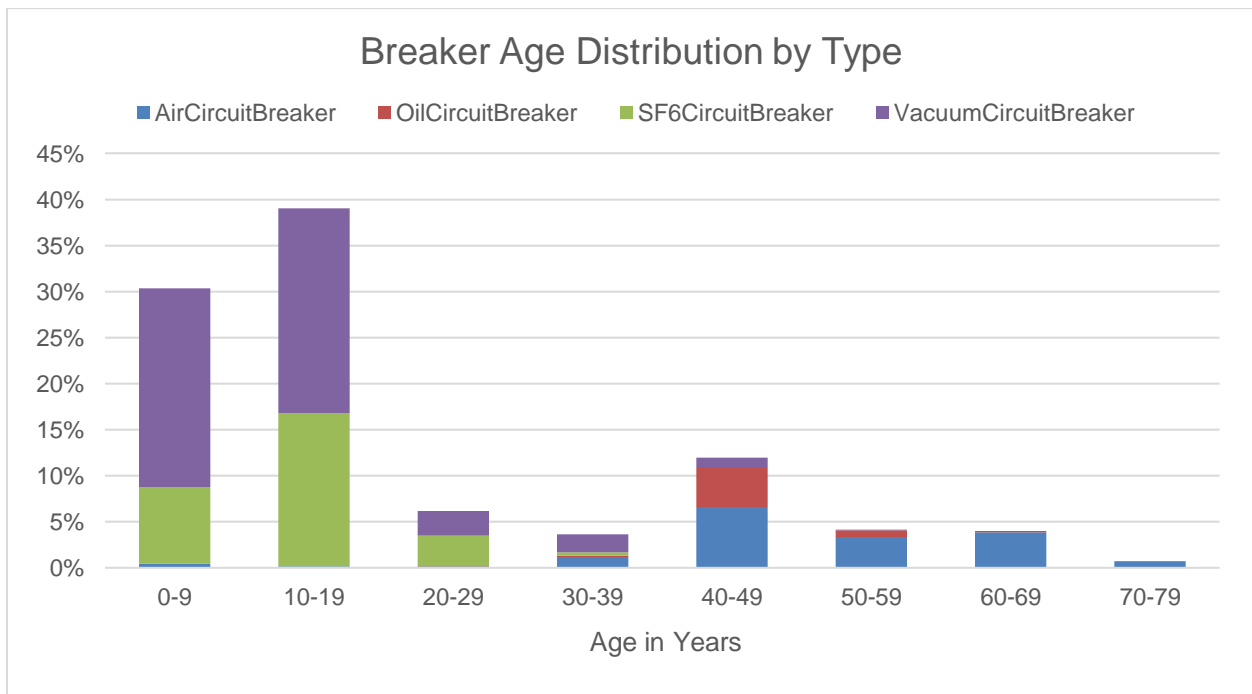
Figures 1 through 5 provide plots of the age distribution of substation transformers, breakers, substation reclosers, distribution 3 phase reclosers, and poles.

Figure 1. Eversource Substation Transformer Age Distribution by Voltage Type



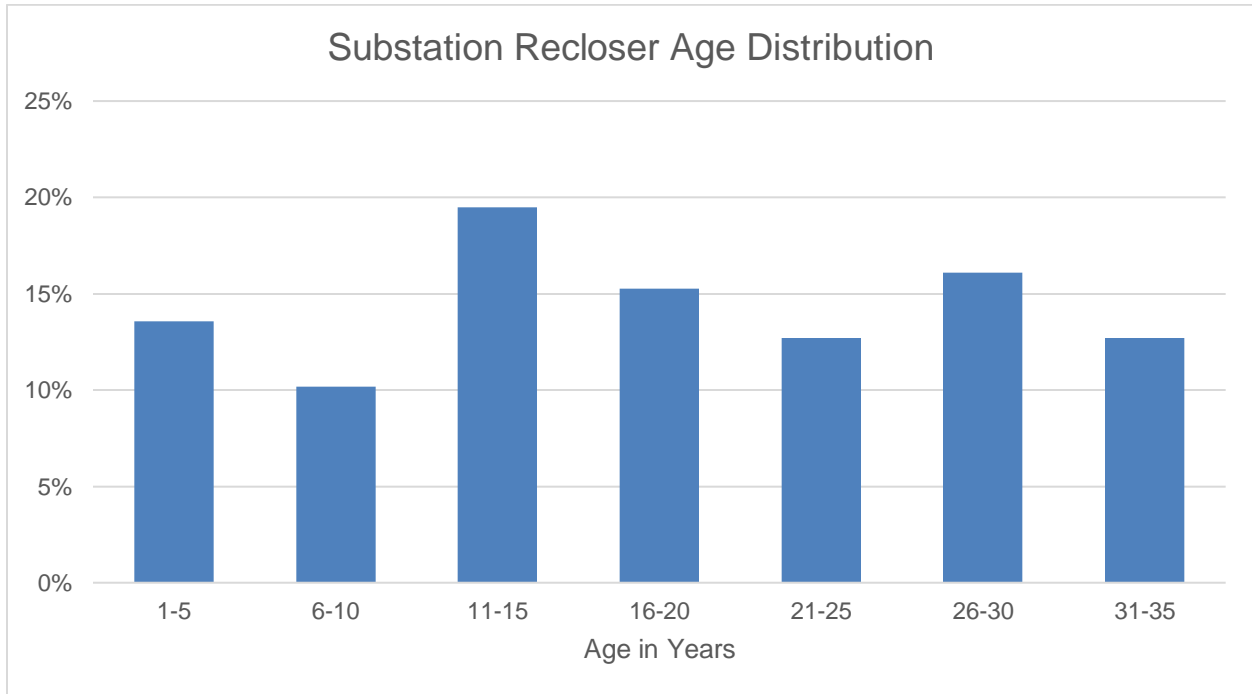
Eversource Response to Interrogatory RSR-3.

Figure 2. Eversource Breaker Age Distribution by Type



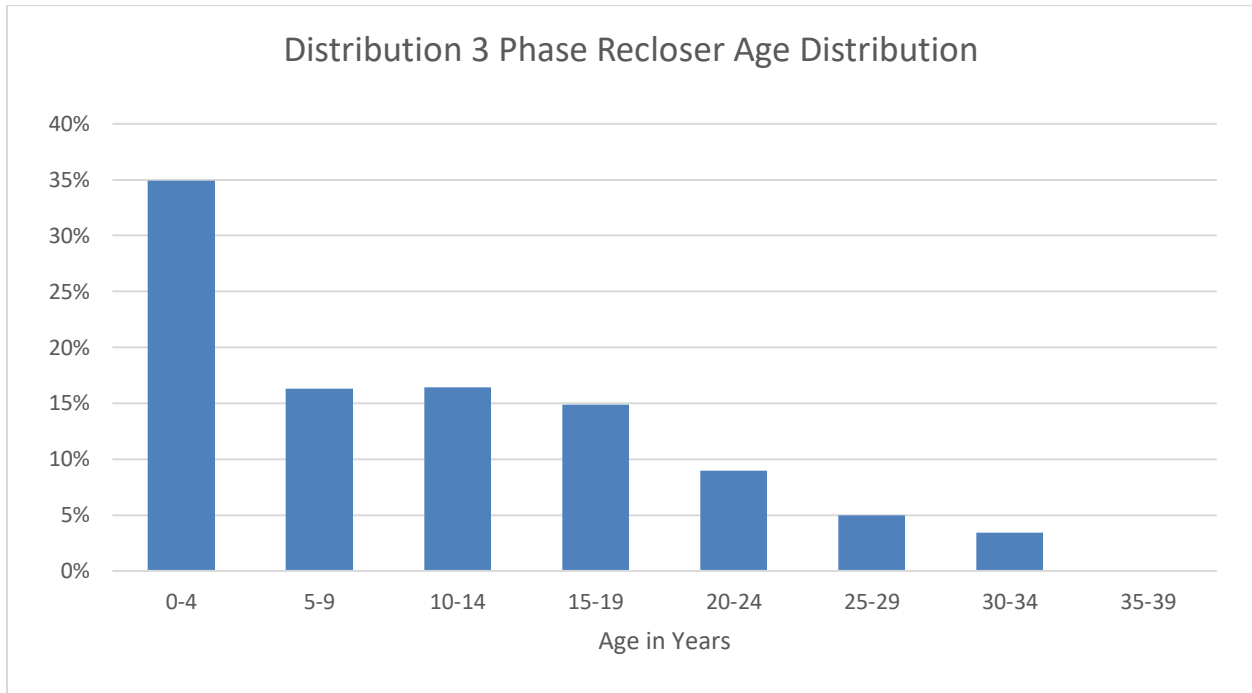
Eversource Response to Interrogatory RSR-3.

Figure 3. Eversource Substation Recloser Age Distribution



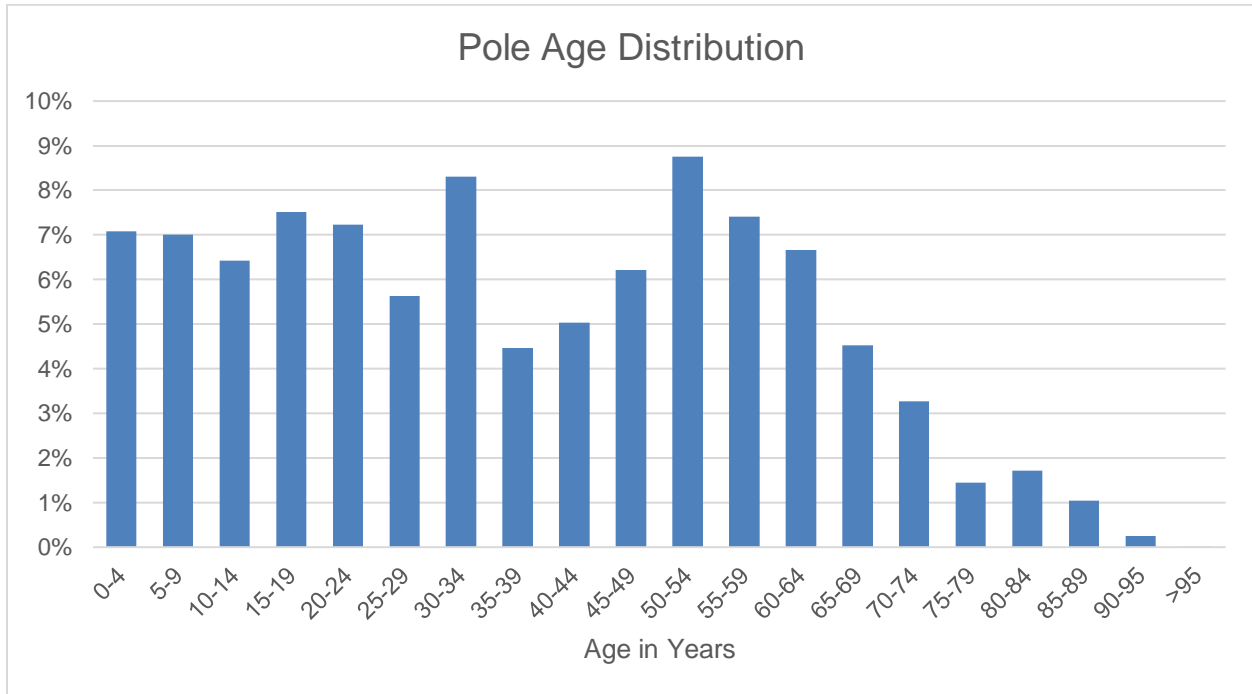
Eversource Response to Interrogatory RSR-3.

Figure 4. Eversource Distribution 3 Phase Recloser Age Distribution



Eversource Response to Interrogatory RSR-3.

Figure 5. Eversource Pole Age Distribution

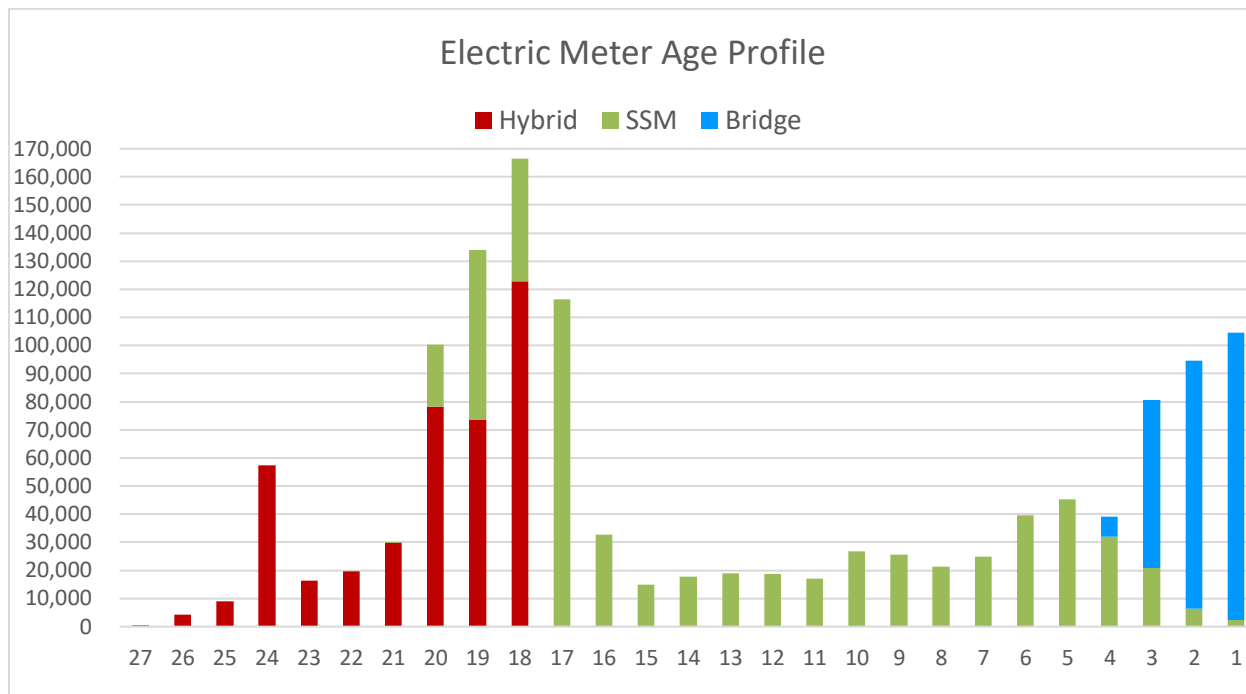


Eversource Response to Interrogatory RSR-3.

The Eversource infrastructure age distribution plots in Figures 1 through 5 show more recent investments in breakers, distribution 3 phase reclosers, and poles than in substation transformers and substation reclosers. Id.

Figure 6 provides an age distribution of electric meters in Eversource’s distribution system.

Figure 6. Eversource Distribution of Electric Meters by Age



Eversource Response to Interrogatory RSR-3.

As illustrated by Figure 6, there were large investments made in meters approximately two decades ago. Eversource Response to Interrogatory RSR-3. Accordingly, in the next five years, approximately 700,000 meters will exceed their useful life of 20 years. Eversource Storm Analysis Report, p. 47. Eversource has begun replacing aging meters with bridge meters, which contain both AMR and AMI functionality. Eversource Storm Analysis Report, pp. 47-48; Response to Interrogatory RSR-3.

Eversource reports that no maintenance of infrastructure, facilities, and equipment has been delayed on its system. Storm Analysis Report, p. 49. Additionally, Eversource reports that it maintains a level of replacement equipment in its warehouses and requires that its equipment distributors maintain a certain level of stock to ensure equipment is available for storm events. Eversource Response to Interrogatory RSR-33. In advance of major events, Eversource contracts with key contractors and vendors, including rental companies, as well as materials and equipment suppliers, to ensure 24/7 availability of equipment during restoration efforts. Id.

b. UI

UI's ERP includes infrastructure maintenance and inspection requirements. UI Storm Analysis Report, pp. 16-17. One area of focus for UI is tree trimming, given that tree damage is a common theme in the biggest storm events from the last decade – Irene, Sandy, and Isaias. Id. In 2014, UI implemented the Utility Protection Zone (UPZ) program, with approval from PURA, to expand its tree clearance specifications around conductors and ensure industry standard operation and protection of its equipment during damaging weather events. Id. At the time Tropical Storm Isaias occurred, 40% of the UI

system was trimmed to the new UPZ specification, which UI attributes as a primary reason for the less extensive damage its system experienced when compared to storms Irene and Sandy, two major storms with similar, sustained wind and gust characteristics. Id.

UI’s transformers range from four to 58 years old (installed in 1963 to 2017). UI Response to Interrogatory RSR-13. Transformer voltages range from a low side of 4 kV to a high side of 14 kV, and from a low side of 115 kV to a high side of 345 kV. Id. The system’s breakers range in age from four to 66 years old (installed in 1955 to 2017), and the voltages include 4.16, 11, 13.8, 115, 230, and 345 kV. Id. UI has 400 distribution reclosers throughout the system, ranging from one to 25 years old (installed in 1996 to 2021). UI Response to Interrogatory RSR-14.

Table 17 provides a summary of the ages of UI’s utility poles, including joint custodian poles and UI owned poles.

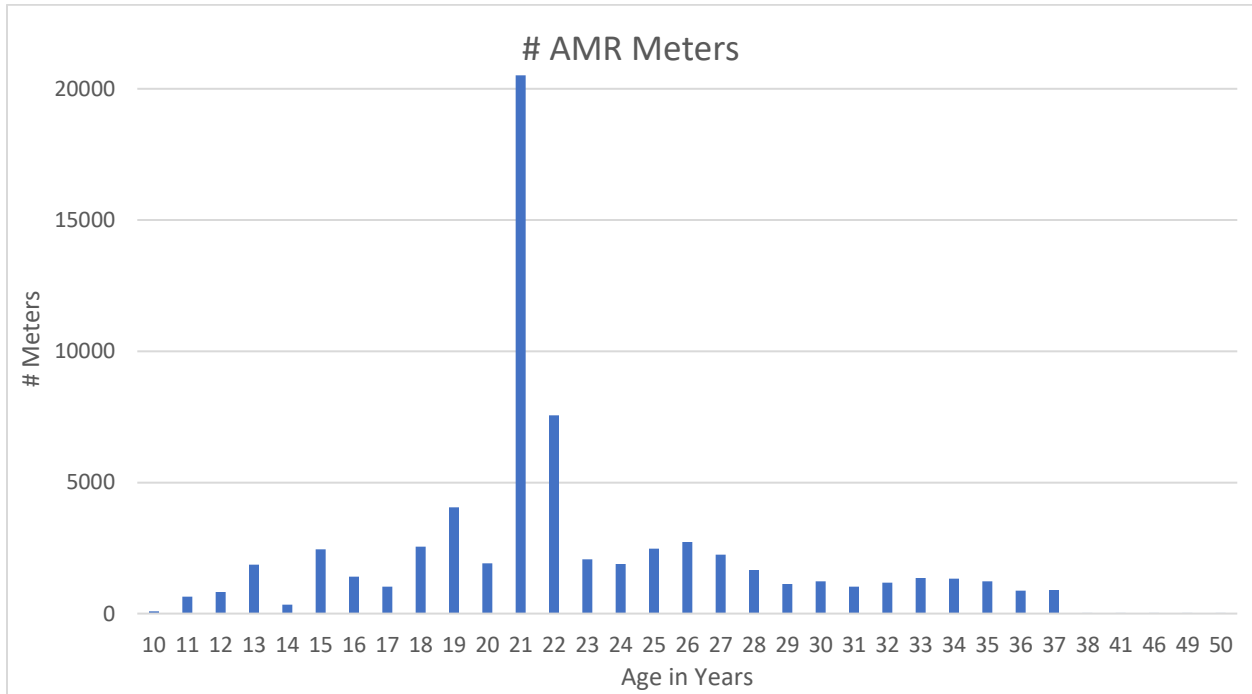
Table 17. UI Summary of Utility Poles and Age Distribution

| | Joint Custodian | UI Owned |
|-------------------------|------------------------|-----------------|
| Total No. Poles | 75,714 | 11,251 |
| Age Distribution | | |
| < 10 years | 24% | 20% |
| 10-30 years | 30% | 33% |
| 30-50 years | 23% | 19% |
| >50 years | 22% | 16% |

Id.

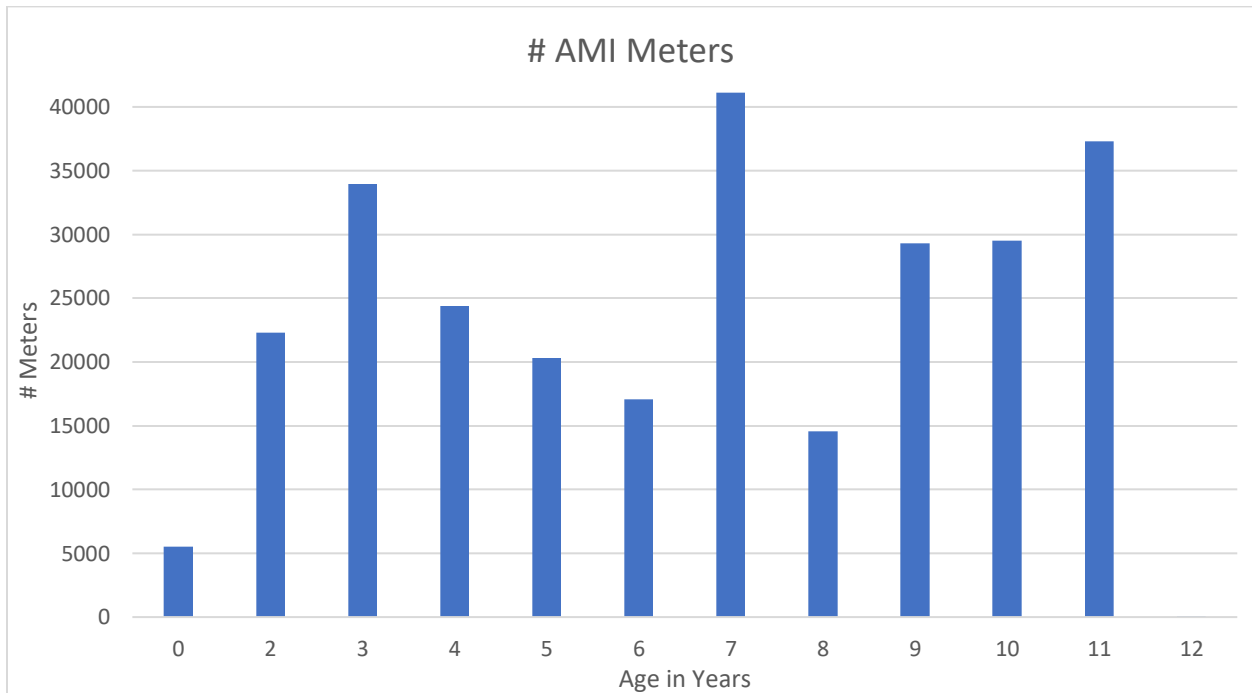
With respect to its meter population, UI has a combination of one-way AMR meters and two-way AMI meters throughout its system. UI Response to Interrogatory RSR-15. Figure 7 and Figure 8 depict the age distributions of the AMR and AMI meters throughout UI’s system.

Figure 7. UI Distribution of AMR Meters by Age



UI Response to Interrogatory RSR-15.

Figure 8. UI Distribution of AMI Meters by Age



UI Response to Interrogatory RSR-15.

As illustrated by Figure 7, most of the deployed AMR meters are 21 years or older and likely exceeding their useful service life. Approximately one decade ago, the Company transitioned from installing AMR meters to AMI meters, as illustrated by the age distribution of its AMI meters reflected in Figure 8.

UI reports that no maintenance of infrastructure, facilities, and equipment has been delayed on its system. UI Response to Interrogatory RSR-33. UI states that it maintains a level of replacement equipment to replace equipment damaged in a storm. Id. UI states that its supplier of equipment is a national supplier, which provides equipment throughout the country and enables it to have a substantial amount of replacement equipment in stock and available at all times. Id.

6. Compliance with Emergency Response Standards

a. Eversource

Eversource states that in accordance with the Decision dated November 1, 2021 in Docket No. 12-06-09, PURA Establishment of Industry Performance Standards for Electric and Gas Companies (12-06-09 Decision), Eversource updated its ERP to include storm performance standards, and continues to submit its ERP to the Authority every two years pursuant to Section 16-32e of the General Statutes of Connecticut. Eversource Storm Analysis Report, pp. 49-50. Furthermore, Eversource reports that it complies with the ERP throughout the year and in major weather events, including submitting after-action reports for all qualifying events. Id.

b. UI

UI similarly asserts that it complied with the 12-06-09 Decision by updating its ERP to reflect storm performance standards and asserts that the Company continues to adhere to PURA's requirements for ERP updates. UI Storm Analysis Report, pp. 10-11. UI reports that since the ERP's inception, it has followed the ERP with respect to the Company's storm response, has submitted numerous enhancements and compliance filings to PURA, and has provided after-action reports for all qualifying events. Id. The Company also complies with the internal and external training requirements included in the ERP. Id. The ERP provides the Company with a foundation and guiding principles for restoration efforts, and applied standards and expectations set forth by applicable laws, regulations, and PURA rulings. Id.

c. Authority Review

In its Tropical Storm Isaias Decision, the Authority found that the EDCs did not meet standards of acceptable performance in their preparation for and response to Tropical Storm Isaias. Of the storms presented by the EDCs in their respective Storm Analysis Reports, only the two storms experienced by UI (i.e., the December 2019 ice storm and the August 2020 thunderstorm) have yet to be reviewed to determine whether UI complied with acceptable performance standards. The Authority will conduct that review when UI requests cost recovery for those storm response efforts in its next general rate case.

B. RELIABILITY AND RESILIENCE PROGRAMS

1. Reliability and Resilience Overview

In order to develop an effective approach by which to evaluate reliability and resilience programs, it is necessary to understand the similarities and differences between reliability and resilience. The foundation supporting the discussion below comes from industry standards, stakeholder input, and Authority findings based on its experience overseeing EDC programs and performance during emergency events.

Electric distribution interruptions are defined by the Institute of Electrical and Electronics Engineers (IEEE) Standard 1366 (2012) as “the total loss of electric power on one or more normally energized conductors to one or more customers connected to the distribution portion of the system.” As such, *reliability* can be thought of as “the ability of the power system to deliver electricity in the quantity and with the quality demanded by users.” Eversource Presentation dated Aug. 30, 2021, p. 2. In short, reliability means that electric service is available when expected. *Id.* Typically, when evaluating reliability, an all or nothing standard is used: is electrical service available or not available at any given time. *Id.*

The provision of safe and reliable electric service is one of the key responsibilities of the EDCs. Conn. Gen. Stat. § 16-244i. Industry standards that measure reliability, therefore, have been in use for many years by electric utilities. Eversource Presentation dated Aug. 30, 2021, p. 2. These will be described in more detail below, but the predominant metrics are defined by industry standard IEEE-1366 and measure the frequency of interruptions (SAIFI) and the duration of service interruptions (SAIDI).⁵ *Id.* A derivation of the SAIDI and the SAIFI measurements can provide a measure of the impact on an average customer using the Customer Average Interruption Duration Index (CAIDI).⁶

Electric distribution *resilience* is defined by the IEEE Power and Energy Society (PES) in technical reports PES-TR65 and PES-TR83⁷ as “[t]he ability to withstand and reduce the magnitude and/or duration of disruptive events, which includes the capability to anticipate, absorb, adapt to, and/or rapidly recover from such an event.” As noted by relevant publications, “[i]n some respects, this definition of broad resilience would fit with the system of metrics developed to assess the ability of utilities to ‘withstand’ incidents without incurring a loss of service”; however, with an increasing frequency of Major Storms, assessing a system’s resilience requires a myriad of tools beyond the foundation that reliability metrics can provide.⁸

⁵ The IEEE Standard 1366 also defines 10 other reliability indices, including CAIDI, CTAIDI, CAIFI, ASAI, CEMI, ASIFI, ASIDI, MAIFI, MAIFI, and CEMSMI. *See*, “IEEE Guide for Electric Power Distribution Reliability Indices,” in *IEEE Std 1366-2012 (Revision of IEEE Std 1366-2003)*, vol., no., pp.1-43.

⁶ *See*, Keogh, Miles and Christina Cody, “Resilience in Regulated Utilities,” (NARUC 2013 Resilience Publication) (Nov. 2013), p. 6.

⁷ *See*, IEEE publications: PES-TR65 and PES-TR83.

⁸ *See*, Stockton, Dr. Paul, “Resilience for Black Sky Days; Supplementing Reliability Metrics for Extraordinary and Hazardous Events,” (NARUC 2014 Resilience Publication) (Feb. 2014), p. 4.

Distinguishing between blue-sky, gray-sky, and dark-sky conditions is important when evaluating the reliability and resilience of a system. In practice, though, distinguishing between blue-sky, gray-sky, and dark-sky conditions is often difficult. Meteorological conditions can be represented on a broad spectrum, with blue-sky conditions on one end and dark-sky conditions on the other, while actual conditions fall somewhere along that spectrum.

Blue-sky reliability is an important industry standard and many methods exist to distinguish blue-sky conditions from unique weather events. Indeed, in Connecticut, there is an established methodology to identify events that should not be assessed using blue-sky condition metrics so that such events could be excluded from the data set when performing certain reliability analyses. Specifically, in the Decision dated March 22, 1995, in Docket No. 86-12-03, Long Range Investigation to Examine the Adequacy of the Transmission and Distribution Systems of The Connecticut Light and Power Company and The United Illuminating Company, the Authority's predecessor, the Department of Public Utility Control (DPUC), established a methodology to define a major storm (Major Storm). For weather events to qualify as Major Storms, the following criterion is applied:

[A] statistical analysis of the most recent four calendar years of reliability data. A cumulative frequency distribution of the number of locations requiring service restoration work per day would be calculated for this four-year period. Whenever the frequency of restoration work locations exceeds the 98.5 percentile, by company and/or region, the major storm criterion would be met.

This definition was developed specifically to assist the Authority in evaluating each EDC's reliability performance during blue-sky conditions, in part because Conn. Gen. Stat. § 16-245y(a) requires the Authority to exclude the effects of major storms from reliability-based evaluations for purposes of certain periodic reports addressed to the Connecticut General Assembly.⁹ Notably, while the Connecticut definition distinguishes between blue-sky conditions and Major Storms, there is no industry standard for distinguishing between the differing intensities of Major Storm events.

Nonetheless, such a distinction is essential to evaluating system performance because there can be significant differences in the intensity and impact of Major Storms. To illustrate this point, outages on a system due to Major Storms typically account for one-quarter to one-third of the total outages in year. See, Decision dated Dec. 9, 2020, in Docket No. 20-06-04, PURA 2020 Annual Report to the General Assembly on Electric Distribution Company System Reliability, pp. 7 and 11. Naturally, this percentage increases when a year sees more intense storms. See, Decision dated Dec. 1, 2021, in Docket No. 21-05-17, PURA 2021 Annual Report to the General Assembly on Electric Distribution Company System Reliability, pp. 7 and 11. Twenty years of data (note: Eversource began tracking storm intensity data in June 2002) demonstrates that outages

⁹ Conn. Gen. Stat. § 16-244i(d) requires that the Authority ensure that the quality and reliability of EDC service are the same or better than levels existing on July 1, 1998. Conn. Gen. Stat. § 16-245y(a) requires that the Authority exclude the effects of major storms, scheduled outages, and outages caused by customer equipment when performing reliability analyses included in the annual report due to the joint standing committee of the General Assembly having cognizance of matters relating to energy.

(and reliability) correlate strongly with the *intensity* of weather events rather than the *frequency* of weather events. Notably, system damage and outages are strongly correlated to catastrophic storms. To illustrate this point, consider the 150 Major Storms experienced within Eversource's service territory over a 20-year period. Those 150 events resulted in 13.5 million customer outages and restorations. Of those, a mere 6% (or nine events) accounted for 6.2 million outages, or 46% of the total storm related outages reported in that time period. Even more telling, four individual events (Hurricane Irene in 2011, Storm Sandy in 2012, October Nor'easter in 2012, and Tropical Storm Isaias in 2020) accounted for 4.4 million customer outages, or nearly 33% of all Major Storm related outages since 2002, despite those four events representing less than 3% of the total number of Major Storm events to occur in the last 20 years. Eversource Response to Interrogatory RSR-17, Attachment 1.

The history of Major Storms is similar in UI's service territory. Since the summer of 2002, 95 Major Storm events occurred, out of which three (Hurricane Irene, Superstorm Sandy, and Tropical Storm Isaias) accounted for 35% of all customer outages. UI Response to Interrogatory RSR-17, Attachment 1. Even more striking, those three events accounted for 80% of the total lost meter hours¹⁰ (i.e., customer outage duration) during that timeframe. Id.

The data presented above indicates the importance of distinguishing between gray-sky and dark-sky conditions. Gray-sky conditions can be thought of as the relatively frequent storms, which despite meeting the definition of a Major Storm, yield limited damage and system impacts. Conversely, dark-sky conditions can be thought of as the rare, but devastating, events that cause widespread damage and are often accompanied by extended service outages.

The EDCs have emergency response plans that categorize Major Storms by intensity level (i.e., Event Level) ranging from 5 to 1, with Event Level 1 being the most destructive. See, Eversource Response to Interrogatory RSR-53, Attachment 2, p. 17. Storms are classified into Event Levels using a number of parameters as guidelines: the number of damage locations, number of customer outages, and so forth. Id. The Event Levels help guide the EDCs in their storm preparedness, response, and restoration activities. Id., pp. 16-17. For that reason, the Event Levels provide a good basis to use to distinguish between storm intensities when evaluating the effectiveness of resilience measures in particular. Eversource contends that using Event Levels for this purpose, would be using Event Levels for a purpose they were never designed and since the Event Levels are pre-determined using damage prediction models, the initial Event Level may not correspond to actual storm conditions. Eversource Written Comments dated June 6, 2022, p. 8. Eversource therefore recommends ignoring the difference between storm intensities when evaluating the effectiveness of resilience programs. Tr. 06/22/22, p. 22. The Authority notes that Event Level designations can, and are changed, as storm conditions materialize. Eversource Storm Analysis Report, pp. 27-28. Therefore, it does not present an inconsistency to use an Event Level reflective of actual conditions to categorize events that occur on the system. For purposes of the Reliability and Resilience Frameworks established herein, gray-sky conditions will refer to Major Storms classified

¹⁰ Eversource did not reliably track this metric from 2002 to present.

as an Event Level 5 or 4; while dark-sky conditions will refer to Major Storms classified as an Event Level 3, 2, or 1.

Tropical Storm Isaias¹¹ presents a prototypical illustration of how the effectiveness of specific reliability and/or resilience measures may differ in storms of greater intensity. Responding to the massive amount of emergency response calls and outage locations in the initial stages of the storm presented an enormous challenge for the EDCs. Tropical Storm Isaias Decision, pp. 81-82, and 90. In many cases, the EDCs were unable to have at the ready a sufficient number of lineworkers to timely respond to emergency response needs, the needs of the municipalities, and the restoration needs of the customers. Tropical Storm Isaias Decision, p. 44.

Mutual assistance programs – agreements among the EDCs and other utilities to share qualified lineworkers across companies for emergency response and restoration activities – exist to help make resources available following these devastating events.¹² The programs allow electric companies to move crews to other service territories based on need; resources are shared equitably, with a proportional share of available resources sent to areas based on damage. Storm Credit Investigation, Tr. 03/30/21, pp. 31-32.

Connecticut EDCs have consistently relied on mutual assistance programs, which can be a valuable tool for emergency response. There are, however, limitations that become evident during very large and catastrophic Major Storm events, which often require an exponential increase in lineworkers to properly respond to the number of emergency response events and to begin restoration. First, there are a discrete number of qualified lineworkers across the US (about 75,000), most of which may be needed at their home utility to perform blue-sky conditions work. Storm Credit Investigation, Tr. 03/30/21, p. 33. Furthermore, for very large storms that have the potential to impact multiple states or regions, which is often the case for tropical storms, hurricanes, or nor'easters that have the potential to affect the entire eastern seaboard, utilities must retain crews until the chance of storm impact has passed, and no emergency work is needed in their own territories. *Id.*, pp. 33-34; Tropical Storm Isaias Decision, pp. 44 and 48. Mutual aid crews are generally from out of state and, therefore, must travel, adding an additional challenge (and cost) to have crews ready and staged when most needed. *Id.*, pp. 49-50. Therefore, while mutual aid resources are an important component to utility emergency response and restoration plans, mutual aid crews are not always available in sufficient quantities to respond to significant Major Storms. Since the largest storms require a massive mobilization of external lineworkers and other resources, the Authority expects that the Resilience Framework will be used to provide valuable insight into the minimum level of lineworkers needed to respond to different intensity storm events. Resilience programs shall be designed to mitigate the burden on utilities to secure additional external resources, while enabling them to respond to events that threaten public safety.

¹¹ Tropical Storm Isaias was classified by Eversource as an Event Level 2 and by UI as an Event Level 3. Decision dated April 28, 2022 in Docket No. 20-08-03, Investigation into Electric Distribution Companies' Preparation for and Response to Tropical Storm Isaias (Tropical Storm Isaias Decision), pp. 33 and 35.

¹² Tr. 03/30/21, p. 31 in Docket No. 20-12-46, PURA Implementation of Residential Customer Credit and Reimbursements by Electric Distribution Companies for Storm-Related Outages (Storm Credit Investigation).

Resilience programs can be designed to address resource inadequacies during dark-sky conditions such as those discussed above. Unfortunately, however, the industry does not yet have a consensus methodology as to how to determine the appropriate scale of resilience programs targeted to dark-sky conditions (particularly as compared to gray-sky conditions) without “breaking the bank.”¹³ Therefore, in the Authority’s view, a key justification for a resilience investment program must be to show how it will address dark-sky conditions by best reducing long duration outages for different types of customers; i.e., a demonstration of how such investment will reduce the number and severity of long-duration outages attributable to high-impact events, especially in the early stages of an event when qualified crews may be limited and public safety requires emergency response to immediate life-threatening incidents, road clearing, critical facility restoration, and customer restoration in an efficient and timely manner.

2. Objectives

In the Interim Decision, the Authority identified the need to maintain and improve reliability and resilience of the electric distribution system, while establishing a framework to identify how to do so in the most cost-effective manner possible. Interim Decision, pp. 19-20. A key determination was to identify reliability and resilience targets and methods to incentivize EDCs to meet those targets. *Id.*, p. 20.

Based on the findings of the Interim Decision, the record in this proceeding, and the overview provided above, the Authority identifies the following objectives related to the establishment of Frameworks that will be used prospectively to evaluate all EDC proposed resilience and reliability programs.

Improve, or at a minimum maintain top-quartile, system reliability performance in blue-sky conditions. This objective acknowledges that the maintenance of first quartile reliability performance, defined as a performance better than 75% of other electric utilities in the country, is a dynamic target dependent on the performance of other utilities. Nonetheless, differences in a utility’s own performance are measurable and discernable from year-to-year; although, annual variations in operating conditions must be accounted for in subsequent evaluations. Previous performance of the individual EDC can serve as a baseline off of which to establish quantifiable targets moving forward.

Improve system reliability and resilience against Major Storms in gray-sky conditions. This objective includes minimizing the frequency and duration of damages and outages due to Major Storms classified as Event Level 5 or 4 emergencies. This objective requires the demonstration and quantification, through analysis, of clearly defined connections between utility programs and corresponding reliability and resilience benefits. Specific metrics must be established to assess whether reliability and resilience programs targeted to enable the distribution system to withstand and recover from gray-sky conditions are performing as designed.

¹³ “Making everything resilient would probably break the bank, and it’s unnecessary. Far better are investments that deliver lower-cost service and improve system performance.” NARUC 2013 Resilience Publication, p. 11.

Improve system resilience against Major Storms in black-sky conditions. This objective includes minimizing the frequency and duration of damage and outages (and the corresponding restoration and recovery timelines) due to Major Storms classified as Event Level 1 – 3 emergencies. This objective requires the demonstration of clearly defined connections between utility programs and resilience benefits, as well as a good faith effort to quantify those benefits – particularly as methodologies and industry best practices emerge and evolve. Specific metrics must be established to assess whether resilience programs are performing as designed, even if such assessments must rely on simulated data for a counterfactual or sensitivity analysis.

Identify system and customer vulnerabilities to climate change and prioritize delivering increased resilience. This objective requires the identification of electric distribution system and customer vulnerabilities to climate change, particularly due to the increasing intensity and frequency of weather events.

Maximize benefits realized by, and the return on investment to, customers. This objective requires the identification and adoption of methods to manage costs and to prioritize, or re-prioritize on a rolling basis, programs to achieve maximum benefits for customers and the public at large. As such, this objective requires the identification and continued refinement of a methodology that quantifies the benefits, and avoided costs, that accrue to ratepayers from different types of reliability and resilience measures. In furtherance of this objective, there must be an effort to differentiate between and within customer classes when evaluating proposed resilience measures to ensure that societal and customer benefits are not masked, and to ensure a balance between cost considerations and minimization of outage duration for the longest-out customers, grid edge customers, medical protection customers, and other vulnerable populations.

Establish minimum staffing standards as a resilience measure and identify the effect of such standards on staffing needs in blue-sky, gray-sky, and black-sky conditions. This objective requires that minimum staffing standards be considered as an applicable resilience measure in formulating each EDC's Resilience Framework, as well as the evaluation of how such standards impact other reliability and resilience programs, including a reduction in the reliance on mutual aid resources and other out-of-state contractor resources.

Improve grid flexibility. This objective requires each EDC, on a continual basis, to identify and integrate other Equitable Modern Grid Initiative programs into its reliability and resilience program planning to leverage potential synergies, assist in prioritization of certain resilience programs, and avoid duplicative or stranded costs.

3. Reliability Framework

a. Reliability Metrics

Industry standard metrics have been in place for many years to measure and track EDC reliability performance, namely System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI). SAIDI is defined as the sum of customer interruptions in the preceding 12-month period, in minutes, divided by the average total number of customers served during that period. Conn. Gen. Stat. § 16-245y(a). SAIFI is defined as the total number of customers interrupted in the preceding 12-month period, divided by the average total number of customers served during that period. *Id.* SAIDI can be viewed as the average outage *duration* experienced by all customers on an EDC's system, while SAIFI can be viewed as the average outage *frequency* on an EDC's system. Lower SAIDI and SAIFI numbers reflect better reliability performance in terms of outage duration and frequency, respectively.

Another common industry metric can be derived from SAIDI and SAIFI, namely Customer Average Interruption Duration Index (CAIDI), which is the ratio of SAIDI to SAIFI. It can be thought of as the average duration of an interruption for customers who experience an outage.

A number of other metrics¹⁴ are gaining prominence in the industry as well, which seek to provide incremental, useful reliability information. These emerging metrics often attempt to identify customer-based reliability performance on a granular level, rather than from the system-based perspective that SAIDI and SAIFI provide. DEEP Written Comments dated Feb. 18, 2022, p. 6. These metrics include:

1. Customers Experiencing Multiple Interruptions (CEMI);
2. Customers Experiencing Long Interruption Durations (CELID);
3. Customers Experiencing Multiple Sustained Interruptions and Momentary Interruptions Events (CEMSMI);
4. Customers Experiencing Multiple Momentary Outages (CEMM); and
5. Momentary Average Interruption Frequency Index (MAIFI).

The Authority has considered whether these metrics provide additional or incremental benefit so as to justify a requirement that the EDCs begin to measure and report on them. A key benefit of the new metrics is that they are customer-oriented metrics and provide more granularity than the system averages provided by SAIDI and SAIFI. DEEP Written Comments dated Feb. 18, 2022, p. 6. Given that the new metrics provide a significantly different perspective regarding the same data, Tr. 03/29/22, pp. 119-121, the burden on the EDCs to report such results is outweighed by the value that such new perspectives will lend to the continuing evaluation of appropriate reliability measures. Accordingly, the Authority will require that the EDCs track each of the new reliability metrics referenced above. In reporting such metrics, which will be described more in Section II.B.3.d.ii below, each EDC will further segment its customer-centric

¹⁴ See, Moving Beyond Average Reliability Metrics, S&C Electric Company: <https://www.sandc.com/globalassets/sac-electric/documents/sharepoint/documents---all-documents/technical-paper-100-t128.pdf?dt=637691309027453197>.

metrics (i.e., CEMI, CELID, CEMSMI, and CEMM) into tranches for customers experiencing three or more, five or more, seven or more, and nine or more sustained interruptions.

b. Establishing Reliability Targets and Planning Parameters

The natural next step beyond tracking new reliability metrics is to find a way to incentivize programs that maintain consistent top-quartile reliability performance while minimizing or reducing ratepayer impact. The Authority envisions a data-driven approach to realizing this objective, where traditional reliability metrics are evaluated in a manner that factors in and balances a broader perspective on ratepayer costs. This type of approach would seek to identify and quantify the incremental costs necessary to maintain or improve upon a baseline level of reliability performance. The foundation of such a framework is discussed more below.

First though, it is important to recognize the business-as-usual case. SAIDI- and SAIFI-based reliability targets were established through Conn. Gen. Stat. § 16-244i(d), which requires that the Authority “ensure that quality and reliability are the same or better than levels existing on July 1, 1998.” In the Decision dated December 22, 2004, in Docket Nos. 03-12-06 and 86-12-03 (Reliability Target Decision), the Authority further clarified the reliability targets to mean the four-year average of SAIDI and SAIFI from 1995 to 1998 (Reliability Targets). Reliability Target Decision, p. 3. A four-year rolling average was used to provide a sense of the conditions that existed on July 1, 1998, while also accounting for year-to-year performance variations. *Id.* Similarly, the Authority established that a going-forward, four-year rolling average will be used to compare against the Reliability Targets to determine if they were met. *Id.* Notably, as discussed in Section II., both SAIDI and SAIFI as reported for compliance with Conn. Gen. Stat. §§ 16-244i(d) and 16-245y(a) are required by statute to exclude outages attributable to Major Storms, scheduled outages, and customer-caused outages. Conn. Gen. Stat. § 16-245y(a)(1).

Since the establishment of the Reliability Targets, the EDCs’ reliability performance has usually exceeded them. 2021 Reliability Report, pp. 4 and 8. In recent years, EDC reliability performance in blue-sky conditions has exceeded the Reliability Targets by a significant margin. *Id.* The EDCs’ most recent four-year rolling SAIDI and SAIFI averages have been well below the SAIDI and SAIFI Reliability Targets. *Id.* When compared against similar utilities, both UI’s and Eversource’s reliability metrics place them in the top quartile of performance. UI Written Comments dated Feb. 18, 2022, p. 2; Quanta Presentation dated Sept. 2, 2021, p. 10.

As discussed above, reliability performance metrics are well established in the industry. State-specific performance standards have been established as well on a system-wide basis, which include a baseline of rolling four-year averages of SAIDI and SAIFI performance. These performance standards remain useful as a baseline minimum standard to evaluate acceptable performance. However, due to the recent high-level of improvement in blue-sky reliability by both EDCs, a new performance target is warranted; a target that takes into account reliability performance *and* cost effectiveness, striking a balance between further improving on blue-sky reliability with costs incurred by ratepayers. The Authority notes that developing an incentive mechanism to consider

alongside a new reliability performance target that factors in cost effectiveness is the natural next step.

Importantly, the Authority initiated Docket No. 21-05-15, PURA Investigation into a Performance-Based Regulation Framework for the Electric Distribution Companies pursuant to Section 1 of Public Act 20-5, An Act Concerning Emergency Response by Electric Distribution Companies, the Regulation of Other Public Utilities and Nexus Provisions for Certain Disaster-Related or Emergency-Related Work Performed in the State (Take Back Our Grid Act). That investigation will develop and adopt a framework for implementing performance-based regulation (PBR) for each electric distribution company.¹⁵ The Authority determines that the PBR investigation should be leveraged to develop a methodology that ensures and incentivizes cost-effective reliability program development and implementation.

In the interim, however, a new set of blue-sky reliability-based planning parameters are appropriately determined. The planning parameters must reflect the following factors: the baseline, blue-sky reliability performance of each EDC; the comparability of each EDC's reliability performance with peer utilities; *and* some measure of cost effectiveness. In other words, these parameters should drive each EDC to, at a minimum, maintain top-quartile reliability performance and ideally, to improve on its previous year results where it is necessary or cost effective to do so, while mitigating or balancing such desired outcomes with projected customer bill impacts. The purpose of establishing forward-looking parameters is so that each EDC can appropriately design a reliability plan that the Authority and all stakeholders can review and objectively assess against as a known and quantifiable goal. The purpose is not so much to require that the EDCs plan for and achieve a specific percentage improvement in reliability as measured by SAIDI, SAIFI, and other reliability metrics; rather, the purpose is for the EDCs to demonstrate through such a plan the achievability or desirability to implement such an improvement to reliability as measured by those metrics. Subsequently, through the PBR docket, appropriate incentive/penalty mechanisms can be established to encourage the EDCs to achieve specific reliability performance targets in the most efficient and least expensive manner possible.¹⁶

¹⁵ See, Revised Notice of Proceeding dated Dec. 14, 2021, in Docket No. 21-05-15.

¹⁶ To be clear, and as discussed in the subsequent paragraph, the reliability-based planning parameters established in this section may require refinement during an EDC's future rate case before such parameters can be used as a performance target. In other words, while this Framework directs the EDCs to present a Reliability Plan that *plans* for an average five (5) percent reduction in the SAIDI and SAIFI values (blue-sky conditions) during the rate plan, if the Authority ultimately directs through a rate case decision the adoption of a Reliability Plan and budget that correspond to the *maintenance* of current performance (i.e., no budget earmarked toward incremental reliability improvements), then the reliability performance target would become the equivalent of the rolling four-year average SAIDI and SAIFI from the test year (with the Conn. Gen. Stat. §16-244i(d) backstop). As stated, the purpose of the plan that considers a five percent reduction in SAIDI and SAIFI is to enable the Authority to compare an investment plan with a standardized metric or set of metrics. In other words, this five percent reliability reduction parameter is not an implementation directive from the Authority; rather, it is a standardized baseline to enable the Authority and others to evaluate a company-specific plan. A company-specific plan will consider reliability needs, ratepayer costs, and other factors for which the company is best situated to plan around. The five percent reliability improvement plan is an evaluation tool and can be filed as an appendix to the EDC's recommended reliability plan filed consistent with this Framework.

The appropriate level of reliability performance targets is established herein, but may require refinement during the course of considering each EDC's Reliability Framework in a future rate case conducted pursuant to Conn. Gen. Stat. § 16-19a to ensure conformance with the objectives established in Section II.B.2., Objectives.¹⁷ The backstop provision to the new targets established herein remains the statutory provision discussed above, which requires that the quality and reliability of service provided by each EDC during blue-sky conditions is the same or better than levels existing on July 1, 1998. Conn. Gen. Stat. § 16-244i(d). Building on this, the Authority finds it appropriate to require that for each multi-year reliability plan submitted pursuant to the Reliability Framework established herein, each EDC shall propose a plan that considers the company's reliability needs and also conducts an analysis that targets an average five (5) percent reduction in the SAIDI and SAIFI values (blue-sky conditions) during the rate plan, calculated from the four-year average derived from the previous Reliability Framework cycle.¹⁸ In the event that the previous four-year average exceeds the Reliability Targets required by Conn. Gen. Stat. § 16-244i(d), the five (5) percent reduction shall be calculated using the Reliability Targets as the baseline. This target, as stated above, will not necessarily be used as a standard by which performance will be evaluated, but rather an evaluation tool for the review of forward-looking plans.

The Authority recognizes, however, that achieving an incremental 5% reduction in blue-sky reliability performance may not always be practicable or desirable in light of the incremental costs to achieve such reductions. Indeed, as noted in Section II.B.2., Objectives, ratepayer costs are a key consideration, as is the return on investment and benefits that a ratepayer can reasonably expect to accrue from an incremental investment in blue-sky reliability. Therefore, the Authority highlights other considerations that will factor in to its decision in a future rate case as to whether to approve a reliability plan supplement designed to achieve an average 5% reduction, including but not limited to, whether: (1) the EDC reported top-quartile reliability performance in the four years leading up to the rate amendment application filing; (2) the EDC has failed to achieve, at a minimum, service equivalent to the Reliability Targets established pursuant to Conn. Gen. Stat. § 16-244i(d) in any of the preceding ten calendar years; and (3) the investment justified in the companion plan submitted to the Resilience Framework established herein would result in unaffordable rates if both the reliability and resilience plans were fully funded as proposed.

Eversource and the OCC both contend that a standard definition of "unaffordable rates" needs to be determined so that it is clear what standard the Companies' reliability programs are being evaluated against. Eversource Written Comments dated June 6, 2022, p. 20; OCC Written Comments dated June 6, 2022, p. 12.

¹⁷ As discussed in a later section, the plan developed pursuant to the Reliability Framework will be submitted in conjunction with an EDC's rate amendment application filed in accordance with Conn. Gen. Stat. § 16-19a.

¹⁸ The Authority further clarifies that the proposed reliability programs can be designed to achieve the targeted 5% average reduction over the life of the corresponding rate plan, or in a specific year of the rate plan, but the projected SAIDI and SAIFI values for the rate plan must be an average of 5% lower than the four-year average of those values from the preceding rate plan years. For clarity, this planning parameter is intended for use in guiding the design of supplemental plans submitted pursuant to the Reliability Framework established herein.

In response to this concern, the Authority establishes that, for the initial iteration of the Reliability Framework, a rebuttable presumption is appropriate for purposes of determining the threshold for “unaffordable rates” and ultimately containing costs; a global definition of “affordability” that may be subsequently adopted by the Authority or the legislature would supersede this rebuttable presumption in subsequent iterations of an EDC’s Reliability Framework. Specifically, each EDC’s reliability program budget proposed under this Framework is unaffordable if it exceeds the Company’s historic average annual reliability program budget, using a data set of the annual reliability program budgets from the 10 years preceding the chosen test year and factoring in reasonable escalation factors derived from Gross Domestic Product (GDP) Deflator index published by the U.S. Bureau of Economic Analysis.¹⁹

The establishment of this initial rebuttable presumption is based on record evidence. First, no Participant made a recommendation for a standard definition of affordable rates. Eversource stated that it was conducting a survey to understand customers’ willingness to pay for resilience, but the survey was more directed toward willingness to pay to avoid outages and less about a broader affordability standard. Tr. 06/22/22, pp. 96, 97, and 125. Nor were the results from the survey available for consideration in this proceeding. *Id.*, p. 97. Neither UI nor Eversource proposed a definition for affordable rates. Tr. 06/22/22, pp. 124 and 125; Tr. 06/23/22, pp. 273, 276, and 277.

However, there is evidence suggesting that historical capital program spending of the EDCs can be used as a reasonable basis for this rebuttable presumption. UI stated that capacity program and infrastructure replacement program expenditures, which are foundational to reliability performance, are steady and not increasing in costs due to long-term planning. Tr. 06/23/22, pp. 236 and 240.

Eversource, meanwhile, contests the inclusion of infrastructure replacement programs, capacity programs, and customer programs in the Reliability Framework. Eversource Written Exceptions, pp. 20-21. Eversource argues that these programs do not contribute to reliability as measured by reliability metrics such as SAIDI and SAIFI. *Id.* Eversource states that infrastructure replacement programs are designed to replace infrastructure before failure, so therefore outages do not occur and are thus not reflected in SAIDI and SAIFI. *Id.*, p. 20.

The Authority finds that Eversource’s assertion regarding capacity and infrastructure replacement programs not being reflected in SAIDI and SAIFI is incorrect. Infrastructure replacement and capacity programs are at their core foundational reliability

¹⁹ The OCC notes that the Authority has consistently used the GDP Deflator index to provide a reasonable measure of inflation that impacts the EDCs. *See, e.g.,* Decision dated June 30, 2010 in Docket No. 09-12-05, Application of the Connecticut Light and Power Company to Amend its Rate Schedules, p. 67; Decision dated June 30, 2009 in Docket No. 08-12-06, Application of Connecticut Natural Gas Corporation for a Rate Increase, p. 31; Decision dated June 24, 1996 in Docket No. 95-12-15, Application of CT American Water Company to Increase its Rates and Revenues, p. 37; Decision dated April 3, 1996 in Docket No. 95- 10-13, Application of the Stamford Water Company, New Canaan Water Company, and Ridgefield Water Supply Company to Amend Their Rates and Charges, pp. 13-14; and Decision dated August 26, 1992 in Docket No. 92-09-19, Application of the Southern New England Telephone Co. to Amend its Rates and Rate Structure, p. 21.

programs, since they are designed to prevent outages before they occur. Tr. 06/23/22, p. 236; UI Written Comments dated June 6, 2022, p. 13. While it is true that these projects may not reflect a measurable improvement effect on reliability indices (such as SAIDI and SAIFI) since they prevent outages in the first place, they do contribute to baseline reliability performance, since failure to perform these programs properly (i.e., failing to replace infrastructure before it fails) would result in outages, which would be reflected in SAIDI and SAIFI measures. Tr. 06/23/22, pp. 236-237. Thus, they are reflected in SAIDI and SAIFI as a steady-state contributor to good performance (i.e., driving outage frequency and duration down). Therefore, it is appropriate to include these programs in the Reliability Framework.

The Authority acknowledges that customer programs, as generally defined by UI and Eversource, are not planned for traditional reliability reasons and generally do not contribute to performance reflected in reliability indices such as SAIDI and SAIFI. Customer-specific programs include providing service to new customers by installing new infrastructure such as service lines, service transformers, meters, infrastructure to support distributed energy resources, and Department of Transportation projects. UI Response to OCC-45, Attachment 1; Eversource Written Comments dated February 18, 2022, p. 3. These programs generally are customer-specific and follow a customer request, and thus are not part of reliability planning. Id. These projects are not totally divorced from EDC reliability, even if they are not planned for by the EDC for that purpose. For example, Eversource cites projects in this category that are done to provide automated back-up (or alternate) service to certain large customers. Id. Eversource also applies its current hardening standards to the infrastructure installed for these projects. Id.

After a review of the evidence provided, the Authority deems it reasonable to exclude projects associated with new customer additions from the rebuttable presumption standard. Nonetheless, the EDCs are still required to report on the projects within the remaining context of the Reliability Framework.

Based on the analysis above, the Authority finds that the rebuttable presumption standard as described above is supported by substantial record evidence. The EDCs undertake a number of programs so that they can provide reliable service to customers. These programs include reliability improvement programs, infrastructure replacement programs, capacity programs, and the like, but exclude “Customer” or capacity addition programs. The EDCs’ current reliability performance as measured by SAIDI and SAIFI is top-quartile among peer utilities. The historical spending undertaken by the companies in those programs has directly contributed to that performance.²⁰ Therefore, average historical capital program spending is a reasonable standard to use for the rebuttable presumption. It is also worth noting that the EDCs may rebut the presumption, or at any time advocate for the adoption of an alternative definition by the Authority or the legislature; the EDCs are not tied to the standard under all circumstances, but rather this shall serve as a reference point for all stakeholders in future proceedings.

²⁰ UI’s historical capital program expenditures is provided in its Response to Interrogatory OCC-45, Attachment 1. Eversource’s historical capital program expenditures is found in its Response to Interrogatory RSR-117.

When submitting a plan pursuant to this Reliability Framework, the aforementioned presumption is rebuttable with reasonable evidentiary support, such as demonstrable, or known and measurable, changes in the system capacity needs (i.e., peak load) and new customer additions that drive reliability investments, and where possible, a quantifiable benefit-cost analysis that justifies new or modified programs. Furthermore, the rebuttable presumption also contemplates that reliability program budgets that are incremental to the average 10-year program budget (plus reasonable escalation factors) must come with some measurable improvement to the reliability metrics discussed in this Framework. By way of example, a multi-year reliability program submitted under this Framework that presents an annual programmatic budget equivalent to, or less than, the prior 10-year average (plus reasonable escalation factors) may include a reliability target of 0% over the course of the reliability plan; conversely, a multi-year reliability program budget that exceeds the historic average must quantify the corresponding incremental benefits, costs, and reliability improvements over the historic baseline, as discussed later in this Framework.

c. Scope of the Reliability Framework

Reliability programs generally target day-to-day distribution system performance, ensuring service is available to customers during blue-sky conditions and gray-sky conditions. UI Presentation dated Aug. 30, 2021, p. 9. Reliability programs seek to resolve existing reliability issues (reactive) or to prevent future ones (proactive), or a combination of both. UI Presentation dated Aug. 30, 2021, p. 11.

i. Identifying Drivers of Reliability Programs

The EDCs generally design reliability programs to achieve the following:

- Replace aging or degraded assets;
- Provide service to new customers, including adding capacity;
- Manage increasing load on circuits;
- Adding capacity to substations;
- Conduct routine system maintenance, such as inspections, surveys, and vegetation management;
- System enhancement, such as installing advanced technologies like field sensors; and
- Improve the reliability of poor-performing circuits.

UI Presentation dated Aug. 30, 2021, p. 11;
Eversource Presentation dated Aug. 30, 2021, p. 19.

Identifying and classifying the drivers that necessitate reliability-based investments is crucial in order to evaluate the effectiveness of reliability programs. After reviewing the

record in this proceeding, the Authority identifies the categories in Table 18 as those to be used in classifying the drivers of reliability investments.

Table 18. Reliability Drivers and Programs

| Reliability Driver | Programs |
|--------------------------------------|--------------------------|
| Infrastructure Replacement | Bulk Substation |
| | Overhead System |
| | Underground System |
| | Distribution Transformer |
| | Pole Replacement |
| | Other – Unique |
| Capacity | Peak Load |
| New Customer Additions ²¹ | New Customer Load |
| | New DER Interconnections |
| Enhancement Programs | System Sectionalization |
| | Field Sensors |
| | Wildlife Protection |
| Maintenance Programs | Inspections |
| | Surveys |
| | Vegetation Management |

Eversource Written Comments dated Feb. 18, 2022, pp. 4-7;
 UI Presentation dated Aug. 30, 2021, pp. 16-19.

ii. “Maintenance” of Current Reliability Metrics

Pursuant to Conn. Gen. Stat. § 16-32g, each EDC must submit to the Authority annually “a plan for the maintenance of poles, wires, conduits or other fixtures, along public highways or streets for the transmission or distribution of electric current, owned, operated, managed or controlled by [the EDC].” The statute further authorizes PURA to prescribe the format of the report, which is accomplished through this Decision.

As referenced in Table 18, maintenance programs are a driver of reliability-based investments. In addition to traditional maintenance programs, the Authority will interpret this requirement moving forward to encompass any blue-sky reliability programs that contribute to the maintenance of each EDC’s current level of SAIDI and SAIFI performance in blue-sky conditions. Thus, whether the driver is load growth or the replacement of degraded infrastructure, if the program is intended to maintain generally the company’s status quo blue-sky reliability performance, it is subsumed in this section of the Reliability Framework. The one exception to this is “Customer related programs,

²¹ As discussed in Section II.B.3.b., Establishing Reliability Targets and Planning Parameters, New Customer Additions programs have key differences from other traditional reliability-driven programs and are excluded from the rebuttable presumption standard.

which the Authority recognizes are not generally a direct contributor to reliability performance as measured by SAIDI, SAIFI, and similar metrics as describe above.

iii. Targeted Improvements of Reliability: Worst-Performing Circuit Program 2.0

Separately, as discussed in a preceding section, the Authority envisions a Reliability Framework that encourages continuous improvement in each EDC's blue-sky reliability performance, insofar as the benefits of doing so outweigh the costs borne by ratepayers. To accomplish this, the EDCs are directed to turn first to the data collected by the newly required, customer-centric metrics established herein (i.e., CEMI, CELID, CEMSMI, and CEMM) for assistance in prioritizing the deployment of programs designed to enhance current blue-sky reliability performance. As described above, the new customer-centric metrics are required to be tracked and reported in tranches for customers experiencing three or more, five or more, seven or more, and nine or more sustained interruptions. Feeders that map to customers in these tranches shall be prioritized as Tier 1 when crafting each EDC's enhanced reliability sub-plan.²²

In formulating Tier 2 priorities, the Authority envisions a re-imagining of the previously approved worst performing circuit programs. For context, the Authority previously established a requirement that the EDCs identify and prioritize reliability improvements for circuits that are among the least reliable according to annual reliability data. Decision, March 23, 1988, Docket No. 86-12-03, Long Range Investigation to Examine the Adequacy of the Transmission and Distribution Systems of The Connecticut Light and Power Company and The United Illuminating Company (Reliability Decision), Order No. 1. As part of this program, Eversource uses SAIDI and SAIFI metrics to identify the "100 Worst Performing Circuits" and to prioritize reliability solutions to implement for those circuits.²³ Reliability projects for this requirement may include: replacement of aging or deteriorated plant; adding sectionalizing devices to minimize the number of customers affected by outages; rebuilds to pole class, cable, and other design standards; enhanced tree trimming and tree removal; animal protection; and lightning protection. Eversource Written Comments dated Feb. 18, 2022, p. 6. UI has a similar program, which similarly prioritizes reliability corrective work for the 4% of worst performing circuits in accordance with the Reliability Decision.²⁴ UI Response to Interrogatory RSR-16.

The re-imagining of the EDCs' respective worst performing circuit programs dictates revising the criteria for identifying the worst performing feeders, striking any feeders that are duplicative of the Tier 1 priorities, and labeling the remaining list as Tier 2 priorities. Specifically, feeders with the poorest reliability will be identified as those having circuit reliability performance that is 250% or more above the EDC's blue-sky, system-wide SAIFI and SAIDI for the same reporting period. If a feeder is identified

²² While ideally priority would be given first to the tranche with nine or more sustained interruptions and then in decreasing numbers of sustained interruptions, the EDC may use its judgment to propose solution sets in this Tier that represent the most cost-effective solution for the most number of affected customers. Notwithstanding this discretion, no circuit should make an appearance in the same tranche two years in a row without being assigned to a work flow.

²³ In 2021, Eversource placed \$7.5 million dollars of plant additions in service for projects for the purpose of prioritizing reliability projects for the 100 Worst Performing Circuits. See, in Docket No. 19-03-01, Order No. 3 Compliance dated March 15, 2022, in Docket No. 19-03-01, PURA Annual Review of the Rate Adjustment Mechanisms of The Connecticut Light and Power Company.

²⁴ In 2020, UI incurred \$367,000 of plant additions for this program. UI Response to Interrogatory RSR-16, p. 2.

through this process as a poorest performing feeder during two of the four years covered by a plan approved in accordance with the Reliability Framework established herein, the feeder shall be reclassified as a Tier 1 priority in the subsequent four-year plan submitted pursuant to the Reliability Framework.

In crafting its enhanced reliability plan, each EDC should turn first to its Tier 1 priorities, followed by its Tier 2 priorities, before drafting any other programs designed to achieve the 5% reliability-based planning parameter discussed in Section II.B.3.b. through mitigation measures designed to be more system-wide in nature (i.e., Tier 3 priorities).^{25,26} While the Authority recognizes that such Tier 3 measures may constitute low-hanging fruit and/or otherwise constitute “cheaper” measures to implement, PURA takes this opportunity to reinforce the need to balance the objectives articulated in Section II.A.2. Said another way, if the EDCs are each delivering top-quartile blue-sky reliability on a system-wide basis, any incremental monies spent on enhancing blue-sky reliability are more appropriately targeted toward remedying repeated issues experienced by the same customers – customers who continue to pay for top-quartile blue-sky reliability performance through rates, yet consistently receive less than the reliability delivered elsewhere in the system.

Eversource contends that the tiers contemplated in the Worst-Performing Circuits Program 2.0 are not aligned with reliability standards already in place, which are measured by system-based reliability metrics such as SAIDI and SAIFI. Eversource Written Comments dated June 6, 2022, p. 22. Eversource states that prioritizing the tiers as the Authority has done, with the most weight given to specific customers with poor reliability rather than the areas of the system with poor reliability will result in expensive solutions to upgrade equipment for individual customers while having little to no impact on system reliability metrics. Id. Eversource recommends reversing Tier 3 and Tier 1, which it argues would resolve this disconnect. Id., p. 23.

The Authority is not persuaded by Eversource’s proposal to reverse the tiers in the context of the objectives and goals articulated herein, but reiterates the following clarification: the reliability-based planning parameters established herein are better understood as a planning tool rather than as a reliability performance target when considered in the context of the Targeted Improvements Program required herein. The program described in this section is but one of a suite of programs in an EDC’s overall reliability plan.

²⁵ The Authority recognizes that the remediation of poorly performing feeders needed to reach the required planning parameter of the 5% average reduction in SAIDI and SAIFI may be far exceeded by the complete list of poorest performing feeders (comprised of all Tier 1, Tier 2, and Tier 3 priorities). In such instances, the EDCs are directed to design and submit a plan to remediate as many Tier 1 – Tier 3 priorities as could be accomplished up to a threshold projected to achieve an average 10% reduction in SAIDI and SAIFI, for all stakeholders to review and consider.

²⁶ The Authority acknowledges it is reasonable to expect that resilience programs targeted at poor performing circuits, mandated later in this Decision, will also offer blue-sky reliability benefits. Quanta Presentation dated Sept. 2, 2022, p. 16; UI Written Comments dated Feb. 18, 2022, p. 11. Nonetheless, the presence of a feeder on the poorest performing feeders’ list for reliability, in addition to the same feeder’s presence on the poorest performing feeders’ list for resilience, does not disqualify the feeder from either list; rather, the EDC shall coordinate and tailor its planned remediation measures to address both blue-sky reliability concerns and resilience issues without duplicating efforts.

Accordingly, while the Authority rescinds the requirement in Order No. 1(f) of the Reliability Decision (i.e., the requirement that the EDCs develop a “reliability corrective action plan” based on the 4% worst performing circuits), such requirement is supplanted by the Reliability Framework established herein.

d. Evaluation, Measurement, & Verification²⁷ (EM&V) of Plans Submitted Pursuant to the Reliability Framework

Due to the potential to optimize reliability planning and investment, the Authority seeks to include in the Reliability Framework a methodology to evaluate whether the most cost-effective solution has been chosen and later, in the verification stage of EM&V, to assess whether that solution has been implemented efficiently. This type of performance evaluation mechanism, when used to evaluate, monitor, and improve the performance of an EDC’s implementation of its reliability program, will be critical to ensuring there is efficiency throughout reliability planning and investment. Performance Metrics to Evaluate Utility Resilience Investments (Sandia Report), Sandia National Laboratories, May 2021, p. 13.

A successful mechanism will include appropriate performance metrics and a plan to track and report the metrics. *Id.* It will also include standards and targets against which to measure performance. *Id.* An additional step may include establishing mechanisms to incentivize or penalize performance. *Id.*, p. 15. Through the Reliability Framework established herein, the Authority addresses the first and second components of a successful mechanism, and as discussed previously, defers the establishment of mechanisms to incentivize or penalize performance to its PBR investigation.

i. Evaluation of Plans

Plans submitted pursuant to the Reliability Framework will require a comprehensive evaluation at the time of submission. Traditional benefit-cost analyses, however, are not always appropriate for evaluation of reliability-based programs. Reliability programs that replace aging or degraded infrastructure simply have to be done to prevent outages, so postponing remediation is not an option. Similarly, providing additional capacity to meet increasing loads at substations or along feeders must be identified and resolved before system capacities are exceeded. In that sense, traditional benefit-cost analyses may be difficult to apply to a number of reliability programs.

What can be done, however, is instituting an analysis paradigm that seeks to identify whether the EDC has undertaken the most cost-effective solution to remediate or mitigate the identified reliability driver. For example, there are a number of maintenance programs, such as pole inspections, infrastructure surveys, or standard vegetation management, which could all be made more efficient using new technology or analytical tools. Quanta Presentation dated Sept. 2, 2021, p. 23. Field sensors and analytical tools can be used to monitor asset condition to optimize replacement strategies. *Id.* Smart devices can be installed to optimize system capacity and relieve potential constraints. *Id.*

²⁷ The “verification” component of EM&V will be conducted through the Annual Review contemplated later in this Decision. See, Section II.B.5.a.ii., Annual Review Process for more information.

To assist in formulating the envisioned analysis paradigm, the Authority will rely on a detailed analysis of historical blue-sky reliability programs implemented by each EDC. In the historical analysis, the EDCs will provide costs and reliability performance on a rolling four-year average for the year 2000 through year-end 2021, using the format prescribed below in Table 19. The EDCs should also include any other data points or additional details deemed relevant for understanding cost, rate impact, or performance differentials from year-to-year, especially vis-à-vis significant variations in reported blue-sky SAIFI and SAIDI data between years. The more granularity in data and narrative provided, the better, as it will minimize the subsequent discovery processes. The EDCs may retain third-party consultants who may assist in accelerating the production of the analysis, provide an independent audit of the data, and provide recommendations for inclusion in the report as to how any observed trends or analysis may be interpreted and applied to future evaluations of blue-sky reliability plans submitted pursuant to this Framework. Accordingly, the Authority will direct each EDC to submit, for the Authority's review and approval, a detailed production timeline, cost estimate, and draft scope of work for producing the historical blue-sky reliability program benefit-cost analysis no later than September 22, 2022.

ii. Measurement – Data Collection Requirements

It is important to track the implementation progress of each plan submitted pursuant to the Reliability Framework to ensure that programs are being carried out in accordance with any approved plan. All facets of the Framework must be measured to the degree practicable to ensure that ratepayers are realizing a return on their continued investment. To this end, the Authority will direct the EDCs to track and report metrics to support a going-forward analysis, which will be used to consider new targets, make periodic adjustments to approved plans, evaluate subsequent plan submissions, and to develop appropriate PBR mechanisms.

First, the metrics will require separate reporting of operations and maintenance (O&M) program expenses from capital construction program costs. The EDCs will track costs according to the underlying reliability driver and the programs designed to address those drivers. The EDCs will begin to track the same data on a going forward basis, starting with 2022. In the going-forward analysis, the EDCs will include revenue requirement and ratepayer impact from reliability programs. The EDCs expressed concern that in requiring this analysis, the Authority is tying specific reliability projects to overall system reliability performance. Eversource Written Comments dated June 6, 2022, p. 24. The Authority clarifies that it is not trying to gather the contribution of specific projects to SAIDI and SAIFI performance; rather it is using system SAIDI and SAIFI as the best available proxy for assessing the reliability improvement of specific projects.

The Authority presents the following table indicating the type of data to be collected. The reported data shall constitute the actual data realized in the calendar year.

Table 19. Template for Required Data for Reliability Metrics

| Reliability Driver | Program | SAIDI (a) | SAIFI (b) | Plant Addition/O&M Expense (c) | SAIDI/Cost (a)/(c) and SAIFI/Cost ²⁸ (b)/(c) | Revenue Requirement and Rate Impact |
|--------------------------------------|----------------------|-----------|-----------|--------------------------------|---|-------------------------------------|
| Infrastructure Replacement | Bulk Substation | | | | | |
| | Overhead System | | | | | |
| | Underground System | | | | | |
| | Dist. Transformer | | | | | |
| | Pole Replacement | | | | | |
| | Other - Unique | | | | | |
| Capacity | Peak Load | | | | | |
| New Customer Additions ²⁹ | New Customer Load | | | | | |
| | DER Interconnections | | | | | |
| Enhancement Programs | Customers per Zone | | | | | |
| | Field Sensors | | | | | |
| | Wildlife Protection | | | | | |
| Maintenance Programs | Inspections | | | | | |
| | Surveys | | | | | |
| | VM | | | | | |

Eversource stated that more detailed categories of drivers can be identified and that it would be useful to specify those. Eversource Written Comments dated June 6, 2022, p. 25. The Authority agrees that if a more granular set of reliability drivers can be incorporated, then it is appropriate for each EDC to do so, as the table above is meant to serve as a template for the minimum amount of required information.

In *addition* to the foregoing, as discussed above, each EDC is also required to track the following reliability-based metrics for each calendar year, and to include such data in the annual reports required pursuant to Conn. Gen. Stat. § 16-245y (see, Section II.B.6., Annual Reliability and Resilience Scorecards):

- SAIDI and SAIFI
 - including Major Storms
 - including planned outages& Major Storms

²⁸ Due to the prioritization of customer-specific reliability programs under the Targeted Improvement Program in Section II.B.3.c.iii, SAIDI and SAIFI here may be substituted with CEMI and CELID as appropriate.

²⁹ As discussed in Section II.B.3.b., Establishing Reliability Targets and Planning Parameters, New Customer Additions programs have key differences from other traditional reliability-driven programs and are excluded from the rebuttable presumption standard. The Authority requires that the EDCs report on the projects within the remaining context of the Reliability Framework.

- excluding planned outages & Major Storms³⁰
- CAIDI and MAIFI
 - including Major Storms
 - excluding Major Storms
 - including planned outages & Major Storms
 - excluding planned outages & Major Storms
- CEMI, CELID, CEMSMI, and CEMM, reported in tranches for customers experiencing three or more, five or more, seven or more, and nine or more sustained interruptions
 - including Major Storms
 - excluding Major Storms
 - including planned outages & Major Storms
 - excluding planned outages & Major Storms

Finally, in addition to reporting annually the actual data corresponding to the metrics summarized immediately above and those in Table 19, the same metrics must also be provided in the form of projections when filing an initial plan pursuant to the Reliability Framework established herein. To the extent practicable, each EDC should ascribe an individual, incremental SAIDI or SAIFI improvement value associated with a specific reliability program, particularly for enhancements contemplated under Section II.A.3.c.iii or for any menu of options provided for consideration.

The EDCs state that they do not currently possess the full capability to track MAIFI, CEMSMI, and CEMM due to limitations on their system that do not allow for the ability to track those at a level that is useful for analysis. Eversource Written Comments dated June 6, 2022, p. 33; UI Written Comments dated June 6, 2022, p. 7. In order to track momentary outages and report on these metrics, the EDC needs SCADA-enabled field devices deployed at sufficient granularity to provide useable information. Eversource Written Comments dated June 6, 2022, p. 33.

Based on current EDC limitations, the Authority holds in abeyance its requirement that the EDCs track and report momentary outages. In the interim, the Authority directs the EDCs to report on capabilities to track momentary outages at a level that is useful in its first annual reliability program submission. Furthermore, the Authority directs the EDCs to develop a plan for inclusion in the Companies' first reliability program submission for tracking momentary outages within four years. Such a plan must include an estimated cost to develop the identified capabilities.

Eversource stated that it needs more than four years to develop the ability to properly track momentary outages. Eversource Written Exceptions, p. 37. Eversource stated in its Written Exceptions that it would need several years beyond its next rate case to develop a plan to track momentary outages. Id. Eversource asserts that it currently has limited capability to provide useful momentary interruption data. Eversource Written

³⁰ When excluding major storms, the EDCs are to use both exclusion criteria that are used currently: Major storm exclusion criteria developed to comply with Conn. Gen. Stat. §§ 16-244i(d) and 16-245y(a), as well as the IEEE-1366 Major Event Days exclusion criteria for benchmarking with other utilities.

Comments dated June 6, 2022, p. 33. The Authority has considered Eversource's request but denies it for the following reasons. The first reference to the length of time needed to develop the ability to track momentary outages was articulated in Eversource's Written Exceptions. However, the Authority first proposed a requirement for EDCs to track momentary outages on page 3 of its May 2, 2022 Straw Proposal of a Reliability and Resilience Framework. In its response to the Straw Proposal, Eversource did not offer a suggestion for how much time it would need to develop the capability. Eversource Written Comments dated June 6, 2022, pp. 17 and 33. Nor did Eversource provide such information at the hearing. Tr. 06/22/22, pp. 31-33, and 119-120. Based on the information provided by Eversource in the evidentiary record, the Authority finds no reason to change its requirement that EDCs have the capability to track momentary outages within four years.

iii. Measurement – Power Quality

While the metrics described above are designed to capture whether the system is delivering electricity in the *quantity* desired (i.e., is electrical service available or not), additional metrics are warranted to assess whether the power service *quality* is adequate or sufficient. Generally speaking, good power quality refers to whether: (1) voltage stays within a prescribed range; (2) frequency remains close to the rated value; and (3) there are both smooth voltage and current waveforms. Pursuant to Conn. Gen. Stat. § 16-244i(d), the Authority is required to oversee the quality of service provided by the EDCs.

In addressing power quality, IEEE technical reports and standards are instructive; specifically, IEEE Standard 1159 (1995), which articulates recommended practices for the monitoring of electric power quality across a utility's systems, as well as IEEE Standard 519 (1992), which addresses recommended practices for harmonic control in electric power systems. Further, the Regulations of Connecticut State Agencies (Conn. Agencies Regs.) are instructive as it pertains to the required frequency of each EDC's system under normal conditions,³¹ the standard nominal voltage,³² and permitted voltage variations.³³ Given that such standards and regulations exist already, and because power quality is particularly important to anyone who relies on equipment or systems that are sensitive to electric disturbances, the Authority intends to begin collecting data for tracking and evaluating the quality of voltage, frequency, and power factor in future reporting.

Before requiring that the EDCs track and report this data, however, it is first necessary to understand what data can be collected, and at what granularity and frequency, as well as what such data will reveal about system power quality. Accordingly, the Authority directs the EDCs to describe what power quality metrics it can record, its

³¹ Conn. Agencies Regs. § 16-11-113 states that, “[a]lternating current service under normal conditions shall be supplied at sixty cycles per second and under normal conditions the deviation shall not exceed one per cent.”

³² Conn. Agencies Regs. § 16-11-114 requires each EDC to adopt a standard nominal voltage for its distribution system, either for the system in its entirety or divided into several areas. The EDCs must also maintain the voltage at their service terminals at levels reasonably constant within the limits prescribed by Conn. Agencies Regs. § 16-11-115.

³³ Conn. Agencies Regs. § 16-11-115 discusses allowable voltage variations for different types of service. For residential or commercial purposes, the voltage variation is not permitted to exceed 3% above or 5% below standard voltage.

recommended granularity and frequency for recording such data, and whether the following, or other, scenarios will provide helpful information regarding the evaluation of power quality: in blue-sky conditions (excluding Major Storms), for frequency, voltage, and power factor (1) over a calendar year; (2) during summer months; (3) during winter months; and (4) during shoulder months.³⁴

The Authority directs the EDCs to include in the first such annual report required pursuant to Conn. Gen. Stat. § 16-245y and implemented in Section II.B.6., Annual Reliability and Resilience Scorecards the above information.

4. Resilience Framework

a. Overview of Resilience Framework

Resilience is the ability of the distribution system to withstand and reduce the magnitude and/or duration of disruptive events. Programs designed to improve resilience can come from a number of areas:

1. Mitigation. Infrastructure hardening, automation, on-site back-up generation, microgrids, system redundancies, etc.
2. Preparedness. Coordination with other responders, development of response plans, conducting training and exercises, etc.
3. Response. Enacting mutual aid agreements, pre-staging resources, activating incident command, control room operations, etc.
4. Recovery. Restoration activities, after-action reports, and lessons-learned, etc.

Eversource Presentation dated Aug. 30, 2021, p. 3.

With respect to resilience measures in the mitigation category, resilience programs can include system hardening; i.e., using more robust design standards, such as stronger class wood poles, steel poles, or fiberglass crossarms. Hardening may also include converting bare wire to covered conductor, spacer cable configuration, or aerial cable. Eversource Presentation dated March 29, 2022, pp. 5-7, 9. Another hardening measure may include converting overhead infrastructure to underground. Id., p. 8. Though not technically a hardening approach, aggressive (not routine) vegetation management is considered a mitigation measure since trees are often the primary cause of outages. Programs designed to clear around overhead facilities and to remove hazardous trees are a very common mitigation measure. Id., p. 10.

Resilience is not limited to hardening; it also includes preparedness activities such as the development of emergency response plans, coordination with other emergency responders, and planning of regular trainings and exercises, as well as the completion of after-action reviews. A company's response actions to an event are also resilience

³⁴ Ideally, the focus of such reporting would be on understanding the magnitude and size of the excursion, as well as the duration of the excursion (i.e., how long the value was out of the acceptable tolerance range). The Authority also seeks comment on whether the metrics can be refined to better achieve these objectives, and/or whether such information would be assisted by a robust advanced metering infrastructure deployment.

measures. For example, securing additional crews through mutual aid agreements in advance of storms,³⁵ prestaging crews and equipment, and activating incident command systems all help reduce the impact of emergency events on customers and communities. Since the number of restoration crews are a resilience measure, there is a relationship between hardening programs and minimum staffing needs. Tr. 09/02/21, p. 141; Tr. 09/23/21, p. 226.

Other resilience measures focus more on enhancing restoration activities, rather than preventing outages or mitigating damage. Tr. 09/02/21, p. 119. These include efforts such as increasing automation and improving situational awareness using “smart” field devices. *Id.*, p. 120. Field devices connected to advanced data management systems allow visibility to better identify faults, damage locations, and even restore customers remotely using smart switching devices. UI Presentation dated March 28, 2022, pp. 6-7. Unfortunately though, in the very large storms (such as those of a similar magnitude to Tropical Storm Isaias), the damage is so great that these solutions may be unavailable, and thus hardened infrastructure is a prerequisite to achieve their full value. Tr. 03/29/22, p. 82.

The Authority designed the following resilience framework (Resilience Framework) to identify vulnerable portions of the distribution system, to enable the selection of mitigation measures, and to ensure any selected resilience solutions are cost effective. Resilience programs must deliver demonstrable and achievable benefits to ratepayers over time and must help EDCs in their mission to protect public safety. Accordingly, in seeking approval for resilience program expenditures, each EDC must design and submit a plan in accordance with the Resilience Framework outlined below.

b. Identify Vulnerabilities and Define Zone Selection Criteria

The purpose of this section is to establish criteria for classifying the vulnerability of segments of an EDC’s electric distribution system (Zones). Zones are a distinct portion of an EDC’s distribution system and can be any size. They may be as large as entire circuits or as small as circuit segments between isolation devices.

The EDCs will identify electric distribution system vulnerabilities to catastrophic storm events using past storm data.³⁶ So-called “All-in” SAIDI data will be the primary metric by which the EDC determines electric distribution system vulnerability; specifically, All-in SAIDI from the previous four-year cycle. All-in SAIDI includes outages incurred during blue-sky, gray-sky, and dark-sky conditions. SAIDI data is the most appropriate data that captures “resilience” aspects of outages, namely long durations. Tr. 03/29/22, p. 79.

All-in SAIDI will be the initial and the primary selection criteria for enabling identification and prioritization of vulnerable system zones. This will allow for an initial

³⁵ Although, effective hardening measures may reduce a company’s reliance on mutual aid restoration crews.

³⁶ This approach may be modified or supplanted in future years, depending on the results of the Climate Change Vulnerability Study required pursuant to Section II.B.8., Addressing and Assessing Climate Change Vulnerabilities.

identification of susceptible portions of an EDC's service territory that may benefit from hardening against storm events. CIEC Written Comments dated Feb. 18, 2022, p. 10. The EDCs may use All-in SAIFI and All-in CAIDI, as well as Major Storm-only values for SAIDI and SAIFI, as secondary and supplemental variables for identifying system vulnerabilities, particularly given that All-in SAIFI may be more useful for identifying zones experiencing multiple interruptions. Indeed, All-in SAIFI and All-in CAIDI may assist in differentiating between susceptibility to more frequent but less severe events (relatively lower SAIDI to SAIFI ratio) and susceptibility to less frequent but more severe events (relatively higher SAIDI to SAIFI ratio).

As discussed above, however, neither SAIDI nor SAIFI are sufficient metrics on their own to identify and prioritize system zones as candidates for hardening. SAIDI and SAIFI metrics may be a useful proxy for understanding resilience, but more variables are necessary to fully understand system vulnerabilities. Accordingly, a more holistic approach is necessary to enable fair and reasonable identification of system vulnerabilities that factor in unique customer needs, community priorities, and specific system characteristics. Tr. 03/29/22, pp. 139-140.

First, it is important to include environmental justice communities when selecting locations for potential resilience work, as these communities may be disproportionately burdened by the impacts of climate change, extreme weather, and associated power outages. DEEP Written Comments dated Feb. 18, 2022, p. 9. DEEP has a tool available online for mapping these communities,³⁷ and there is a map of these communities on the state Office of Environmental Justice website. *Id.* Additionally, the Department of Economic and Community Development (DECD) publishes a list of distressed municipalities annually.³⁸ Therefore, the Authority will direct the EDCs to include as a factor in prioritizing Zones the proximity of environmental justice communities pursuant to Conn. Gen. Stat. § 22a-20a³⁹ and distressed municipalities pursuant to Conn. Gen. Stat. § 32-9p.⁴⁰

Furthermore, community needs should be factored into any identification and prioritization process. Facilities identified by municipalities for priority restoration following storm events and clearing roads blocked by EDC facilities and downed trees are among the top priorities.⁴¹ Eversource Response to Interrogatory RSR-53, Attachment 1, p. 28; UI Written Comments dated Feb. 18, 2022, p. 22. These priorities can require substantial

³⁷ DEEP Environmental Justice Communities, <https://portal.ct.gov/DEEP/Environmental-Justice/Environmental-Justice-Communities#Map>

³⁸ DECD, Distressed Municipalities, https://portal.ct.gov/DECD/Content/About_DECD/Research-and-Publications/02_Review_Publications/Distressed-Municipalities.

³⁹ Conn. Gen. Stat. § 22a-20a defines an environmental justice community as "(A) a United States census block group, as determined in accordance with the most recent United States census, for which thirty per cent or more of the population consists of low income persons who are not institutionalized and have an income below two hundred per cent of the federal poverty level, or (B) a distressed municipality, as defined in subsection (b) of section 32-9p."

⁴⁰ Pursuant to Conn. Gen. Stat. § 32-9p, DECD identifies a distressed municipality based on the municipality's tax base, its residents' personal income, and its residents' need for public services.

⁴¹ Connecticut's 'Make Safe' protocol determines the process EDCs and municipalities follow to coordinate the clearing of blocked roads during emergency response and restoration. A summary of the protocol can be found here: <https://portal.ct.gov/-/media/DEMHS/docs/LEOP/makesafequickreferenceversion11final83016pdf.pdf>.

resources in the initial phases of restoration, especially during very significant events such as Tropical Storm Isaias. Id.; Tropical Storm Isaias Decision, pp. 82-86 and 90-95. Since the timely response to municipal priorities is so essential to protecting public safety, it must be considered in any resilience initiative.

Another specific class of customers that should be factored into any consideration of resilience measures are EDC customers who have medical conditions that necessitate life support equipment that must be run by electric service (Life Support Customers). Eversource Response to Interrogatory RSR-53, Attachment 1, p. 67. Due to this dependency, Life Support Customers require additional support from EDCs both during blue-sky conditions and before/during/after outage events, which require communications with the customers and the community in which they live to ensure customer safety. Id.

Commercial and industrial customers should also be specifically considered when evaluating portions of an EDC's system. In support of this proposition, CIEC notes that its members include large commercial and industrial customers who employ 30,000 residents, and who rely on reliable and resilient service from the EDCs. CIEC Written Comment dated Feb. 18, 2022, p. 2. Initial analysis done by Eversource indicates that the value of electric service to these customers is very high and the cost borne by them during extended outages is quite significant. Eversource Presentation dated Feb. 18, 2022, p. 42; Tr. 03/29/22, pp. 73-74. Therefore, the number of commercial and industrial customers in a particular zone is also an appropriate parameter to consider when evaluating community vulnerabilities.

Lastly, additional system-specific characteristics should be factored into the identification and prioritization of zones susceptible to storms. Difficulty of site access to patrol and repair circuits following storms can lead to longer and more challenging restoration work. UI Response to Interrogatory RSR-93; Eversource Presentation dated March 29, 2022, p. 9. Topographical considerations must be considered as well; indeed, the length of backbone feeder, tree density, and customer density all have an effect on the vulnerability at any one point on the system. UI Presentation dated March 28, 2022, p. 11.

Accordingly, the EDCs will consider other factors to classify vulnerability of Zones, which are shown in Table 20.

Table 20. Criteria to Identify and Prioritize Vulnerable Zones.

| Criteria | Category | Rank |
|---|------------------------|-----------|
| All-in SAIDI (for last four years) | Outage-based | Primary |
| All-in SAIFI (for last four years) | | |
| All-in CAIDI (for last four years) | | |
| Major Storm-only SAIDI | | |
| Major Storm-only SAIFI | | |
| No. of Customers per Zone | System Characteristics | Secondary |
| Mainline length | | |
| Density and Type of Vegetation | | |
| Feeder Type: Backbone or Lateral | | |
| Feeder ties | | |
| Site Access Difficulty (e.g., hard to access right-of-ways) | Community Priorities | |
| Municipal Priorities including Blocked Roads | | |
| No. of Commercial and Industrial Customers per Zone | | |
| Located in Distressed Municipality | | |
| Located in Environmental Justice Community | | |
| No. of Life Support Customers | | |

Each of the secondary factors will be assessed using a three-tiered ranking (low, medium, high), to prioritize zones selected by the All-In SAIDI metric.

The EDCs will be required to track these metrics to demonstrate implementation progress and to model resilience program performance; see, Section II.B.4.d.ii. Measurement – Data Collection Requirements.

c. Mitigation Measure Selection

Once Zones are selected and prioritized based on vulnerability, a methodological approach will be used to identify the most cost-effective resilience solutions. UI Presentation dated March 28, 2022, p. 11; Eversource Presentation dated March 29, 2022, pp. 19-20.

As discussed above, resilience mitigation measures overwhelmingly include hardening measures. Specific hardening solutions include: (1) reconductoring with tree wire, spacer cables, or aerial cable; (2) pole replacements; or (3) undergrounding. Other measures offer less hardening, but more flexibility, such as automatic reclosers and smart switches, which allow automatic operation to clear momentary faults or to enable an alternate source, respectively. These flexibility measures are most beneficial when paired with hardening measures, especially for dark-sky day events where significant storm damage may impact back-up circuits and prevent automatic switching. Tr. 03/29/22, pp. 53- 54.

System hardening or other resilience measures must be appropriately selected to promote resilience in a cost-effective way. For example, steel poles may be appropriate to replace aging wooden poles along backbone right-of-way feeders in heavily treed areas. Eversource Presentation dated March 29, 2022, p. 9. Meanwhile, different solutions may be better suited for lateral distribution lines. Further, alternative solution sets may exist for both scenarios, depending on the relative costs and effectiveness of different measures in withstanding or reducing long-duration outages when compared to the affected customer population's willingness to pay, based on the value of lost load from the perspective of those customers. NARUC 2013 Resilience Publication, pp. 12-13. Said another way, there may be two solutions to an identified issue, where one is cheaper and 30% effective in reducing long-duration outages associated with a Tropical Storm Isaias-type event, while another solution is more expensive but 70% effective. For customers who value their lost load at a certain threshold, the more expensive option may actually be preferable from a customer perspective (while acknowledging the greater cost), even if cheaper from the utility perspective.

Accordingly, the EDCs are directed to include a methodology that can be applied to Zones identified pursuant to the Resilience Framework, which allows for the determination of an appropriate solution set of resilience measures that relies at least in some part on both cost-effectiveness testing as well as some degree of customer feedback regarding willingness to pay, assessed broadly across Residential, Commercial and Industrial customer segments.⁴² The EDCs may provide a separate methodology for backbone and lateral feeders, as appropriate.⁴³ In conjunction with its submission of a plan in accordance with the Resilience Framework established herein, each EDC shall detail in its submission the methodology used to select mitigation measures for an identified Zone, including the conditions by which each solution is selected or not selected. The Authority directs the EDCs to apply the methodologies (one for backbone, one for lateral) to the ranked list of vulnerable Zones and to establish a prioritized list of vulnerable Zones with resilience-based solutions selected. At least one alternative solution set must be presented for each Zone.

d. Evaluation, Measurement, & Verification (EM&V)

As discussed with respect to the Reliability Framework established through this Decision, the Authority similarly seeks to include in the Resilience Framework a methodology to evaluate whether the most cost-effective solution has been chosen and later, in the verification stage of EM&V, to assess whether that solution has been implemented efficiently. This type of performance evaluation mechanism, when used to evaluate, monitor, and improve the performance of an EDC's implementation of its reliability program, will be critical to ensuring there is efficiency throughout reliability planning and investment. Performance Metrics to Evaluate Utility Resilience Investments (Sandia Report), Sandia National Laboratories, May 2021, p. 13.

⁴² See, Section II.B.6., Annual Reliability and Resilience Scorecards for a discussion of a tool that may facilitate customer engagement conversations pertaining to the willingness to pay input.

⁴³ Backbone feeders are the portion of the line that starts at the substation and continues to the first fuse or other sectionalizing device. This portion of the line serves all customers downstream. Lateral distribution lines start where the backbone line ends and branch out off the mainline.

i. Evaluation of Plans

The EDCs shall perform a benefit-cost analysis (BCA) test using modeling tools to simulate a reasonable set of storm scenarios. These analyses shall be performed for all project categories in a Resilience Plan. The BCA shall include a description of the models used to determine benefits, assumptions used by the models, and the categories of data for both benefits and costs described in the subsections below.

In order to be useful, a Resilience Plan BCA must include both a reasonable estimate of program costs and a reasonable prediction of benefits. When predicting resilience benefits, at least two things must be determined in a reasonable manner. First, the expected hardening effect (e.g., reduced number or duration of outages) against a Major Storm event must be reasonable; that is, there needs to be a reasonable estimate as to how well the resilience efforts perform in response to real events. Second, a reasonable prediction of the number and intensity of Major Storm Events has to be made to understand how often resilience programs will be “tested” following program implementation.

To that end it is important to distinguish between different intensity of storms. As has been discussed, there is a significant difference in impact from gray-sky conditions to dark-sky conditions. The EDCs have emergency response plans that categorize storms by intensity level (Event Level) from 5 to 1, with Event Level 1 being the most destructive. See, Eversource Response to Interrogatory RSR-53, Attachment 2, p. 17. Storms are classified into Event Levels using a number of parameters as guidelines, including the number of damage locations, number of customer outages, and so forth. Id. The Event Levels help guide the EDCs in their storm preparedness, response, and restoration activities. Id., pp. 16-17. For that reason, the Event Levels provide a basis on which to distinguish between storm intensities when evaluating the effectiveness of resilience measures.

(a) Costs

During the course of developing a plan pursuant to the Resilience Framework, all costs will be planning level cost estimates. Tr. 03/29/22, p. 40. Therefore, project costs used for conducting the BCA during the plan development must include all assumptions about how the estimate was derived. This may include, but is not limited to, the historical costs on a per mile basis, expected escalation factors, contingencies, etc.

Subsequently, actual costs will be recorded and tracked during the Annual Review process put forth in Section II.B.5.a.ii.Annual Review Process., during which all stakeholders can conduct a comparison between the planning estimates and actual results, which may lead to in-cycle adjustments and/or future Resilience Framework refinements.

(b) Benefits

Resilience Plan benefits will include the following components:

1. Avoided storm restoration costs;
2. Avoided customer interruption costs;
3. Avoided vegetation management costs; and
4. Avoided pole replacement costs.

UI Written Comments dated Feb. 22, 2022, p. 18.

With respect to the first category, storm restoration costs consist of capital and O&M costs related to restoring power to customers after outage events. Since system hardening measures are designed to withstand storms or to avoid damage, it follows that some level of restoration costs would be avoided. Id.

The second category, avoided customer interruption costs, includes the economic burden that customers (both residential and commercial) incur due to the loss of electric service. Id. These costs likely account for the single largest category of benefits. Id.

Third, avoided vegetation management costs are those costs that would be spent in the absence of the Resilience Framework on standard vegetation management maintenance program. Similarly, the fourth category of avoided pole replacement costs are those costs that would be spent on replacing poles under traditional maintenance activities (age- or condition-related replacements) in the absence of the plan. Id. The third and fourth categories of costs are generally easy to estimate based on historical vegetation management and pole replacement costs.

Both avoided storm restoration costs and avoided customer interruption costs must be modeled, however, since they rely on predictions about both the type and intensity of storms that will impact the area after hardening work has been done. Eversource Presentation dated March 29, 2022, p. 40. There are multiple ways to model the benefits of avoided storm restoration and avoided interruption. The first step is to predict the reduced impact of a Major Storm on the electric distribution system due to a plan adopted pursuant to the Resilience Framework. This requires determining an estimate of how the duration of interruptions would be reduced. Eversource proposes using All-in SAIDI for the past five years as a proxy baseline for future storm impact. See, Eversource Presentation dated March 29, 2022, p. 22. Modeling the reduced impact that the Resilience Plan would have on future events requires making reasonable assumptions about the effectiveness of resilience measures.⁴⁴

⁴⁴ The Authority also received evidence that the University of Connecticut Eversource Energy Center (UConn) is developing a modeling tool that uses a number of inputs to ultimately estimate impact of various storm levels on outage durations. UConn Presentation No. 1 dated March 28, 2022, pp. 5 and 14. The model considers actual EDC infrastructure data, vegetation data, weather models, resilience project implementation, and other factors. Id., p. 5. These factors are applied to historical storm impact data to simulate damage and outage predictions for a number of storm types and storm intensity levels. Id. The model also predicts the likelihood of the occurrence of storms of different intensity, based on historical storm intensity data. Id. While the model is still in its development phase, such a tool could prove instructive to these efforts.

The Authority finds that at this time, there is not yet a uniform modeling tool that can be mandated for assessing these benefits. Rather, the Authority finds that the EDCs may use a reasonable estimate for expected outage reductions derived from a model or source of its choosing; however, each EDC must provide all assumptions and inputs used to determine how outage durations are expected to be reduced during various events as part of its submission.

Once an EDC is able to reasonably predict how a resilience measure will reduce the duration of outages in an event, both avoided storm restoration costs and avoided costs from customer interruptions can be estimated. Avoided storm restoration costs can be determined by considering the reduced outage durations and applying the cost of restoration crews that would have been needed if those interruptions had occurred.⁴⁵

Avoided interruption benefits can be simulated by placing a value on customer load. The benefit for avoiding customer interruptions may be estimated by using a tool developed by the U.S. Department of Energy (DOE). The DOE developed a tool that identifies a cost that customers bear when they lose electric service (Value of Loss Load or VOLL). This tool is called the Interruption Cost Estimate (ICE) calculator and allows for the determination of VOLL. UI Written Comments dated Feb. 18, 2022, p. 19.

(c) Benefit Cost Analysis

A modeled BCA must be completed to determine prioritization of Zones and specific resilience solution sets to be recommended as part of the plan submitted by an EDC in conformance with the Resilience Framework established through this Decision. The BCA will include all the cost and benefit elements discussed herein. The table below presents the type of information that will be included in a BCA.

Due to both (1) the typically long duration (5-10 years) between extreme weather events (dark sky events) and (2) utility infrastructure investments having long life-cycles (typically more than forty years), a BCA must consider near-term and long-term benefits to properly reflect the costs and benefits. UI Written Comments dated June 6, 2022, p. 16. Accordingly, the BCA should perform analyses over 5-, 10-, 20-, and 30-year windows.

A BCA will only be valuable if it predicts, with a reasonable degree of accuracy, the number and intensity of storms, since the outage reduction benefits depend greatly on the number and duration of outages. Accordingly, a BCA must include a reasonable assessment of the likelihood of the various storm Event Levels occurring. To estimate this, the EDCs will use actual events from the last five-year period as a proxy to predict the frequency of Event Levels for the 5-, 10-, 20- and 30-year analysis windows. Table 21 lists the minimum set of parameters that must be included in a BCA. Table 21 reflects only 5- and 10- year windows, but shall also include 20- and 30-year windows in a submitted BCA.

⁴⁵ See, "2020-2029 Storm Protection Plan," Florida Power & Light Company, Docket No. 20200071-EI, April 10, 2020, Appendix A, pp. 10-11.

Table 21. Benefit-Cost Analysis Minimum Reporting Requirements

| | |
|-----------------------------|---------------------------------|
| Resilience Plan | |
| Program Costs | Capital Expenditures |
| Assumed SAIDI Reduction | Customer minutes Interrupted |
| 5-Year Resilience Benefit* | Avoided Interruption Costs |
| | Avoided Storm Restoration Costs |
| | Avoided VM and Pole Costs |
| 10-Year Resilience Benefit* | Avoided Interruption Costs |
| | Avoided Storm Restoration Costs |
| | Avoided VM and Pole Costs |
| 5-Year BCA | |
| 10-Year BCA | |

*Benefits should be provided such that they demonstrate a reasonable representation of the uncertainty of storm impact and resulting benefits.

(d) Rate Impact

Understanding the near-term and long-term impact on rates from implementing a plan pursuant to the Resilience Framework is paramount to ensuring that the objectives articulated in Section II.B.2., Objectives are reasonable achieved. Accordingly, the EDCs will be directed to include an estimate of expected revenue requirements and associated bill impacts for customers associated with implementing the plan.⁴⁶ The estimate will project 10-year bill impacts and will present the annual costs in separate tranches. Presenting the cost impact in separate tranches provides granular insight into the effect of each Resilience Plan year on rates. The type and level of information is presented in Table 22 below.

Table 22. Resilience Plan Annual Revenue Requirement and Rate Impact

| | 2021 Capital Additions | | 2022 Capital Additions | | 2023 Capital Additions | | ... | 2030 Capital Additions | |
|------|------------------------|-------------|------------------------|-------------|------------------------|-------------|-----|------------------------|-------------|
| Year | Rev. Req. | Rate Impact | Rev. Req. | Rate Impact | Rev. Req. | Rate Impact | | Rev. Req. | Rate Impact |
| 2021 | | | | | | | | | |
| 2022 | | | | | | | | | |
| 2023 | | | | | | | | | |
| ⋮ | | | | | | | | | |
| 2030 | | | | | | | | | |

⁴⁶ Table 22 will require at least three submissions, recognizing that the EDCs must present at least one alternate solution set for each Zone in accordance with Section II.B.4.b., Identify Vulnerabilities and Define Zone Selection Criteria.: (1) the values for the recommended solutions sets; (2) the values if the least expensive solution sets were selected for each Zone; and (3) the values if the most expensive solution sets were selected for each Zone.

ii. Measurement – Data Collection Requirements

It is important to track the implementation progress of each plan submitted pursuant to the Resilience Framework to ensure that programs are being carried out in accordance with any approved plan. All facets of the Framework must be measured to the degree practicable to ensure that ratepayers are realizing a return on their continued investment. To this end, the Authority directs the EDCs to track and report metrics to support a going-forward analysis, which will be used to consider new targets, make periodic adjustments to approved plans, evaluate subsequent plan submissions, and to develop appropriate PBR mechanisms.

Specifically, the EDCs are directed to track system-based measurements, such as construction progress (i.e., planned miles completed, percentage backbone completed, etc.), as well as construction costs. Customer- and community-based measures should also be tracked. These measures generally align with the criteria used to identify vulnerable zones (See, Section II.B.4.b. Identify Vulnerabilities and Define Zone Selection Criteria) and include the number of customers affected, number of critical facilities affected, and number of customers in environmental justice communities. Quanta Presentation March 29, 2022, p. 8.

The Authority presents the following table indicating the type of data to be collected. The reported data shall constitute the actual data realized in the calendar year.

Table 23. Program Implementation Reporting Requirements

| | | No. Complete | No. Planned | % Complete | % Planned | Total Costs |
|--------------------------------|---|--------------|-------------|------------|-----------|-------------|
| System Metrics | Backbone Mi. - Aerial | | | | | |
| | Backbone Mi. - Tree Wire | | | | | |
| | Backbone Mi. - Spacer Cable | | | | | |
| | Backbone Mi. - Underground | | | | | |
| | Backbone Mi. - VM | | | | | |
| | Backbone Mi. and # - Steel Pole | | | | | |
| | Lateral Mi. - Aerial | | | | | |
| | Lateral Mi. - Tree Wire | | | | | |
| | Lateral Mi. - Spacer Cable | | | | | |
| | Lateral Mi. - Underground | | | | | |
| | Lateral Mi. - VM | | | | | |
| | Lateral Mi. & # - Pole Replaced | | | | | |
| Customer and Community Metrics | Customers | | | | | |
| | Critical Facilities | | | | | |
| | Customers in EJCs | | | | | |
| | Distressed Municipalities | | | | | |
| | EJC Census Blocks | | | | | |
| | Commercial and Industrial | | | | | |
| Ancillary | Explain any ancillary benefits, such as increased DER hosting capacity due to hardening | | | | | |

Finally, in addition to reporting annually the actual data corresponding to the metrics summarized above, the same metrics must also be provided in the form of projections when filing an initial plan pursuant to the Resilience Framework established herein.

iii. Verification

Evaluating how resilience programs perform against actual events remains a challenge in the industry; there are no established industry-wide metrics. Eversource Written Comments dated Feb. 18, 2022, p. 27. The primary issue is the probabilistic nature of weather events and the complexities of grid infrastructure and the surrounding environment. UConn Presentation dated March 28, 2022.⁴⁷ These variables introduce significant uncertainty into any performance analysis. Id.

The Resilience Framework established through this Decision permits the EDCs to rely on models to predict the benefits of specific resilience measures when formulating the plan for Authority review and approval. However, such models, while suitable for an

⁴⁷ “State-of-the-Art Outage Prediction System for Resilience Evaluation: Methodology and Results for Eversource-Connecticut,” p. 2.

initial estimate of expected outcomes, are not yet suitable for validating whether a resilience plan is effective.

Therefore, until such time that a peer-reviewed model or tool is readily available for verifying the effectiveness of a resilience measure(s), the solution is to begin to track a set of data by storm intensity level to collect the necessary information to perform an after-the-fact analysis to evaluate program effectiveness. The Authority determines it is best to track the information according to the storm Event Levels as set forth in the EDCs' ERPs, as these designations best reflect current EDC system characteristics in relation to storms of varying intensity. Accordingly, the Authority will direct the EDCs to classify the data according to the following Event Levels: Non-storm, and Event Level 1 through Event Level 3.

The Authority directs the EDCs to track the information separately by "Resilience Zone" (i.e., those Zones that have been hardened pursuant to projects⁴⁸ filed in accordance with the Resilience Framework), "non-hardened" Zones, and "vegetation management only" Zones. Non-hardened Zones include those zones not targeted, as well as those Zones that *are* targeted but not yet in service, by the current plan filed in accordance with the Resilience Framework.

The data will also be collected on the basis of the mitigation measure utilized, in line with these general categories: undergrounding, resilience-based vegetation management, pole replacement, reconductoring, and aerial cable.

The Authority directs the EDCs to compare the data collected from the Resilience Zones with non-hardened Zones. Zone comparison should be made by zones that are comparable according to system characteristics, such as by feeder type, rural/urban/suburban, tree density, geographical proximity, and so forth.

In the Authority's view, a key justification for the approval of resilience programs is to reduce the impact (both scale and duration) of dark-sky conditions on the distribution system, so that the EDCs are less reliant on mutual aid lineworkers and other storm duty resources. Therefore, it is crucial that programs track metrics to assess performance in this regard. Accordingly, the Authority directs the EDCs to track metrics regarding life threatening emergency response events, blocked roads, and critical facility outages.

The Authority presents the information to be tracked for each Major Storm in the following table.

⁴⁸ This category should also include those zones hardened by prior iterations of resilience programs.

Table 24. Reporting Metrics for Major Storms

| For each category: Overhead Backbone, Overhead Lateral, Underground | | | |
|---|--------------------|-----------------|--------------|
| | Non-hardened Zones | Resilience Zone | VM-only Zone |
| Event Type | | | |
| Event Level | | | |
| Event Start Date | | | |
| Event End Date | | | |
| Event Duration | | | |
| | | | |
| Total Customer Min. Interrupted | | | |
| No. of Customer Outages | | | |
| Total Customers | | | |
| % of Customers Out | | | |
| Estimate of Lost Load | | | |
| | | | |
| No. of C&I Outages | | | |
| Total C&I Customers | | | |
| % of C&I Outages | | | |
| Estimate of Lost Load | | | |
| | | | |
| No. of Critical Facility Outages | | | |
| Total Critical Facilities | | | |
| % of Critical Facility Outages | | | |
| | | | |
| No. of Life Support Outages | | | |
| Total Life Support Customers | | | |
| % of Life Support Outages | | | |
| | | | |
| Time to Restore 50% customers | | | |
| Time to Restore 90% customers | | | |
| No. of Cust. Outages Exceeding 96 hr. | | | |
| No. of Cust. Outages Exceeding 120 hr. | | | |
| | | | |
| No. of Distribution Miles | | | |
| No. of Pole Failures | | | |
| No of Blocked Roads | | | |
| No. of Fire Police (FPS) Priority 1 | | | |
| Average time to respond FPS1 | | | |
| No. of Fire Police Priority 2 | | | |
| Average time to respond FPS2 | | | |
| No. of Fire Police Priority 3 | | | |
| Average time to respond FPS2 | | | |

This data will be presented annually for stakeholder review, according to the annual review process outlined in Section II.B.5., Administration of Reliability and Resilience Frameworks.

e. Minimum Staffing Standards

Pursuant to Conn. Gen. Stat. § 16-32n(d), the Authority is required to establish a minimum staffing standard for outage planning and restoration personnel including lineworkers following issuance of the final decision in which it reviewed the EDC's Storm Analysis Reports. The minimum staffing standards may reflect different staffing levels based on the severity of any emergency.

Subsequent to this Decision, the Authority will develop standards for minimum staffing.⁴⁹ As discussed in Section II.B.2. Objectives above, the Authority recognizes that emergency response staffing, and especially lineworker staffing levels, are a type of resilience measure. Therefore, the Authority intends to develop these standards in conjunction with the review of the EDCs' resilience programs filed in their next general rate case pursuant to the Resilience Framework established herein. Developing these standards in this way will ensure that the Authority considers the most cost-beneficial number of lineworkers in the context of an EDC's entire suite of resilience programs.

5. Administration of Reliability and Resilience Frameworks

a. Framework Review Process and Submission Schedule

Each EDC is statutorily charged with maintaining the integrity of the distribution system in conformance with the NESC and other standards, in a manner sufficient to provide safe and reliable service. Conn. Gen. Stat. § 16-244i(a). In furtherance of this directive, Title 16 codifies companion evaluation and reporting directives, including the requirement that: (1) each EDC submit annually, by January 1, a plan for the maintenance of poles, wires, conduits or other fixtures, along public highways or streets for the transmission or distribution of electric current, owned, operated, managed or controlled by the EDC, Conn. Gen. Stat. § 16-32g; (2) the Authority report biennially to the General Assembly regarding the vegetation management practices of each EDC, Conn. Gen. Stat. § 16-32k; and (3) each EDC report annually its SAIDI and SAIFI values for the preceding twelve months, Conn. Gen. Stat. § 16-245y. Separately, in accordance with Conn. Gen. Stat. § 16-19a, the Authority shall, at an interval of not more than four years, conduct a complete review and investigation of each EDC's rates to "determine whether the rates of each such company are unreasonably discriminatory or more or less than just, reasonable and adequate, or that the service furnished by such company is inadequate to or in excess of public necessity and convenience or that the rates do not conform to the principles and guidelines set forth in section 16-19e."

⁴⁹ Notably, the Authority has already established minimum staffing for a number of emergency response personnel in the Tropical Storm Isaias Decision. In that Decision, the Authority required the EDCs to have sufficient lineworkers to provide at least one crew to each municipality in its service territory. Tropical Storm Isaias Decision, p. 134. The Authority directed the EDCs to have sufficient liaisons to provide one to each town for managing blocked roads. *Id.* Furthermore, the Authority required updates to the minimum number of lineworkers, damage assessors, and liaisons that the EDCs must have available at storm onset. *Id.*, p. 132.

i. Initial Submissions

In the instant proceeding, the Authority seeks to build on the reporting avenues and timelines already in place when establishing the submission guidelines for the Reliability and Resilience Frameworks required herein. As such, an initial submission of each required Framework for Authority review and approval is timed appropriately with each EDC's next general rate case required pursuant to Conn. Gen. Stat. § 16-19a. While each Framework should therefore focus on detailed projections for the years subsumed by the proposed rate plan, the EDCs shall nonetheless scope the Frameworks to reflect planning parameters for a minimum of ten years, beginning with the first year of the rate plan. During each subsequent rate proceeding conducted in accordance with the timing intervals specified in Conn. Gen. Stat. § 16-19a,⁵⁰ the EDC will submit comprehensive revisions to the Reliability and Resilience Frameworks, so that each Framework encompasses planning parameters for a complete ten-year horizon, with such revisions reflecting any feedback and guidance provided in the intervening review processes described in the subsequent section.

As part of the comprehensive review process conducted through the Conn. Gen. Stat. § 16-19a rate proceeding, the Authority will consider the benefit-cost analysis, EDC assessment of alternatives, and potential rate impacts associated with implementing the Reliability and Resilience Frameworks, as well as the EM&V results of previous multi-year cycles implemented for each Framework, as discussed in Sections II.B.3.d.i., Evaluations of Plans (Reliability) and II.B.4.d.i., Evaluation of Plans (Resilience). Thus, a complete application filed pursuant to Conn. Gen. Stat. § 16-19a will be viewed as one that appends the Ten-Year Reliability and Resilience Frameworks required herein, inclusive of the benefit-cost analysis, rate impact, and EM&V results for each proposed Framework.⁵¹ Cost recovery associated with the approval of each Framework will therefore be evaluated as part of the revenue requirement and multi-year rate plan at issue in the Conn. Gen. Stat. § 16-19a proceeding, with the rebuttable presumption being that such recovery for reasonable and prudent expenditures shall be accomplished through base distribution rates.⁵²

⁵⁰ In accordance with Conn. Gen. Stat. § 16-19a, these are “intervals of *not more than* four years.” (emphasis added). For simplicity, the instant Decision therefore refers to plans submitted in accordance with the Reliability and Resilience Frameworks as having “four-year cycles”; however, the cycle may be shorter in duration to correspond with the approved rate plan.

⁵¹ The Authority recognizes that EM&V results, as envisioned herein, will not be available for the first iteration of the Ten-Year Reliability and Resilience Frameworks, and thus, this requirement should be read to require the inclusion of the EM&V results beginning with the second iteration of the Ten-Year Reliability and Resilience Frameworks. Ideally, however, the historical analyses required pursuant to Section IV.D.1. would be available coincident with the first iteration of the Ten-Year Reliability and Resilience Frameworks, as well as the BCA results discussed in Section II.B.4.d.i.c., Benefit Cost Analysis.

⁵² In other words, absent the design or recommendation of an alternative rate mechanism pursuant to the Authority's investigation in Docket No. 21-05-15, PURA Investigation into a Performance-Based Regulation Framework for the Electric Distribution Companies, the EDCs shall assume in the presentation of their general rate proceeding applications that cost recovery associated with the Reliability and Resilience Frameworks is accomplished through the proposed distribution rates.

ii. Annual Review Process

As described above, the Reliability and Resilience Frameworks are designed, at least in part, to allow for a flexible set of projects that are developed and prioritized according to a methodological process. This process can be expanded, modified, or retracted at any given point. Accordingly, the approved reliability and resilience plans and Frameworks will be subject to annual review cycles in the years intervening a Conn. Gen. Stat. § 16-19a rate proceeding,⁵³ designed to coincide with the filings required pursuant to Conn. Gen. Stat. § 16-32g. Specifically, no later than September 22 annually, the EDCs will be required to submit the plan required by Conn. Gen. Stat. § 16-32g pertaining to the subsequent calendar year, restructured to also encompass the reporting requirements associated with each approved Framework as discussed in Sections II.B.3. Reliability Framework and II.B.4. Resilience Framework. While such timeline does not permit a review of all data associated with the coincident calendar year, it does afford the Authority, EDCs, and stakeholders an opportunity to assess the current calendar year results through the majority of the storm season, alongside an adequate opportunity to review and adjust the plans prior to the start of the subsequent calendar year.

The Authority reserves the right to make modifications to program size, scope, and duration during these review cycles to account for any trends or lessons learned through the implementation of each Framework, particularly in response to the performance of the Framework in an actual emergency event. This is particularly relevant to the Resilience Framework program design described herein, which allows for the scaling or retracting of implementation since there is a prioritized list of Zones and a methodological approach to identify solutions for those Zones. The annual review process (Annual Review), beginning on or around September 22, will review key metrics and make strategic adjustments to the Frameworks to ensure: (1) continued alignment with the Program Objectives; and (2) that the Frameworks are on target to realize the envisioned implementation milestones in a manner consistent with the projected customer impacts and construction timelines. The Authority may also, through the Annual Review process, evaluate the effectiveness of the data tracking metrics and benefit-cost analysis model(s). As a result of such review, the Authority may consider modifying projects' size and scope, identifying potential new program performance and deployment targets, reevaluating program construction implementation timelines, and/or potentially revising other program details or priorities.

The Authority will endeavor to conclude the Annual Review within 90 days to provide the EDCs time to implement program changes prior to the subsequent calendar year. At least one public meeting will be held in the course of the Annual Review to allow stakeholders an opportunity to engage with the EDCs.

⁵³ Said another way, the annual review process discussed in this section will not take place in a calendar year in which a Conn. Gen. Stat. § 16-19a rate amendment application is under consideration or receives a final determination during the third or fourth quarters of the calendar year, as the Frameworks will have recently undergone scrutiny through the rate case proceeding. In such instances, the annual plan requirement codified in Conn. Gen. Stat. § 16-32g will be deemed satisfied by the filing of the Frameworks appended to the Conn. Gen. Stat. § 16-19a rate amendment application. The annual review process will resume in the subsequent calendar year.

Eversource is concerned that this annual review process improperly removes control of the EDC's capital program planning process from the EDC and gives it to the Authority. Eversource Written Exceptions, p. 32. In response to this, the Authority notes that ultimately the EDCs bear the statutory obligation to plan and operate the electric distribution system to provide safe and reliable service to customers. Conn. Gen. Stat. § 16-244i. The Authority's role is to ensure that customers are being charged fair rates and that the EDCs are conducting business in a prudent manner. This process therefore is not intended to inhibit the EDC's prudent operation of the system; rather, it is designed to ensure that the Authority and appropriate stakeholders are informed and able to evaluate on a regular basis whether the EDCs are doing business in accord with approved reliability and resilience plans and the Frameworks.

Eversource argues that conducting the annual review proceeding will lead to inefficiencies and delays in planning and maintenance activities. Eversource Written Exceptions, p. 32. In response, the Authority notes the following. First, under the current review of the EDCs' maintenance plan under Conn. Gen. Stat. § 16-32g, the Authority receives the maintenance plan in December just prior to January 1 for purposes of reviewing and revising programs underway in the upcoming calendar year. Under that existing statute, the Authority is enabled to issue orders and to require an updated plan be filed. Conn. Gen. Stat. § 16-32g. Under the current process, the Authority can direct changes while the EDC is carrying out its plan, and such changes invariably interrupt implementation during the plan year. Under this new annual review process, the Authority would receive the EDC's plan in accordance with the Frameworks in September. Subsequently, the Authority will initiate a public process and direct any changes prior to the plan year starting. Instead of causing delays, this new process actually provides more time for the Authority and the EDCs to comply with this statute. Second, consistent with Conn. Gen. Stat. § 16-11, this new annual review process, along with its reporting and metrics requirements, will allow the Authority to keep more fully informed as to the manner of operation of reliability and resilience programs and will allow the Authority to more timely order reasonable improvements or changes. Third, consistent with Conn. Gen. Stat. § 16-244i, the new annual review process ensures the Authority's oversight of quality and reliability of service. The Annual Review is an exercise of existing statutory authority that contemplates less interruption through a time-limited but thorough evaluation. Accordingly, if Eversource enters each Annual Review in the spirit of meeting Authority expectations for substantive requirements and procedural timelines, there should be limited chance for inefficiencies or delays.

6. Annual Reliability and Resilience Scorecards

As discussed above, in accordance with Conn. Gen. Stat. § 16-245y, each EDC is required to report annually its SAIDI and SAIFI values for the preceding twelve months. The EDCs typically submit the required data in March, while the Authority is statutorily required to complete its review of the data through a report due to the General Assembly by January 1 of the subsequent year.

Building on this existing reporting vehicle, the Authority will require the EDCs to report data for the complete set of reliability and resilience metrics established herein as part of the Conn. Gen. Stat. § 16-245y process. The submissions will be due no later than March 22 annually, with complete data for the preceding calendar year, as well as a four-year rolling average reported for each metric. In turn, the Authority will review and analyze the data, endeavoring to complete its required report to the General Assembly prior to the commencement of the Annual Review process each September.

In addition to serving as the input to the required annual Conn. Gen. Stat. § 16-245y report, the validated data will be used to populate town-specific scorecards that the Authority expects will provide more transparency and accountability regarding the sizeable expenditures on reliability and resilience each year. The scorecards are also envisioned to contribute toward the goal of establishing a feedback loop wherein customers are more readily able to analyze and express their willingness to pay on a going forward basis – particularly for resilience measures or incremental blue-sky reliability improvements. Therefore, establishing a format, presentation vehicle, and appropriate level of granularity of data to be included in the scorecards is of critical importance to achieving the desired outcome. As such, the Authority will direct its Office of Education, Outreach, and Enforcement (EOE) to facilitate a limited duration working group (Scorecard Working Group) for the purpose of designing and vetting the envisioned scorecards.

To jumpstart the Scorecard Working Group's efforts, the EDCs will be directed to each submit a proposed scorecard format for initial consideration to EOE no later than September 15, 2022. After facilitating discussions among the Working Group participants, the Authority will direct EOE to file its recommendation as a motion, with supporting analysis appended in the form of a report, no later than February 1, 2023. While EOE is encouraged to pursue consensus on its recommended scorecard design, consensus is not a prerequisite to the required February 1, 2023 submission. Following submission of the EOE Scorecard Working Group Report, stakeholders will be permitted an additional opportunity to comment on the motion prior to issuance of an Authority ruling. The Authority's intent is to review and approve a scorecard format for release in 2023, reflective of data for calendar year 2022.⁵⁴

⁵⁴ The Authority recognizes that some data recommended for inclusion in the scorecard format based on the Reliability and Resilience Frameworks established herein may not yet be tracked or available for calendar year 2022. In that instance, the applicable reporting categories will be left blank until future scorecard iterations.

7. Other Matters Related to the Frameworks

a. Integration with Other Equitable Modern Grid Initiatives

In order to align the Reliability and Resilience Frameworks more fully with other Equitable Modern Grid initiatives as identified in Section II.B.2., Objectives, the Authority directs the EDCs to include in their respective Frameworks information pertaining to projects approved or installed in conjunction with other Equitable Modern Grid programs.

For example, this may include, but is not limited to, projects installed in accordance with the Decision dated July 28, 2021, in Docket No. 17-12-03RE03, PURA Investigation into Distribution System Planning of the Electric Distribution Companies – Electric Storage (Storage Decision). The Storage Decision implemented an Electric Storage Program to value electric storage for the net benefit of the electric distribution system. Storage Decision, p. 1. The Electric Storage program identifies as a key objective the provision of resilience benefits to the electric distribution system, particularly for customers on the grid edge, low- to moderate-income customers, and those customers who may reside in an environmental justice or economically distressed community. Id., pp. 5-6. Since the Electric Storage Program was designed in part to incentivize projects that provide resilience to vulnerable customers or critical facilities on the grid edge, the EDCs must account for projects implemented through the Electric Storage Program in the design of its Resilience Framework in particular, including in performing its BCA.

b. Alignment with Federal Funding

Every effort must be made, both now and in the future, to identify non-ratepayer funds to offset the costs associated with implementing the Reliability and Resilience Frameworks required herein. Specifically, it is incumbent on each EDC, the Authority, and stakeholders, to continuously review the Frameworks for alignment and potential leveraging of existing and future federal funding opportunities, particularly those included in the Federal Infrastructure Investment and Jobs Act (IIJA). The IIJA has at least one energy program that provides funding for EDC resiliency and reliability programs. Eversource Presentation dated March 29, 2022, p. 47.

Section 40101⁵⁵ of the IIJA provides a formula-based grant directly to utilities for the purpose of preventing outages and enhancing electric grid resilience. Id. There is a total of \$5 billion available through this program, which seeks to fund “activities that are supplemental to existing hardening efforts” or “reduce the likelihood of consequences of disruptive events.” Id.

Given the innovative approach to the Reliability and Resilience Frameworks established herein, both of which envision supplemental efforts to existing programs, the Authority expects that each EDC will be competitive for the IIJA funding. Therefore, the Authority directs the EDCs to seek all available funding that could offset the costs borne by ratepayers associated with the adoption of the Frameworks. To further bolster the competitiveness of any such applications, the EDCs must ensure that their respective and

⁵⁵ Section 40101 falls under Title I – Grid Infrastructure and Resiliency, Subtitle A – Resiliency and Reliability.

forthcoming Reliability and Resilience Framework plans align with the overarching objectives of the IIJA, which largely map to objectives outlined herein and identified previously through the Authority's overarching Equitable Modern Grid Initiative. Specifically, the relevant IIJA criteria are as follows:

- Provide incremental contributions to clean energy economy employment and benefits directed towards disadvantaged communities;
- Advance federal, state, and local clean energy goals;
- Involve public, private, and research sector partnerships; and
- Preference for teams with reliability and resilience experience.

Accordingly, the Authority directs the EDCs to include in their respective and forthcoming Reliability and Resilience Frameworks a section demonstrating how the plans align with the IIJA's program priorities and objectives. Further, the Authority directs the EDCs to research and apply for any and all appropriate funding opportunities and record all steps taken in the funding process. This directive includes applying for all relevant funding for programs that may benefit emergency preparedness or resilience of state or local governments. DEEP Written Comments dated June 6, 2022, p. 14. For example, the Federal Emergency Management Agency (FEMA) has available competitive funding opportunities that provide resilience or emergency preparedness funding state and local entities. *Id.* FEMA programs include the Building Resilient Infrastructure (BRIC), Flood Mitigation Assistance, and Hazard Mitigation Grant Programs, some of which have increased funding through the IIJA. *Id.*, p. 15.

The EDCs shall provide a report describing their funding progress to the Authority every three months, commencing September 19, 2022. Such report shall include at a minimum: (1) the dates and manner of researching funding opportunities; (2) a description of all pre-application steps taken for each opportunity; (3) the date of application for each funding opportunity and the amount of funding sought; (4) a general description of communications from the funding source including the date, provided separately for each funding opportunity; (5) the number of applications pending approval/denial as of the date of the report; and (6) a list of all funding sources obtained by name of source and amount of funding.

8. Addressing and Assessing Climate Change Vulnerabilities

a. Further Evaluation of Alternative Risk Transfer Programs

In the Tropical Storm Isaias Decision, the Authority agreed with DEEP that “[g]iven the number and intensity of storms Connecticut has experienced in the last ten (10) years, and the risk of increasing frequency and severity of storms due to climate change...that a storm insurance policy warrants further consideration.” Tropical Storm Isaias Decision, p. 120. In compliance with the Authority's directive therein, the EDCs coordinated with the State of Connecticut Insurance Department to review options for climate change related storm insurance policies, culminating in a report submitted to PURA on December 22, 2021, entitled “Evaluation of Potential to Obtain Storm Insurance Coverage” (Insurance Report).

Upon a review of the Insurance Report and consideration of the presentations thereto through Technical Meetings in the instant docket, the Authority affirms its agreement with its colleagues at the State of Connecticut Insurance Department insofar as the Report is an “excellent first step, but this cannot be the last we hear of this.”⁵⁶ Specifically, while the Insurance Report provides a thorough review of possibilities and options, it stops short of providing detailed, independent analysis of the feasibility, or difficulty, of structuring an alternative risk transfer program. Indeed, the Report itself contemplates a process for fully evaluating the solutions contemplated therein, Insurance Report, p. 22, and confirms that such analysis would require “working with brokers, (re)insurance companies and the CT Department of Insurance.” *Id.*

Accordingly, the Authority will leverage the expertise of its sister agency, the Connecticut Insurance Department, in shaping the procurement and solicitation of a detailed, independent feasibility report regarding the structuring of an alternative risk transfer program for the state’s EDCs. The Authority will request that the Connecticut Insurance Department submit in this docket by October 1, 2022, for Authority review and approval, a scope of work for inclusion in an eventual Authority-issued RFP, inclusive of a recommended milestone list and corresponding timelines, as well as recommendations regarding a potential budget for such study. The Authority directs the EDCs to provide any assistance requested by the Insurance Department in its scoping of a potential scope of work for service providers to conduct a feasibility study for each EDC.

b. Prospective Modeling of Climate Change Risk

On December 16, 2021, Governor Lamont signed Executive Order No. 21-3⁵⁷ (EO) directing state agencies to take action to reduce carbon emissions and to prepare for impacts of the climate crisis. One specific action, as specified in Section 11 of the EO, directs the state to conduct a Climate Change Vulnerability Assessment to evaluate the vulnerability of state government assets and operations to the impacts of climate change. DEEP Written Comments dated February 18, 2022, p. 4.

Other jurisdictions have undertaken climate change vulnerability assessments specific to their utility infrastructure, notably New York and California. CIEC Written Comments dated February 18, 2022, pp. 7-8. In December 2019, the Consolidated Edison Company of New York released its Climate Change Vulnerability Study, which was subsequently relied on to develop a Climate Change Implementation Plan.⁵⁸ On August 27, 2020, the California Public Utilities Commission ordered its EDCs to conduct climate vulnerability studies to determine adaption plans for businesses and operations under climate change conditions.⁵⁹

⁵⁶ Tr. 03/28/2022, p. 10.

⁵⁷ See, [Executive-Order-No-21-3.pdf \(ct.gov\)](#)

⁵⁸ See, Consolidated Edison Company of New York Inc., Climate Change Vulnerability Study (December 2019), available at <https://www.coned.com/-/media/files/coned/documents/our-energy-future/our-energyprojects/climate-change-resiliency-plan/climate-change-vulnerability-study.pdf?la=en>.

⁵⁹ See, Decision on Energy Utility Climate Change Vulnerability Assessments and Climate Adaptation in Disadvantaged Communities (Phase 1, Topics 4 And 5), in Rulemaking 18-04-019, [Order Instituting Rulemaking to Consider Strategies and Guidance for Climate Change Adaptation](#), available at <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M346/K285/346285534.PDF>.

Accordingly, in furtherance of the state's mission to understand the impacts of climate change on critical infrastructure, each EDC will conduct a Climate Change Vulnerability Study to consider the effect of extreme weather due to climate change on its service territory, focusing on identifying the effects of climate change on the company's operations, planning, and infrastructure. In conducting this study, the EDCs are directed to consult the 2021 Working Group 1 Report to the Sixth Assessment Report of the IPCC,⁶⁰ as may be updated from time to time, to consider the most up-to-date climate science information that may be used to conduct climate risk assessments. The EDCs will also consider the findings from the following reports that were designed to identify the impact on the future of Connecticut from climate change:

1. Governor's Council on Climate Change January 2021 Report;⁶¹
2. Connecticut Physical Climate Science Assessment Report, Connecticut Institute for Resilience & Climate Adaptation (CIRCA), August 2019;⁶² and
3. CIRCA 2018 Sea Level Rise in Connecticut Final Report.⁶³

The objective of these assessments is to identify vulnerabilities of EDC system infrastructure at a granular level (i.e., at least by substation) to climate change. Once completed, this assessment will be used as an input to future EDC planning policies, including those related to the Reliability and Resilience Frameworks established herein. Consequently, each EDC's Climate Change Vulnerability Study will be an integral input informing future iterations of all reliability and resilience programs.

To effectuate the aforementioned objectives, the Authority will direct each EDC to submit, for Authority review and approval, a detailed scope of work, timeline, and anticipated budget for completing its Climate Change Vulnerability Study no later than October 7, 2022. The EDCs are directed to consult with DEEP, and other experts as suggested by DEEP including CIRCA, in development and completion of the study. The Authority finds that consulting with DEEP will ensure that the EDCs are relying on the most relevant and up-to-date guidance regarding climate change and system vulnerabilities. DEEP Written Comments dated June 6, pp. 5-6. The EDCs are directed to include in the scope of work consideration of the following standard factors recommended by DEEP:

1. Exposure. Exposure is the degree to which infrastructure is exposed to hazards and can change over time due to climate change.
2. Sensitivity. Sensitivity is the degree to which electricity infrastructure is affected by a hazard.
3. Adaptive capacity. Adaptive capacity is the ability to adjust to potential hazards or respond to consequences.

⁶⁰ IPCC, AR6 Climate Change 2021: The Physical Science Basis, <https://www.ipcc.ch/report/ar6/wg1/> .

⁶¹ Governor's Council on Climate Change, Taking Action on Climate Change and Building a More Resilient Connecticut for All, Phase 1 Report: Near-Term Actions, January 2021, https://portal.ct.gov/-/media/DEEP/climatechange/GC3/GC3_Phase1_Report_Jan2021.pdf .

⁶² CIRCA, Connecticut Physical Climate Science Assessment Report (PCSAR): Observed trends and projections of temperature and precipitation, August 2019, <https://circa.uconn.edu/wp-content/uploads/sites/1618/2019/11/CTPCSAR-Aug2019.pdf> .

⁶³ James O'Donnell, Sea Level Rise in Connecticut, <https://circa.uconn.edu/wp-content/uploads/sites/1618/2019/02/SeaLevelRiseConnecticut-Final-Report-1.pdf>

DEEP Written Comments dated June 6, 2022, p. 4.

The Authority determines that including these factors will help standardize the study process and results and ensure that all relevant factors are considered in the study.

The EDCs are encouraged to consult the studies completed by peer utilities in California and New York to ascertain best practices and lessons learned, including but not limited to the inclusion of a comprehensive engagement plan for disadvantaged communities, establishment of a minimum set of criteria, and formation of a transparent and replicable study methodology.⁶⁴

Subsequent to the completion of the first Climate Change Vulnerability Study, the Authority will direct each EDC to include the study alongside the Reliability and Resilience Frameworks appended to its Conn. Gen. Stat. § 16-19a rate application,⁶⁵ and to discuss the main takeaways from the study through a separate section therein, including at a minimum: (1) a list of identified vulnerabilities; (2) proposals addressing those vulnerabilities, including a range of options; and (3) long-term goals for adapting to climate risks. Particular attention will be required toward reconciling any proposals stemming from the study with other projects and initiatives contemplated through the approved Reliability and Resilience Frameworks.

c. Display Climate Change Vulnerability Study Results

DEEP recommends that the Authority require the EDCs to develop a public dashboard for customers to understand the results of the Climate Change Vulnerability Study. DEEP Written Comments dated June 6, 2022, p. 6. DEEP recommends that the dashboard includes geographical displays of risks that can identify the impacts of extreme weather on critical infrastructure in the state. *Id.* DEEP states that CIRCA offers such a dashboard that shows climate change vulnerability geographically and something similar could be adopted for the EDC study results. *Id.*

In the Decision dated April 20, 2022, in Docket No. 21-07-01, Application of The Connecticut Light and Power Company and Yankee Gas Services Company, Each Individually D/B/A Eversource Energy, The United Illuminating Company, Connecticut Natural Gas Corporation, and The Southern Connecticut Gas Company for Approval of Arrearage Forgiveness Program 2021-2022 (21-07-01 Decision), the Authority found that a user-friendly reporting platform and dashboard (PURA Data Dashboard) for various billing, customer service, and regulatory reporting and metrics would provide transparency and accessibility for the Authority and stakeholders. 21-07-01 Decision, p. 10.

⁶⁴ See, e.g., CPUC Rulemaking 18-04-19, *supra*, Decision 20-08-046 - Decision On Energy Utility Climate Change Vulnerability Assessments And Climate Adaptation In Disadvantaged Communities (Phase 1, Topics 4 And 5 (issued Sept. 3, 2020)).

⁶⁵ The Authority recognizes that the Climate Change Vulnerability Study may not be completed on a timeline that aligns with each EDC's next Conn. Gen. Stat. § 16-19a rate application. In that event, the Study shall be appended to the filings required for the next Annual Review, and should highlight any recommended modifications to the Reliability and Resilience Frameworks derived from the study results.

The initial iteration of the PURA Data Dashboard contemplates centralizing various energy affordability reporting requirements so as to enable the Authority and all stakeholders to track progress toward offering energy assistance and flexible payment arrangements for customers in need, while mitigating the impact of uncollectibles on all ratepayers. Id. However, the Authority also explicitly contemplated the ability to expand the PURA Data Dashboard to support other Equitable Modern Grid objectives, which would include Docket No. 17-12-03RE08. Id., p. 11. Thus, the Authority required that the PURA Data Dashboard be designed to accommodate future reporting in other programs. Id., p. 12. At present, a compliance filing relative to progress on the PURA Data Dashboard is due no later than September 30, 2022. Ruling to Motion No. 16, dated June 2, 2022, in Docket No. 21-07-01.

The Authority finds that including the results from the Climate Change Vulnerability Study in the PURA Data Dashboard is beneficial and within the scope of an expanded dashboard. The Authority directs the EDCs to include in their next filing on the PURA Data Dashboard a proposal for incorporating the results of the Climate Change Vulnerability Study. The proposal should appropriately consider anticipated timing of study results and whether planning for inclusion of the study results should commence immediately, concurrent with development of the energy affordability portion of the PURA Data Dashboard.

9. Long-Term Undergrounding Strategy

The record in this proceeding reflects a sustained interest in a long-term undergrounding strategy, made more urgent by a combination of increased frequency and duration of climate change events coupled with the state's trend toward increased electrification.⁶⁶ However, undergrounding remains a costly mitigation measure, particularly when factoring in the percentage of each EDC's existing systems served by overhead three-phase backbones, three-phase laterals, and single-phase laterals. See, Eversource and UI Responses to Interrogatories RSR-103 – 105. The Authority sought to understand through this proceeding whether the costs of undergrounding are outweighed or mitigated by either the costs attributable to other reliability and resilience measures, long-term O&M savings, and/or the benefits that accrue to customers and society from reduced frequency and duration of outages.

In short, such a detailed inquiry applicable on a statewide basis requires more dedicated resources than the instant proceeding envisioned;⁶⁷ although, the Authority is confident that the Reliability and Resilience Frameworks established herein are designed to cement the consideration of undergrounding as a viable mitigation measure. Therefore, if a statewide strategy for undergrounding is to be considered or drafted, subsequent action is required. Some such actions may lie within the Authority's existing jurisdiction; while others may require, or may benefit from, additional legislative guidance or enabling legislation. For example, several state legislatures have adopted

⁶⁶ See, e.g., Correspondence filed by The Garden Club of New Haven, Memorandum in Support of a Statewide Strategy for Undergrounding of Electric and Communication Wires and Cables, dated Jan. 26, 2022.

⁶⁷ Further, the Authority posits that the true answer may lie more so in the consideration of an individual's or community's valuation of electric service and their commensurate "willingness to pay".

requirements, in place since the 1960s and 70s, that new electric service connections be placed underground.⁶⁸ Moreover, some jurisdictions, such as the District of Columbia, have acted to enable unique financing mechanisms to support extensive undergrounding projects.⁶⁹

On the regulatory commission side of the equation, some jurisdictions have crafted programs that specify financing provisions for the undergrounding of existing electric distribution lines. On the west coast, for example, the California Public Utilities Commission (CPUC) adopted its Rule 20 in 1967, which is designed to facilitate primarily municipality-driven and private applicant-driven underground conversion projects.⁷⁰ CPUC Rule 20. In its current form, the Rule is divided into four subprograms that provide diminishing levels of ratepayer contributions to projects, with its third component (requiring an individual property owner or developer to fully fund the cost of undergrounding) largely mirroring policies encompassed in each Connecticut EDC's Electric Service General Terms and Conditions.⁷¹

With this backdrop, the Authority finds that it is appropriate to take a multi-part approach to next steps in formulating a statewide strategy to undergrounding. *First*, the Authority will solicit and compile stakeholder recommendations that may benefit from legislative guidance, and *second*, the Authority will direct interested stakeholders, to submit, for Authority review and approval, a proposal commensurate to the CPUC Rule 20 program discussed herein.

Regarding the first action, the Authority will invite proposals from stakeholders related to any undergrounding matters, and comments thereto, that may benefit from the General Assembly's consideration in a subsequent legislative session.⁷² The initial set of recommendations shall be filed with the Authority in the instant docket no later than October 7, 2022; reply comments will be solicited thereto no later than October 21, 2022, and the Authority may consider hosting a public meeting if necessary and appropriate.

Regarding the second action, the Authority notes that while not all circumstances that led to the creation and modification over time of the CPUC Rule 20 may apply to the Connecticut landscape, the program parameters and structure seem generally conducive to replication. As such, the Authority encourages the stakeholders to reference the CPUC Rule 20 program, or other duly-enacted programs from other jurisdictions, as a model for their efforts in Connecticut. To assist in such discussions, the Authority will establish a

⁶⁸ See, OLR Research Report 2011-R-0400, dated Nov. 30, 2011, available at: [REQUIREMENTS TO UNDERGROUND UTILITY LINES IN OTHER STATES/ NORWICH PUBLIC UTILITIES \(ct.gov\)](#).

⁶⁹ See, The Electric Company Infrastructure Improvement Financing Act of 2013 (Washington D.C. Council Bill B20-0387) (May 3, 2014).

⁷⁰ There are also corresponding provisions for the undergrounding of communications infrastructure.

⁷¹ The four subprograms include (A) 100% ratepayer-funded, but must meet public interest criteria; (B) 20-40% ratepayer-funded, but must consist of a minimum of 600 feet; (C) 100% applicant funded; and (D) funding for undergrounding when it is the preferred method for wildfire mitigation. See, CPUC Rulemaking 17-05-010, Phase 1 Decision Revising Electric Rule 20 and Enhancing Program Oversight, dated June 7, 2021, pp. 7-8.

⁷² The Authority recognizes that such proposals could be raised by a stakeholder or directly by a legislator herself, and therefore merely seeks to use this forum to gather information that may lead to the Authority or other stakeholders endorsing such proposals.

limited-purpose working group (Rule 20 Working Group),⁷³ and will designate its Office of Education, Outreach, and Enforcement (EOE) to facilitate such discussions. The Authority directs EOE to file its recommendations as a motion, with supporting analysis appended in the form of a report, no later than December 5, 2022, after convening the Rule 20 Working Group. While EOE is encouraged to pursue consensus on its recommended program structure, consensus is not a prerequisite to the required December 5, 2022 submission. Following submission of the EOE Rule 20 Working Group Report, stakeholders will be permitted an additional opportunity to comment on the motion prior to issuance of an Authority ruling.

A third component of the multi-part approach to establishing a long-term, statewide undergrounding strategy is ensuring that we are appropriately utilizing already codified statutory provisions targeted at enhanced coordination across state and local governmental entities, public service companies, and potential providers. For example, Conn Gen. Stat. § 13a-126d requires that:

“The Department of Transportation and any municipality shall notify the Public Utilities Regulatory Authority of any pending project involving the construction, alteration, reconstruction, improvement, relocation, widening or changing of the grade of a section of any state highway or any other public highway, that is greater than five miles long or located in a commercial area. The authority, upon determination that such project may provide an opportunity for any public service company, as defined in section 16-1, to install, replace, upgrade or bury any water, sewer or gas line, electric wire or cable or fiber optics, shall notify such company of such project.”

Moreover, the recently codified Public Act 21-159, An Act Concerning Equitable Access to Broadband, requires the Authority to develop a process for the construction of facilities in the public highways, streets or other public rights-of-way to ensure timely and nondiscriminatory procedures that accomplish conduit excavations for telecommunications service providers and broadband Internet access service providers. Indeed, in the resulting Docket No. 21-12-21, PURA Implementation of Process and Procedures for Conduit Excavations for Telecommunications Service Providers and Broadband Internet Access Service Providers, the Authority issued a Notice of Request for Written Comments, dated April 8, 2022, through which, *inter alia*, the Authority sought input on notification processes for existing providers so as to reduce the potential for future street excavations (and thus, costs).

Accordingly, the Authority will place a renewed emphasis on planning and coordination moving forward so as to reduce both the disruptions within our communities and the costs borne by ratepayers. To this end, the Authority directs the attention of all interested stakeholders to the processes already publicly noticed for its Docket No. 21-12-21, including the aforementioned request for written comments, as the intended venue for discussing potential “dig once” policies and the feedback loop of any such policies into the undergrounding programs contemplated herein.

⁷³ To ensure a robust discussion regarding potential public interest criteria and the coordinated implementation of such a program with municipalities, the Authority directs EOE to include in such working group, at a minimum, representatives of CCM and COST.

Finally, the Authority also wishes to direct the attention of all stakeholders to another tenet of its Equitable Modern Grid Initiative; specifically, the recently established Innovative Energy Solutions Program, approved through the Decision dated March 30, 2022, in Docket No. 17-12-03RE05, PURA Investigation into Distribution Planning of the Electric Distribution Companies – Innovative Technology Applications and Programs. With a request for concept proposal tentatively scheduled for January 2023, potential innovators, particularly those interested in collaborating directly with Eversource and/or UI, may find that the Innovation Energy Solutions Program offers a viable pathway toward addressing unique undergrounding challenges encountered in certain areas of the distribution grid.

10. Vegetation Management Working Group

In the Decision dated January 13, 2021 in Docket No. 18-12-25, PURA Review of Electric Companies' and Electric Distribution Companies' Plans for Maintenance of Transmission and Distribution Overhead and Underground Lines (18-12-25 Decision), the Authority stated that it would consider in this proceeding the establishment of a standing working group to assist the Authority generally in its oversight of future iterations of the EDCs' vegetation management programs (VM Working Group). 18-12-25 Decision, p. 8. This was done at the urging of DEEP's Division of Forestry, which recommended that the Authority establish a standing working group to address the EDCs' vegetation management programs with an eye toward programmatic improvements and addressing emerging issues such as rising costs related to traffic control and municipal permitting. Id.

In this proceeding, the Authority sought written comments on what types of matters a VM Working Group would be most effective at solving and how this would complement the Authority's oversight role of the EDCs' vegetation management programs and practices. The Authority also sought comment regarding what structure a VM Working Group might take on, including mission, governance, membership, by-laws, and so forth.

In responding to the whether a working group would be effective at resolving VM matters, stakeholders were overwhelming supportive of the creation of a VM Working Group to resolve broad policy issues that exist. DEEP Written Comments dated February 18, 2022, p. 10; UI Written Comments dated February 18, 2022, p. 24; Eversource Written Comments dated February 18, 2022, pp. 60-61.

Regarding what policy matters a working group should be tasked with resolving, stakeholders identified a substantial number, including, but not limited to:

- The notification requirements pursuant to Conn. Gen. Stat. § 16-234 imposed only on EDCs and no other entities (municipal electric departments, municipalities);
- Lack of definition of "trees and shrubs" that is required by Conn. Gen. Stat. § 16-234(4);
- Efficient coordination with municipalities and tree wardens;
- Clarification surrounding the "minimum level of pruning" as implemented by the Authority in the 18-12-25 Decision;

- Incorporating environmental considerations in vegetation management program design, including impacts of climate change;
- Impact of rising costs of vegetation management programs due to notification and traffic control requirements;
- Consideration of undergrounding utility facilities and how it relates to VM programs;
- Establishing consistent and efficient VM practices across the municipalities;
- Enhance public education regarding VM programs; and
- Enhance statewide standards for roadside tree planting.

Eversource Written Comments dated February 18, 2022, pp. 55-58; DEEP Written Comments dated February 18, 2022, p. 11; UI Written Comments dated February 18, 2022, p. 25.

Regarding the structure of a VM Working Group, stakeholders generally recommended using the State Vegetation Management Task Force (SVMTF) that was created in 2012 and headed by DEEP as a model. DEEP Written Comments dated February 18, 2022, p. 11; Eversource Written Comments dated February 18, 2022, pp. 60-61; UI Written Comments dated February 18, 2022, p. 25. Indeed Eversource, UI, and DEEP recommend reconvening the SVMTF or initiating a new VM Working Group but adopting its objectives, mission, and structure. Eversource Written Comments dated February 18, 2022, p. 61; UI Written Comments dated February 18, 2022, p. 25; DEEP Written Comments dated February 18, 2022, p. 11. Stakeholders support using as a model the mission, membership, charter, and ground rules of the SVMTF.⁷⁴

Members of a VM Working Group should include: EOE, OCC, DEEP, research institutions (e.g., Eversource Energy Center at UConn, Agricultural Experiment Station), municipal organizations, tree warden organizations (e.g., the Tree Warden Association), and non-profit environmental representatives. Eversource Written Comments dated February 18, 2022, p. 60; DEEP Written Comments dated February 18, 2022, p. 11. DEEP understands that working groups place a heavy administrative burden on staff acting in leadership or administrative roles. DEEP Brief, p. 7. With that in mind, DEEP has engaged with the University of Connecticut (UConn) who has expressed the ability and interest in managing the leadership or facilitator role of a potential VM Working Group. DEEP Written Comments dated February 18, 2022, p. 11. Therefore, DEEP recommends that a Working Group contemplate UConn to perform the role of leadership and facilitator. DEEP Brief, p. 8.

The Authority has considered the comments submitted by stakeholders in this proceeding and has determined that a standing working group should be convened to address the policy issues identified above and any others that may be raised from time to time to improve the implementation and oversight of the EDCs' vegetation management programs. The VM Working Group is appropriately facilitated at this time by EOE.

⁷⁴ Details regarding the mission, structure, and ground rules of the SVMTF can be found here: [https://portal.ct.gov/DEEP/Forestry/VM-Task-Force/Vegetation-Management-Task-Force#:~:text=The%20State%20Vegetation%20Management%20Task%20Force%20\(SVMTF%20or%20Task%20Force,the%20October%202011%20Nor'easter.](https://portal.ct.gov/DEEP/Forestry/VM-Task-Force/Vegetation-Management-Task-Force#:~:text=The%20State%20Vegetation%20Management%20Task%20Force%20(SVMTF%20or%20Task%20Force,the%20October%202011%20Nor'easter.)

Accordingly, the Authority directs EOE to collaborate, at a minimum, with DEEP, the OCC, and the EDCs to develop a working group mission, member list, governance structure, and set of ground rules, which should be derived from the SVMTF structure and modified as necessary to be consistent with the recommendations herein. The VM Working Group governance filing must also include a requirement that the group issue an annual report on the work done by the group in the preceding twelve months. The Authority directs EOE to submit this information to the Authority, for review and approval, by October 15, 2022. Moving forward, the working group's annual report will be a required submission, by EOE on behalf of the VM Working Group, into the Annual Reliability and Resilience Framework Review Process described in Section II.B.5.a.ii. Annual Review Process. Doing so will allow the Authority to consider any VM Working Group recommendations in the context of PURA's Annual Review of the EDC's Reliability and Resilience Frameworks.

C. REVIEW OF EMERGENCY RESPONSE PLANS

Conn. Gen. Stat § 16-32e(b) requires that each EDC submit to the Authority every two years, starting in 2012, an updated ERP for restoring service that is interrupted as a result of an emergency.⁷⁵ No later than September 1 every two years, following the submission of each EDC's ERP, the Authority is required to submit a report to the joint standing committee of the General Assembly having cognizance of matters relating to public utilities that summarizes its review of the ERPs. Conn. Gen. Stat. § 16-32e(b). The Authority conducts its biennial review of each EDC's ERP in this proceeding, as noticed in the Notice Regarding Docket Timeline and Process dated June 23, 2021.

Importantly, the Authority directed a number of improvements to the EDCs' ERPs in the Tropical Storm Isaias Decision; thus, the purpose of the review through this proceeding is to build on those improvements. The Tropical Storm Isaias Decision mandated changes to the EDCs' ERPs to ensure that each company is able to meet acceptable standards of performance during emergency response. Tropical Storm Isaias Decision, pp. 132-133. The ERP changes mandated by the Authority include requirements designed to ensure that the EDCs have sufficient resources on hand at the onset of an emergency, as well as during restoration activities, to support municipal emergency response efforts tied to the clearing of electrical hazards from blocked or partially blocked roads and ensuring timely restoration of critical facilities and infrastructure. Tropical Storm Isaias Decision, p. 132. The mandated ERP changes also ensure that the EDCs are: (1) acquiring sufficient damage assessors to identify priority damage and perform timely damage assessment; (2) identifying and tracking life support customers and their outages, (3) stress testing communications channels and ensuring their operation during extreme events; (4) responding to the needs of major customers; (5) improving the EDCs' ability to track line crew field work; and (6) timely sharing relevant information with municipalities. Id.

⁷⁵ Conn. Gen. Stat. § 16-32e(b) states that the ERP "shall include measures for (1) communication and coordination with state officials, municipalities and other public service companies and telecommunications companies during a major disaster, as defined in section 28-1, or an emergency; and (2) participation in training exercises as directed by the Commissioner of Emergency Services and Public Protection. Each such plan shall include such company's, provider's or municipal utility's response for service outages affecting more than ten per cent, thirty per cent, fifty per cent and seventy per cent of such company's, provider's or municipal utility's customers."

Incorporation of the ERP review into this proceeding also aligned with the statutory requirement that the EDCs provide biennial updates of their ERPs pursuant to Conn. Gen. Stat § 16-32e(b) and the 12-06-09 Decision. It also allowed the Authority to consider emergency response standards and reviews in conjunction with EDCs' reliability and resilience planning, thus permitting a holistic review of these interrelated programs.

1. Modifications to the EDCs' ERPs

By ruling to Motion No. 68 Ruling dated August 11, 2021 (Motion No. 68 Ruling) and ruling to Motion No. 70 dated August 11, 2021 (Motion No. 70 Ruling) in Docket No. 20-08-03 (together, Motion Rulings), the Authority noted that UI and Eversource, respectively, made a number of modifications to their ERPs that were beyond those required by the Authority in the Tropical Storm Isaias Decision. The Tropical Storm Isaias Decision contemplated specific changes to each EDC's ERP following an in depth investigation culminating in the Tropical Storm Isaias Decision.⁷⁶ In the Motion Rulings, the Authority noted that the EDCs' incremental proposed changes did not necessarily follow a public process that involved the Authority and other stakeholders. Motion No. 68 Ruling, p. 2; Motion No. 70 Ruling, p. 3. Accordingly, the Authority incorporated into this proceeding an investigation, including a public process, to comprehensively review the changes made by the EDCs to their ERPs. Motion No. 68 Ruling, p. 2; Motion No. 70 Ruling, p. 3. Accordingly, the Authority held a Public Comment Hearing on February 7, 2022, and sought written comments from docket Participants and interested stakeholders to seek input on the changes made by the EDCs to their ERPs.

The Authority identified a number of changes made by the EDCs that it considered in this proceeding. Two of these changes include the following made by Eversource:

1. Eversource's incorporation of a number of new definitions; and
2. Eversource's creation of a Public Safety Section within the ERP to deal specifically with the needs of a municipality.

These two modifications are worthy of further discussion in this proceeding, and are discussed individually below.

a. Eversource Definitional Changes

Eversource included a number of new definitions in its ERP, which the Company contends provide more uniformity and clarity to municipalities, since the municipalities are a key partner in emergency response. Eversource Response to Interrogatory RSR-52, Attachment 3, pp. 1-2. Eversource included new or modified definitions of the following terms:

1. Safe to Proceed;
2. Critical Facilities;
3. Global-, Town-, Event- Estimated Time to Restoration (ETR); and

⁷⁶ These modifications required by the Authority following Tropical Storm Isaias are documented in the Tropical Storm Isaias Decision, pp. 132-135.

4. Blocked Roads.

The Authority specifically identifies these changes because they are crucial to understanding Eversource's emergency response actions, especially as they relate to coordination with municipalities in its service territories.

First, Eversource defines "Safe to Proceed" as the point in time when restoration and response begins. The Company asserts that this time is important to declare since it is the point at which the Incident Commander has declared environmental conditions safe for field resources to begin work. Eversource Response to Interrogatory RSR-53, Attachment 1, p. 27. This "Safe to Proceed" declaration indicates the time that the Company focuses on responding to life threatening emergency calls, Make Safe Blocked Roads locations, and critical facility restoration. Id. For purposes of the Company's ERP, the Authority will not direct any modifications to Eversource's incorporation of this definition into its ERP. Because the Authority acknowledges the value that inclusion of this definition can provide in standardizing response activities, the Authority directs UI to include this definition in its ERP as well.

Second, Eversource proposes to modify its ERP definition of "Critical Facilities" to include facilities identified by municipalities as performing critical functions for the town, such as police/fire stations, hospitals, and shelters, as well as facilities identified by state agencies such as DEEP and the Department of Public Health, including water supply facilities, wastewater treatment facilities, and 911 infrastructure. Id., p. 28; Tr. 12/21/21, p. 68. This definition was included to mirror the state emergency response definition of critical infrastructure. Eversource Response to Interrogatory RSR-53, Attachment 1, p. 28. Doing so is intended to provide clarity to Eversource emergency response teams and those entities that it has to coordinate, such as municipal, state, and other utility or private sector partners. Id.

Third, Eversource proposes to include definitions for different types of estimated times of restoration (ETR)⁷⁷ that it shares with state and local officials. Id., p. 46. There are three definitions that are made explicit: global ETR, town-level ETR, and event ETR. Id. The main distinction here is that global ETR is the time to 99% restoration for all customers on the system; town-level ETR is the time to complete 99% restorations for customers in a town; and event-level ETR is restoration of a specific outage order (e.g., a specific damage location serving a number of customers). Since the EDCs are required to share this information with state and local officials during response efforts, it is crucial that clear definitions of these terms exist. Accordingly, the Authority will not direct any modifications to Eversource's incorporation of these definitions into its ERP. Since UI is expected to provide the same information to state and local officials, the Authority will direct UI to incorporate Eversource's definitions of these different ETRs into its ERP.

Fourth, Eversource proposes to define various iterations of blocked roads to ensure better clarity of communications and coordination when responding to down

⁷⁷ ETR is defined as the estimated time by which an EDC expects to substantially complete restoration. Tropical Storm Isaias Decision, p. 61. "Substantially complete" restoration is defined as the restoration of 99% of customers following an emergency event. Id.

electrical facilities in accordance with the state's Make Safe Protocol.⁷⁸ To improve the ability to follow this protocol, Eversource makes the following definitional distinctions:

1. **Make-Safe Blocked Road.** A road that is impassible to emergency vehicles and there is no other reasonable means of access to an area.
2. **Blocked Road.** A road that is impassible to emergency vehicles, but there is a reasonable means of access to the area.
3. **Partially-Blocked Road.** A road that is partially blocked (one lane has a 9' wide x 14' high opening) but is passable to emergency vehicles.
4. **Reasonable Means of Access.** An alternate access route around a blocked road that does not require more than a five-minute detour for emergency vehicles.

Eversource Response to Interrogatory RSR-53, Attachment 1, p. 57.

The Authority finds that including these types of definitions into an ERP should aid the prioritization of the different types of blocked roads that can be overwhelming and confusing in a large-scale weather event. Tr. 12/21/21, pp. 73-74; Tropical Storm Isaias Decision, pp. 84-85. Accordingly, the Authority will direct UI to incorporate these same definitions into its ERP.

b. Eversource's Public Safety Section

Eversource proposes to include a new Public Safety Section, led by a Public Safety Chief, into the Company's ERP incident command structure. Response to Interrogatory RSR-43, Attachment 1, pp. 39 and 53. The Public Safety Section is primarily responsible for responding to hazards that impact local communities in an emergency event. Id. This section is responsible for working with municipalities to sort through and ensure accurate reporting of response and restoration priorities such as blocked roads, partially blocked roads, and critical facility outages. Id. Through its Public Safety Section, Eversource designates Public Safety Officers assigned to work with municipalities and municipal liaisons to identify and prioritize these events. Tr. 12/21/21, pp. 72-73. Also within this Section are lineworkers from the Response Specialist Organization who can be assigned to municipalities in an emergency to resolve hazards such as blocked roads and other emergency calls. Id. Duties include overseeing road clearing responsibilities in conjunction with towns and ensuring adequate crews are secured and made available to towns. Tr. 12/21/21, p. 73.

The Authority will not direct any modification to the incorporation of this new Public Safety Section into Eversource's ERP. Responding to municipal needs is an obligation of the EDC and must be a key consideration of the Company in its emergency response.

⁷⁸ The Make Safe Protocol is a state emergency response protocol included in the state's State Response Framework Emergency Support Function 12- Energy and Utilities. The protocol establishes procedures for clearing roads of electrical hazards. Tropical Storm Isaias Decision, p. 22. It provides instructions for the EDCs, state agencies, and municipalities with respect to the clearing of blocked roads for emergency vehicle access following an emergency event. Id. The protocol establishes a process for EDCs to coordinate with municipalities to safely and timely identify, prioritize, and coordinate the clearing of blocked roads and other hazards to allow for emergency access. Id.

The Authority therefore appreciates the thoughtful development of this section. With this Public Safety Section, Eversource now attempts to bring more resources to bear in working with municipalities. This is necessary because in the very large events like Tropical Storm Isaias, the number of municipal priorities is huge, and delaying response to those priorities can be detrimental to the public welfare. Tropical Storm Isaias Decision, p. 80. Furthermore, just responding to priority calls is not in itself sufficient; the tracking of response and resolution to these priorities is also important. Id., pp. 67-68. The inclusion of this new section into Eversource's incident management structure is a good step to improve communication and coordination with municipalities.

2. Incorporation of Winter Reliability Emergency Protocols into ERPs

During the course of its review of the EDCs' ERPs, issues came to the forefront surrounding how emergency protocols of the regional grid operator related to winter reliability issues may disrupt the EDCs' operations and affect local communities who rely on electric service, as well as the role that state and local officials may be asked to serve through these operating procedures.

Every year the Independent System Operator of New England (ISO-NE) meets with public officials to review procedures for dealing with capacity deficiencies.⁷⁹ Tr. 01/06/22, p. 8. These meetings generally take place in early winter, since a large risk comes from the potential for inadequate fuel supply in cold temperatures resulting in capacity deficiency. Id., pp. 7-8. In preparation for this scenario, ISO-NE has developed operating procedures (OPs) for mitigating the risk of capacity deficiency and, in the event of an actual energy emergency resulting from a capacity deficiency, responding in such a way to avoid system-wide blackouts and uncontrolled outages. Id., p. 44.

ISO-NE's OP-4 is procedure that outlines steps that ISO-NE can implement to lessen the likelihood that an actual capacity deficiency will take place or that it will devolve into an energy emergency. Id., p. 16. OP-4 essentially has steps to reduce the demand on the transmission system when a capacity deficiency is likely to happen or is currently happening and has key steps that involves the EDCs and state and local officials. The actions that involve the EDCs and state and local officials include, reducing system voltage, reducing large customer's demand, making appeals to the public to curtail load, and requesting assistance from state governors to appeal to the public to reduce load. ISO-NE Presentation dated January 6, 2022, p. 12.

According to ISO-NE, successful implementation of these procedures, especially the appeals to the public for load curtailment, can either remove the risk of an energy emergency entirely or seriously mitigate its devastating consequences. Tr. 1/6/22, p. 23. Doing so requires timely information sharing from ISO-NE regarding the appeals as well as consistent messaging from utilities, state and local officials urging conservation. Id., pp. 22 and 23.

⁷⁹ "Capacity deficiency" here basically means that the transmission grid is unable to provide electricity to meet the demand from customers connected to it. Capacity Deficiency can result from a loss or inability to use certain transmission or generation facilities or from an inadequate fuel supply. Tr. 01/06/22, pp. 13-14. Capacity deficiency can be localized or can be region-wide throughout New England. Id., pp. 16 and 71.

ISO-NE procedure OP-7, Action in an Emergency identify the steps ISO-NE will take to address a capacity deficiency that is not being managed by OP-4 or is otherwise imminent. Id., p. 44. The steps in this procedure essentially call for disconnection of a certain amount of load (i.e. customers) from the system to avoid catastrophic damage, blackouts, and uncontrolled outages. Id. ISO-NE only directs the EDCs how and where load must be disconnected, and itself does not disconnect customers. ISO-NE Presentation dated January 1, 2022, p. 15. The EDCs must follow the directive by ISO-NE, but may have some flexibility regarding which portions of the system can be disconnected at any given time. UI and Eversource Responses to Interrogatories RSR-76. Generally, the larger the deficiency, the more load needs to be disconnected, and the less flexibility there is in deciding which circuits to disconnect. Tr. 1/6/21, pp. 77 and 78. Certain circuits with critical infrastructure may be exempt from disconnection. Tr. 1/6/22, pp. 75 and 99. Disconnections under OP-7 can be extended in duration. Tr. 1/6/22, p. 116.

The EDCs have certain responsibilities when ISO-NE implements OP-4 and OP-7. In OP-4, the EDCs may have to reduce system voltage. UI Response to Interrogatory RSR-74. They also notify state and local officials and large customer accounts of the actions taken by ISO-NE. Id. Regarding OP-7, the EDCs may be asked to disconnect customers (“shed load”). UI Response to Interrogatory RSR-76. Load-shedding may be done automatically in some circumstances and may be done manually in others. Id. As stated above, depending on the circumstances, each EDC may have some flexibility in selecting portions of its system for disconnection, and it can prioritize circuits to be exempt based on the critical infrastructure on those circuits, such as emergency rooms, airports, gas facilities and so forth. UI and Eversource Responses to Interrogatory RSR-79. Both EDCs have internal plans on how to implement both OP-4 and OP-7. UI and Eversource Responses to Interrogatories RSR-74, 76, and 79.

The Authority finds that the EDCs need to include in their ERPs procedures for dealing with capacity deficiencies under OP-4 and energy emergencies under OP-7. The ERPs are meant to be documents shared with state and local emergency response partners. Conn. Gen. Stat. § 16-32e. Actions taken by ISO-NE and the EDCs in response to OP-4 and OP-7 require speedy, accurate, and consistent communication and coordination with state and local partners as discussed above. This is especially true under public calls for conservation in OP-4, where conservation may be able to prevent a catastrophic energy emergency but the general public may be hesitant to conserve. Tr. 01/06/22, pp. 24, 54, 87, and 88. The risks of experiencing a capacity deficiency are not small in New England, where there is not an insignificant potential for fuel shortages during cold spells. Id., p. 43.

Furthermore, if OP-7 actions are initiated, it will be crucial that state and local officials understand the actions taken by the EDCs to shed load. Information sharing from the utilities regarding which circuits are to be disconnected at certain times will be crucial for state and local officials. Officials will need to know which critical facilities within their town will be without service and when. Since there is some flexibility with the selection of circuits, state and local officials should ideally have some say in identifying critical locations, and at a minimum have sufficient awareness of the plans under various scenarios.

Accordingly, the Authority directs the EDCs to incorporate into their ERPs, certain information specific to the Companies' roles, actions, and reactions to ISO-NE OP-4 and OP-7 procedures. The EDCs are directed to include the following elements, at a minimum:

1. Communication protocols with state and local officials regarding the status of OP-4 and the Companies' plans for messages to customers to conserve.
2. Communications protocols with state and local officials regarding actions taken during OP-7, including protocols for communicating load shedding plans.
3. A preparedness plan, so that EDCs work with state and local officials to identify locations of critical infrastructure that each EDC may incorporate into its load-shedding plan.
4. An appendix demonstrating load-shedding scenarios for various load reduction needs similar in content to the information provided by Eversource on pages 8-19 of its presentation dated January 6, 2022, and presented at the January 6, 2022 technical meeting.

3. Plan to Address Other Utility Critical Infrastructure

In the Decision dated August 31, 2022, in Docket No. 22-02-10, 2022 PURA Review of Connecticut Public Service Company Emergency Response Plans (2022 ERP Decision), the Authority required that the state's local gas distribution companies (LDCs), facilities-based telecommunications providers, and certain privately-owned water companies (collectively, Utilities) provide to the EDCs in whose service territories they operate a list of facilities critical to their operation that rely on commercial electric service. 2022 ERP Decision, pp. 5-8. The purpose of this requirement is to ensure that long-duration electric outages to utility facilities are properly prioritized for restoration so that disruption to customers of these services are at less risk – particularly those services that affect public safety. Id.

The EDCs recognize the importance of coordinating with other utility providers and public service companies during response to extreme weather events. UI ERP, p. 20; Eversource ERP, p. 70. Efficient communication between these entities is crucial to ensure coordination, safety, and proper response to emergency events. Eversource ERP, p. 70. Eversource utilizes a Utility Liaison to coordinate with other utilities to achieve this purpose. Id.

To ensure adequate and efficient coordination, the Authority requires that the EDCs incorporate the following information into their ERPs. First, the Authority directs the EDCs to receive and process at minimum annually an updated critical facility list from the Utilities that operate in the EDC's service territory. Additionally, the Authority directs the EDCs to include a component in their respective ERPs for incorporating restoration to these facilities among other priorities. The EDCs are also directed to include in the ERPs primary and secondary points-of-contact for the Utilities that operate in their service territories. This list of contacts should be updated on an annual basis prior to June 1.

4. Incorporation of a Cybersecurity Plan into ERPs

In the final report titled Connecticut Public Utilities Action Plan, dated April 6, 2016 in Docket No. 14-05-12, PURA Cybersecurity Compliance Standards and Oversight Procedures (Action Plan), the Authority developed an annual review process to review the cybersecurity program of certain public utilities, including the EDCs. Under the Action Plan, the Authority has met with the EDCs every year since 2017 to discuss the Companies' cybersecurity management programs and how they prepare for and respond to current cybersecurity threats.⁸⁰

In the most recent report dated January 7, 2022 (2021 Report), the Authority identified opportunities to improve cybersecurity and emergency preparedness. In the 2021 Report, the Authority noted that ERPs are designed primarily around damaging weather events and that there is a need to exercise those plans for cybersecurity-specific events. 2021 Report, p. 7.

Expanding the EDCs' cybersecurity-based emergency preparedness has long been noted in the reviews. Indeed, in the annual report dated October 11, 2019 (2019 Report), the Authority noted that the EDCs' plans did not include a cybersecurity component. 2019 Report, p. 13. The 2019 Report stated that the utilities should update the plans (then due in 2020) with new and relevant information regarding cybersecurity emergency preparedness.

The Authority notes that the ERPs submitted for review under Conn. Gen. Stat. § 16-32e have not included any mention of cybersecurity. Therefore, the Authority directs the EDCs to include in their ERPs due in 2024 a cybersecurity disruption response section. The cybersecurity portion of the ERP should contemplate emergency preparedness and response policies and procedures for responding to cyber events that disrupt customers' service. The EDCs may wish to use the ESF-12 working group process to help develop plan components.

The Authority will track the progress of the EDCs in incorporating a cybersecurity disruption component into their ERPs during the annual cybersecurity reviews done in accordance with the Action Plan. The Authority directs the EDCs to provide a status update on the progress of a cybersecurity plan at each annual cybersecurity review.

⁸⁰ See here for the past reports on those meetings: <https://portal.ct.gov/PURA/Electric/Cybersecurity-and-Connecticut-Public-Utility-Companies>.

III. CONCLUSION AND ORDERS

A. CONCLUSION

In this Decision, the Authority establishes reliability and resilience frameworks by which the EDCs must plan and implement their reliability- and resilience-based capital programs. The Authority directs the Companies to develop programs in accordance with these frameworks and to submit them for approval by the Authority in the companies' next general rate cases. The Authority also reviewed the reports submitted by the electric distribution companies pursuant to Conn. Gen. Stat. § 16-32n(b) through this proceeding. In conducting the review of these reports, the Authority finds that lineworker staffing levels must be considered in the context of an electric distribution company's reliability and resilience programming. Therefore, final decisions regarding lineworker staffing increases must take place in each EDC's next rate case.

In addition, the Authority has reviewed the emergency response plans of the EDCs, and pursuant to Conn. Gen. Stat. § 16-32e, directs the EDCs to incorporate certain modifications as detailed herein.

B. ORDERS

For the following Orders, the Company shall submit an electronic version through the Authority's website at www.ct.gov/pura. Submissions filed in compliance with the Authority's Orders must be identified by all three of the following: Docket Number, Title and Order Number. Compliance with orders shall commence and continue as indicated in each specific Order or until the Company requests and the Authority approves that the Company's compliance is no longer required after a certain date.

1. Order No. 1(f) in the Reliability Decision is hereby rescinded. The EDCs shall identify and prioritize worst-performing circuits for reliability improvements in accordance with the Framework outlined in Section II.B.3.c.ii., Targeted Improvements of Reliability.
2. No later than March 22, 2023, and annually thereafter, the EDCs shall track and report to the Authority on a calendar year basis the reliability metric data as described in Section II.B.3.d.ii., Measurement – Data Collection Requirement. The reliability data shall include:
 - a. The EDC's reliability metrics as shown in Table 19. Data provided in Table 19 may be provided to show more detailed level of data, but shall not provide less information.
 - b. The remaining SAIDI, SAIFI, CAIDI, MAIFI, CEMI, CELID data as described in the section.
 - c. No later than March 22, 2026, the EDCs shall report momentary outage data: MAIFI, CEMM, and CEMSMI pursuant to the section.
3. The EDCs shall include in its first Reliability Plan submission submitted in its next general rate case pursuant to the Reliability Framework herein, a report on the

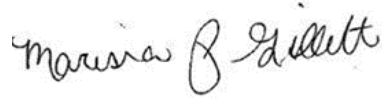
- capabilities to track momentary outages, and plan for developing the capability to track such. The plan for developing the capability must include an estimated cost to develop the capabilities.
4. No later than March 22, 2023, the EDCs shall track and submit to the Authority the report on the power quality metrics as described in Section II.B.3.d.iii., Measurement – Power Quality.
 5. In its next general rate case, each EDC shall submit its portfolio of reliability programs and resilience programs in accordance with the Reliability Framework and Resilience Framework implemented herein and as outlined in Section II.B.5.a.i., Initial Submissions.
 6. No later than September 22 each year, and starting in the first September following Authority approval in a rate proceeding of the EDC's reliability and resilience plans, each EDC shall submit updates to its reliability and resilience plans consistent with Section II.B.5.a.i., Annual Review Process. This annual review process will review the reliability and resilience plans approved as part of the EDC's prior rate proceeding. The submission shall include EDC's proposed line maintenance plans required pursuant to Conn. Gen. Stat. § 16-32g.
 7. No later than March 22, 2023, and annually thereafter, the EDCs shall submit all reliability and resilience metrics pursuant to Conn. Gen. Stat. § 16-245y and as supplemented in Section II.B.6., Annually Reliability and Resilience Scorecards. The submissions shall be made in the annual proceeding opened pursuant to the Annual Review process as outlined in Section II.B.5.a.i., Annual Review Process.
 8. No later than September 15, 2022, the EDCs shall submit a proposed scorecard format to EOE. No later than October 1, 2022, EOE shall initiate the Scorecard Working Group to review the EDCs' proposed designs and to seek input from other stakeholder groups for the final design format of the Scorecard. A proposed scorecard format and design shall be submitted by EOE as a motion for Authority review and approval no later than February 1, 2023.
 9. The EDCs shall include in its Reliability and Resilience Frameworks the following information:
 - a. Information pertaining to companion Equitable Modern Grid Programs as described in Section II.B.7.a., Integration with Other Equitable Modern Grid Initiatives.
 - b. Information demonstrating how the frameworks align with IJJA's program priorities and the steps the EDC has taken to identify and seek funding from those programs as described in Section II.B.7.b., Alignment with Federal Funding.
 10. No later than September 19, 2022, and every three months thereafter concluding on December 19, 2024, the EDCs shall provide a report describing their IJJA funding progress to the Authority every three months in accordance with Section II.B.7.b., Alignment with Federal Funding. Such report shall include at a minimum:

- (1) the dates and manner of researching funding opportunities; (2) a description of all pre-application steps taken for each opportunity; (3) the date of application for each funding opportunity and the amount of funding sought; (4) a general description of communications from the funding source including the date, provided separately for each funding opportunity; (5) the number of applications pending approval/denial as of the date of the report; and (6) a list of all funding sources obtained by name of source and amount of funding.
11. No later than October 1, 2022, the Authority requests that the Connecticut Insurance Department submit, for Authority review and approval, a scope of work for inclusion in an Authority-issued RFP, inclusive of a recommended milestone list and corresponding timelines, as well as recommendations regarding a potential budget for such study. The EDCs shall provide any assistance requested by the Connecticut Insurance Department in its development of a potential scope of work for service providers to conduct a feasibility study for each EDC.
 12. No later than October 7, 2022, the EDCs shall conduct and submit for Authority review and approval a detailed scope of work, timeline, and anticipated budget for completing its Climate Change Vulnerability Study as described in Section B.8.b., Prospective Modeling of Climate Change Risk.
 13. In the Company's next general rate case submitted pursuant to Conn. Gen. Stat. § 16-19a after such study is completed, the Company shall incorporate into the Reliability and Resilience Frameworks the results from its Climate Change Vulnerability Study as described in Section II.B.8.b., Prospective Modeling of Climate Change.
 14. No later than October 7, 2022, interested docket Participants shall submit proposals related to undergrounding matters that may benefit from the General Assembly's consideration. Interested docket Participants shall submit reply comments to the October 7, 2022 proposals no later than October 21, 2022.
 15. No later than December 5, 2022, the Rule 20 Working Group shall submit its report as described in Section II.B.8.b., Prospective Modeling of Climate Change for Authority review and approval.
 16. No later than October 15, 2022, EOE shall collaborate, at a minimum, with DEEP, the OCC, and the EDCs to develop and submit for Authority review and approval a VM Working Group mission, charter, structure, membership list, ground rules, and other requirements as outlined in Section II.B.10., Vegetation Management Working Group.

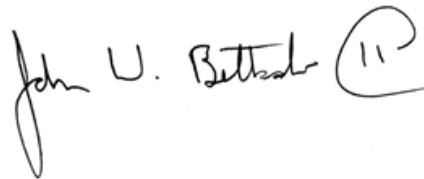
17. No later than September 30, 2022, UI shall include in its ERP the definitions identified in Section II.C.1.a., Eversource Definitional Changes. These changes shall be submitted for Authority review and approval (i.e., as a motion).
18. No later than September 30, 2022, the EDCs shall include in their respective ERPs appropriate protocols related to ISO-NE operating procedures as described in Section II.C.2., Incorporation of Winter Reliability Emergency Protocols into ERP.
19. No later than September 30, 2022, the EDCs shall include in their respective ERPs Utilities' critical infrastructure information and point-of-contact information consistent with Section II.C.3., Plan to Address Other Utility Critical Infrastructure.
20. No later than June 30, 2024, each EDC shall include a Cybersecurity disruption response component in its ERP submitted pursuant to Conn. Gen. Stat. § 16-32e as described in Section II.C.4., Incorporation of Cybersecurity Plan into ERP.

**DOCKET NO. 17-12- PURA INVESTIGATION INTO DISTRIBUTION SYSTEM
03RE08 PLANNING OF THE ELECTRIC DISTRIBUTION
COMPANIES - RESILIENCE AND RELIABILITY
STANDARDS AND PROGRAMS**

This Decision is adopted by the following Commissioners:



Marissa P. Gillett



John W. Betkoski, III



Michael A. Caron

CERTIFICATE OF SERVICE

The foregoing is a true and correct copy of the Decision issued by the Public Utilities Regulatory Authority, State of Connecticut, and was forwarded by Certified Mail to all parties of record in this proceeding on the date indicated.



Jeffrey R. Gaudiosi, Esq.
Executive Secretary
Public Utilities Regulatory Authority

August 31, 2022

Date