EVERSOURCE

Annual Reliability Report

2022 Report to the NH Public Utilities Commission

March 1, 2023

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Eversource

2022 Reliability Report

Executive Summary

Executive Summary

This report has been prepared in accordance with the terms of the October 9, 2020 Settlement Agreement approved by the New Hampshire Public Utilities Commission ("Commission" or "PUC") in Docket No. DE 19-057 (the "Settlement Agreement") including Appendix 4 of the Settlement Agreement. It provides information on Public Service Company of New Hampshire d/b/a Eversource Energy's ("Eversource" or the "Company") distribution system reliability and activities undertaken by the Company in calendar year 2022 focused on reliability.

Section 1 provides graphs of various reliability indices as specified in Appendix 4 of the Settlement Agreement. All graphs are based on IEEE reporting criteria, which was adopted by the NH Public Utilities Commission in 2014.

Section 2 provides a summary of specific operations and maintenance ("O&M") activities undertaken in 2022 which are generally targeted at maintaining or improving reliability. These activities include patrols of overhead distribution lines, inspections of underground developments and padmounted equipment, inspections of wood distribution poles for decay, and repairs of non-capital items on distribution lines related to the National Electrical Safety Code.

Section 3 provides information on capital projects targeting reliability, with information on the replacement of wooden distribution poles found to be defective through inspection, replacement of direct buried underground cable with new cable in conduit, and other capital reliability projects with spending greater than $100,000 in the calendar year. This last category is further broken down into new projects initiated in 2022, and projects with spending in 2022 over the threshold but which were established in prior years. Projects established in 2022 also have project descriptions included. Projects included in Section 3 include any locations where reliability was listed as an objective of the project, even if the project had other justifications such as replacing obsolete assets or safety concerns. Spending in 2022 on defective pole replacements totaled $1.38M. Spending on two projects replacing direct buried cable totaled $550K. Spending on new reliability projects totaled $22.836M, and on continued projects from prior years amounted to $26.142M.

Section 4 contains the Company's annual report on the 50 worst performing circuits for the previous year.

The Company's reliability has improved over time, with reductions in the overall frequency of outages (SAIFI), the duration of outages (SAIDI), and the number of customers impacted when outages do occur (CIII). Improvements in SAIFI and CIII have led to a general increase in CAIDI. Summary charts are provided in Section 1.1.

Preventing outages from occurring and reducing the number of customers impacted by those outages are methods to improve SAIFI and CIII. Company work in areas such as tree trimming, the installation of covered wire, pole top distribution automation, and TripSavers, as well as other activities have resulted in the improvements shown. The increasing penetration of pole top distribution automation has the unfortunate impact of resulting in a general increase in CAIDI, as more customers are restored in under five minutes and the remaining customers are subject to the full duration of the outages that require lineworkers to effect repairs. Company initiatives to reduce CAIDI include expanding the regions of the state with troubleshooters to provide 24 hour coverage, utilizing the System Operations Center to manage the distribution system at voltages below 34.5 kV, adding SCADA control to lower voltage substations, and continued penetration of pole top Distribution Automation which can help identify a fault location while crews are en route to the outage.

Section 1

Distribution System Reliability

The following is a brief description of the reliability graphs contained in this section. All graphs represent data for the time frame 2018 through 2022 and reflect IEEE criteria, adopted by the NHPUC in the second quarter of 2014.

Section 1.1 shows Eversource NH SAIFI, CAIDI, SAIDI, and CIII. All graphs are based on IEEE criteria. The Company SAIFI and SAIDI have shown much improvement since 2018; 2022 was the best year for SAIDI since 1996. SAIDI performance of 79 in 2022 is comparable to 1991 and 1992, which have been the best years since at least 1989. 2019 was the first year since 1993 that SAIDI has been under 100 and it has stayed below 100 through 2022.

Eversource tracks metrics on minor storm days that are not defined by the PUC major storms (IEEE Major Exclusion Days ("MEDs")). The impact of minor storms is included in all presented data. Eversource experienced a total of 38 minor storm days in 2022 compared to 47 in 2021, 37 in 2020, 23 in 2019, and 28 in 2018. The impacts of these storms are included in the reported statistics. These storms contributed 40 minutes to Eversource's SAIDI performance in 2022, compared to 51 minutes in 2021, 47 minutes in 2020, 27 minutes in 2019, and 47 minutes in 2018.[1]

Section 1.2 depicts CAIFI and CTAIDI over the 2018 through 2022 timeframe. These new indices have only been reported on since 2020. CAIFI is designed to show trends in customers interrupted and shows the number of customers affected out of the whole customer base. It is calculated by dividing the total number of customer interruptions by the number of distinct customers interrupted. CTAIDI is the average total duration of interruption for customers who had at least one interruption during the period of analysis and is calculated by dividing the total number of customer minutes of interruptions in the period by the number of distinct customers interrupted. Therefore, both CAIFI and CTAIDI indices refer only to customers who have experienced a service interruption in the period. For 2018 through 2022, CAIFI was in the range of 1.68 to 2.02 and CTAIDI has been in the range of 3.13 to 3.8 with 2022 reflecting roughly the average for the 5 year period.

Section 1.3 depicts Eversource tree related statistics. The largest cause group for outages is trees and limbs, primarily from outside of the clearance area, therefore all four indices closely follow the total distribution system indices shown in Section 1.1. More than half of all tree related outages included in the reporting metrics occur during minor storm events and, therefore, tend to be longer duration outages. SAIDI, SAIFI and CIII showed improvement in 2022 compared to 2021, with CAIDI showing an uptick due to tree related outages during minor storms.

Section 1.4 shows Eversource equipment related statistics on the distribution system. These statistics exclude substation equipment, which are presented separately in the Section 1.5. Equipment failures were between the second and fourth leading cause contributors for SAIDI and SAIFI over the presented time frame. SAIFI, SAIDI and CIII all showed a downward trend over the reporting period.

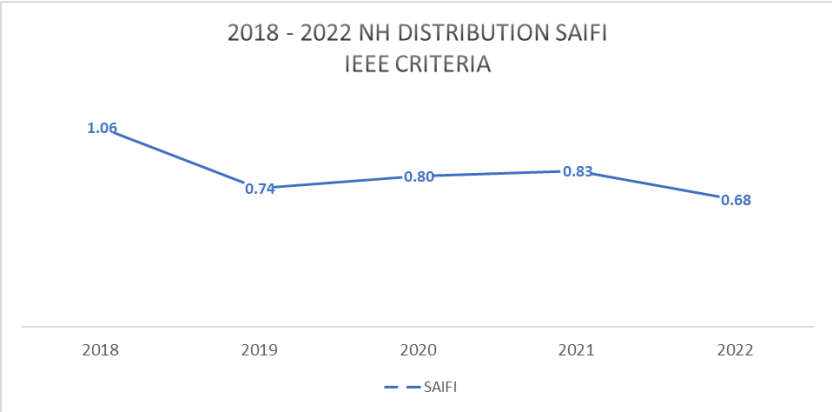
Section 1.5 shows results for distribution substation equipment failures. Power outages caused by equipment failures inside substations typically affect many customers and can be long in duration. That said, the reliability impact from substation outages has been minimal over the presented time frame. There was no equipment failure event in 2022, compared to one in 2021, one in 2020, three in 2019 and one in 2018.

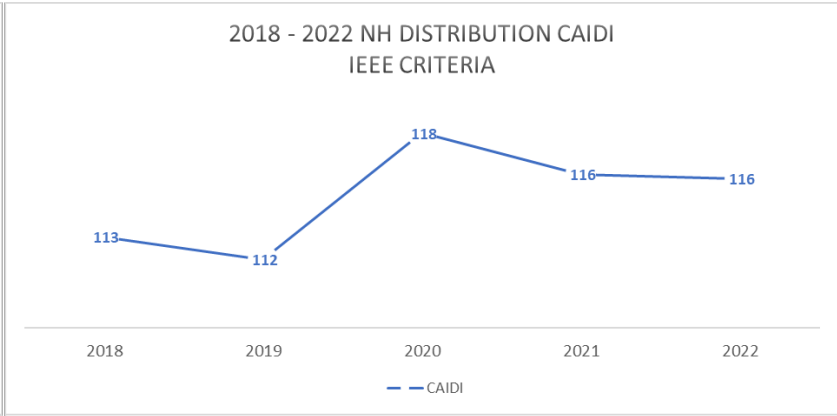
Section 1.6 shows Total SAIDI and Equipment Failure SAIDI that occurred during IEEE MEDs. The reliability impact of these major storms is not included in Eversource statistics presented elsewhere.

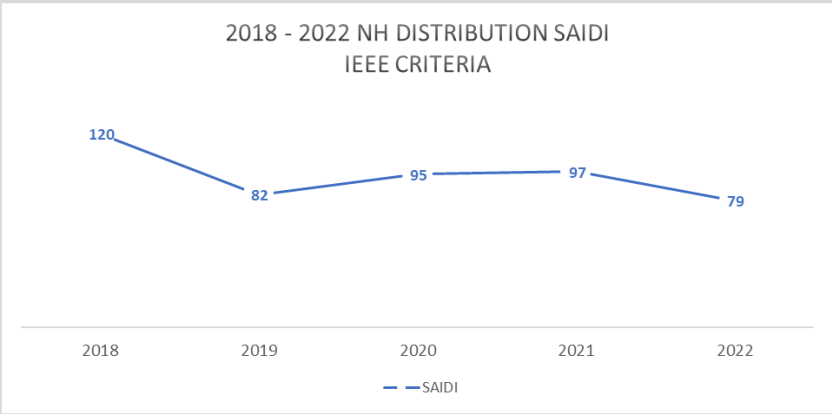
[1] Please note that the minor storm data presented in this 2022 Reliability Report differs from the minor storm data presented in the 2021 Reliability Report filed in Docket DE 22-010. The Company discovered an inadvertent error with the data presented in the 2021 Reliability Report while compiling this 2022 Reliability Report. The data presented here is correct.

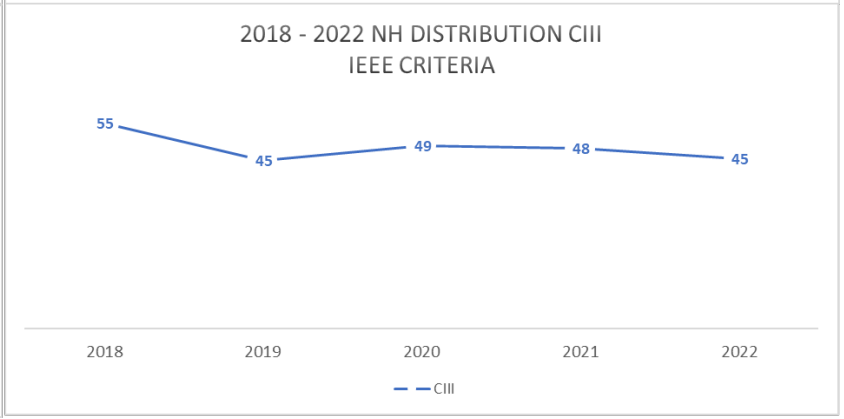
Section 1.7 shows SAIDI and SAIFI broken down by cause for each year 2018 through 2022. Tree related outages are the top driver of both statistics for the entire period, averaging 57 SAIDI minutes per year over the reporting period. Second, third and fourth places include Equipment Related, Action By Others and Other related outages. Outages due to equipment related causes averaged 10 SAIDI minutes per year. Action by Others, which includes causes such as motor vehicle accidents, customers and contractors digging into underground cables or felling trees on lines or vandalism, etc., averaged 10 SAIDI minutes per year. The “Other” category includes Public Safety Intentional Outages, Load Shedding, Planned Interruptions and Miscellaneous and averaged 12 SAIDI minutes per year over the reporting period.

Section 1.1 SAIFI (frequency), SAIDI (minutes), CAIDI (minutes), CIII (# of customers) – Distribution System Only – IEEE Criteria

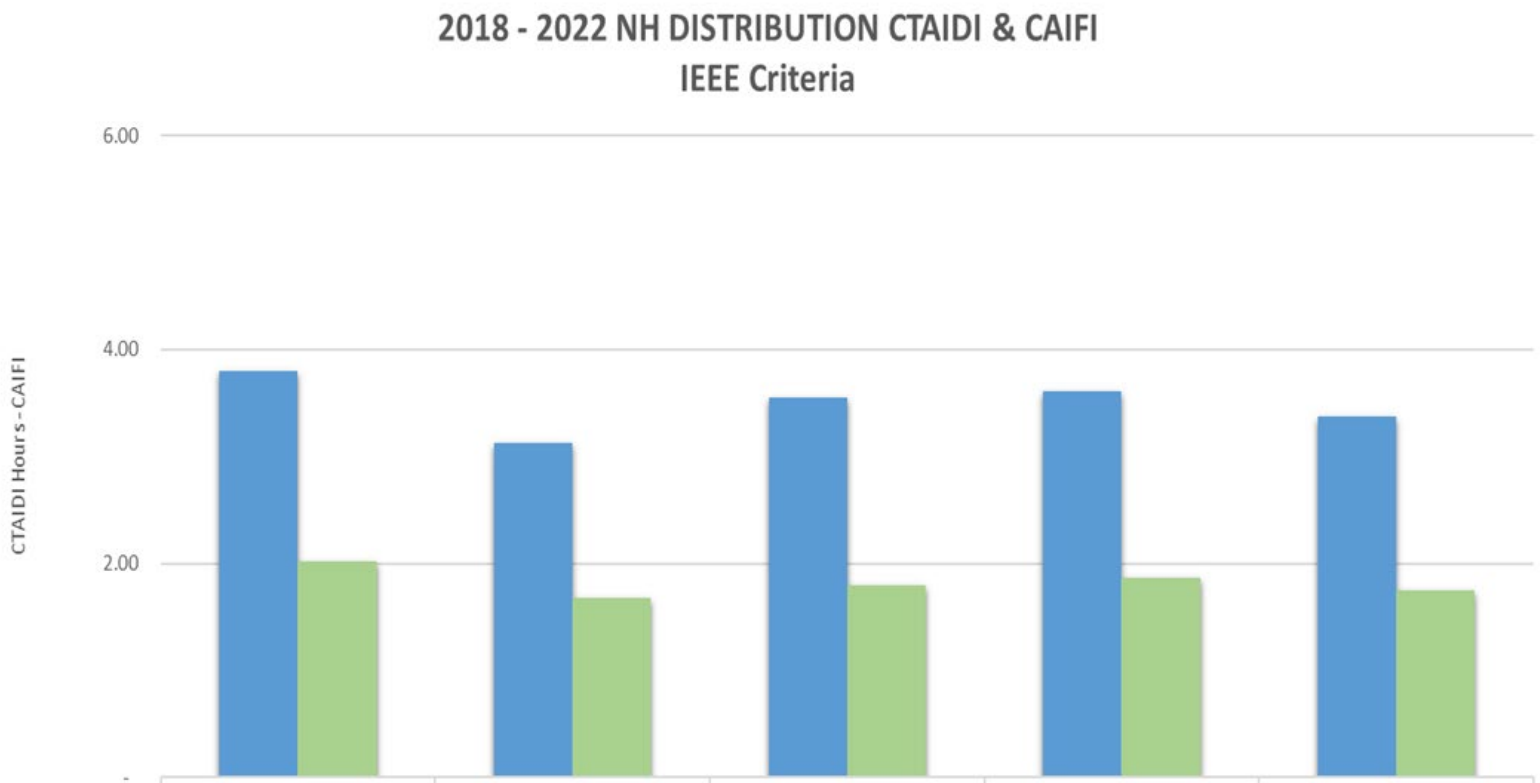






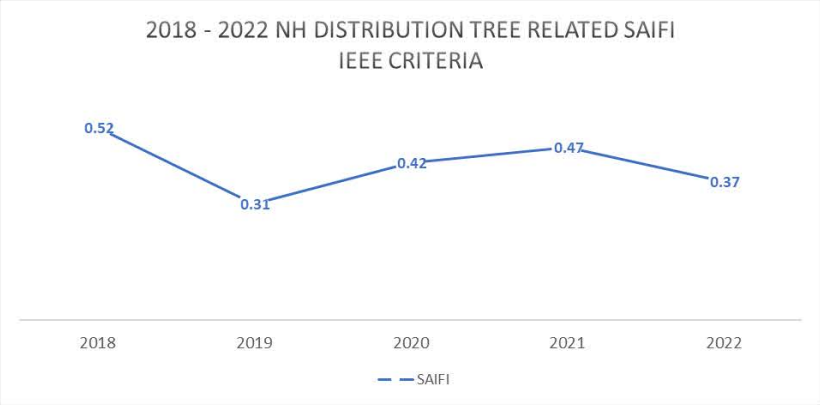


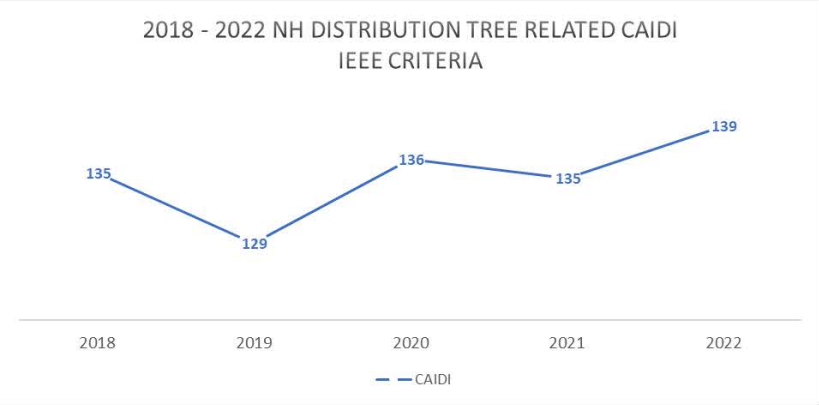
Section 1.2 CAIFI (frequency), CTAIDI (hours) – Distribution System Only – IEEE Criteria

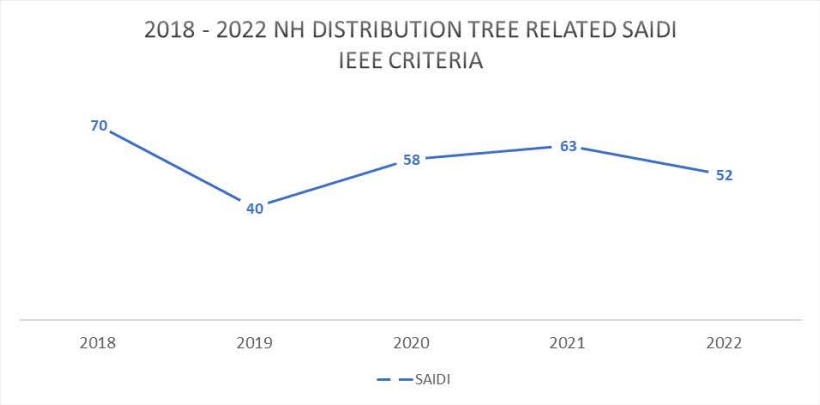


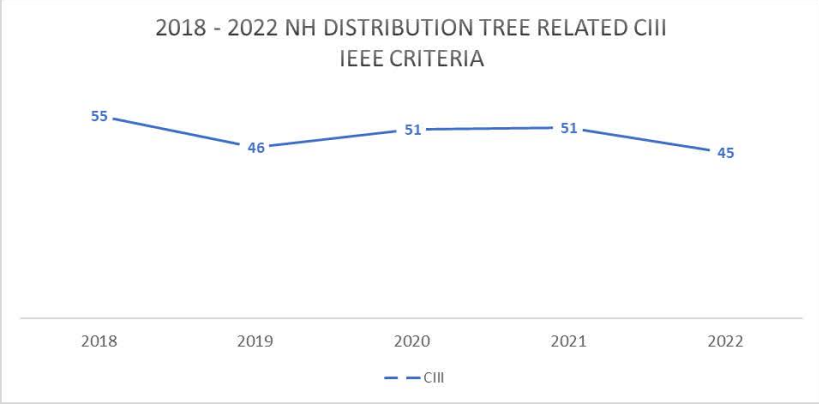
	2018	2019	2020	2021	2022
CTAIDI - Hours	3.80	3.13	3.55	3.61	3.37
CAIFI	2.02	1.68	1.80	1.86	1.74

Section 1.3 SAIFI, SAIDI, CAIDI, CIII – Distribution System – Tree Related – IEEE Criteria

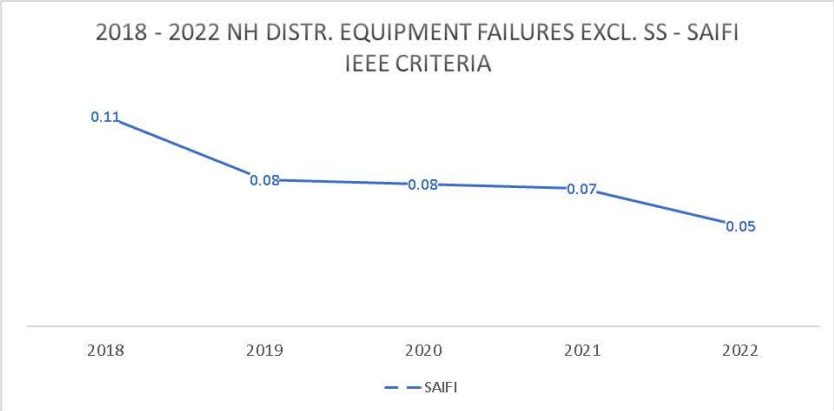


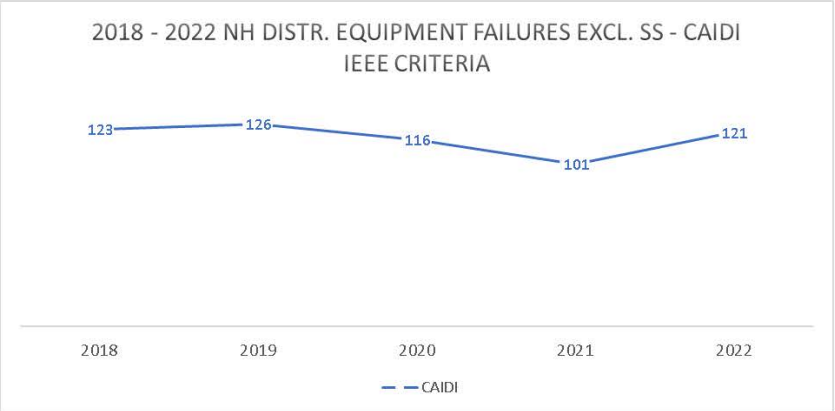


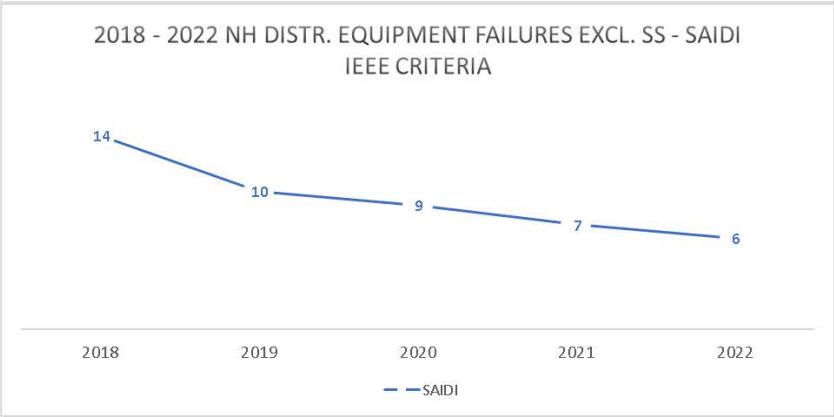


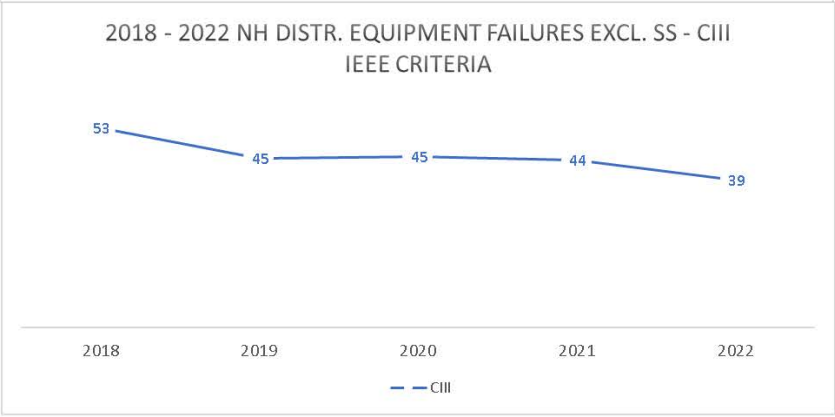


Section 1.4 SAIFI, SAIDI, CAIDI, CIII – Distribution (excluding Substation) Equipment Failures – IEEE Criteria

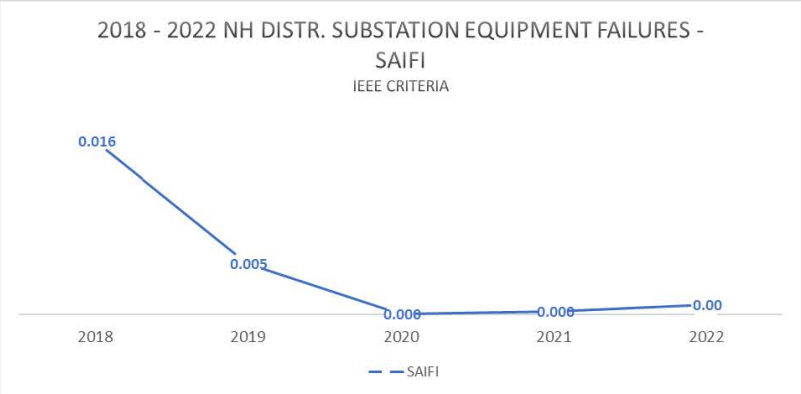


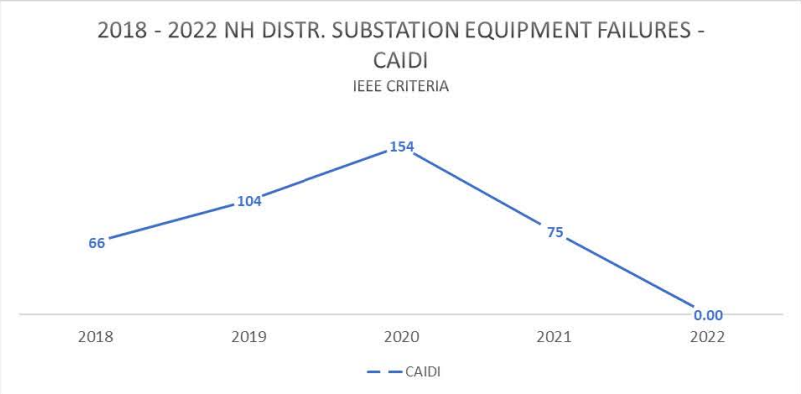


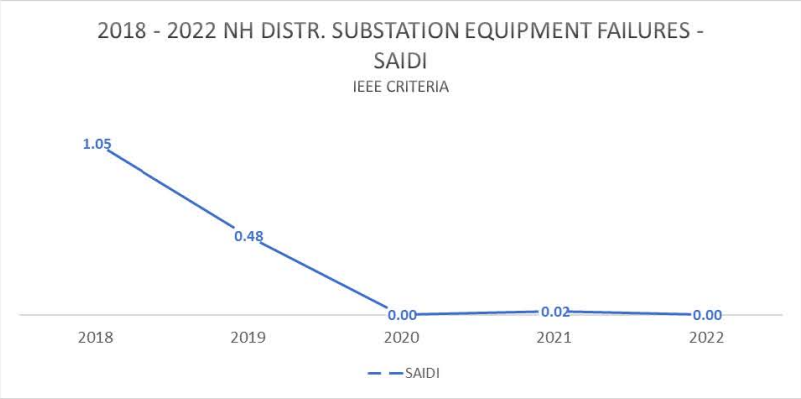


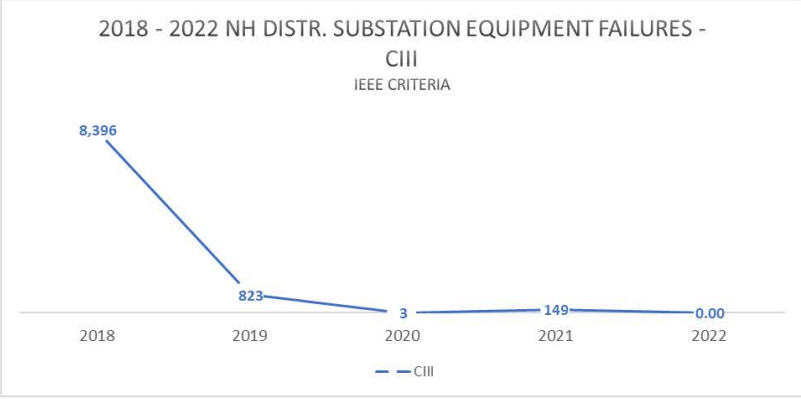


Section 1.5 SAIFI, SAIDI, CAIDI, CIII – Distribution Substation Equipment Failures - IEEE Criteria

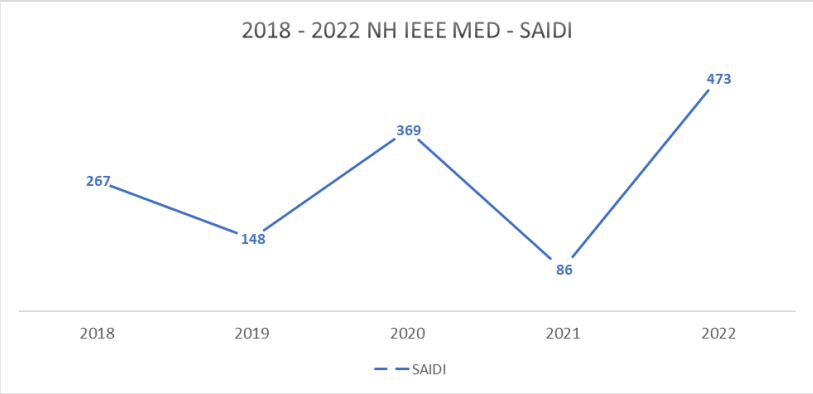


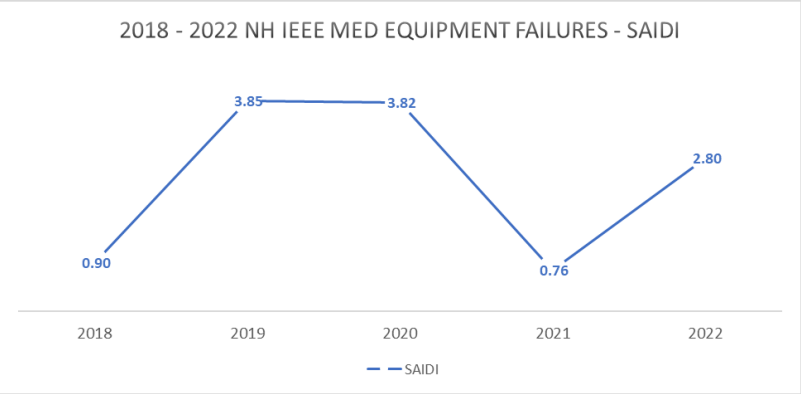


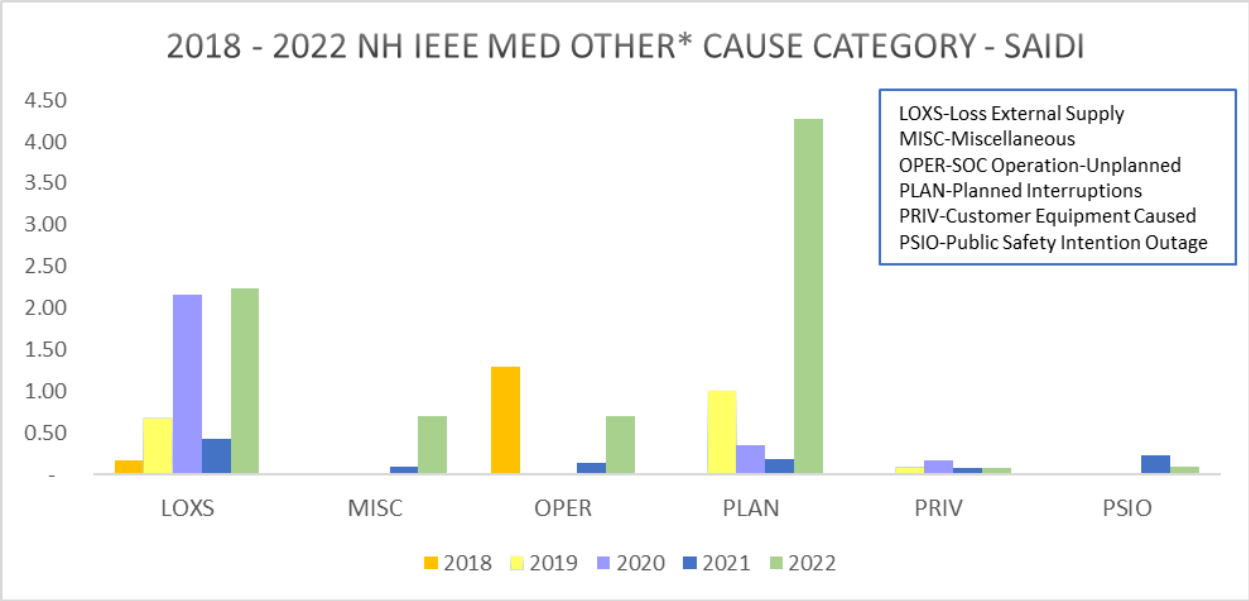




Section 1.6 SAIDI (IEEE MED) – Storm MED; Equipment Failure MED- Total System







Section 1.7 SAIDI and SAIFI by Cause – Total System - IEEE Criteria

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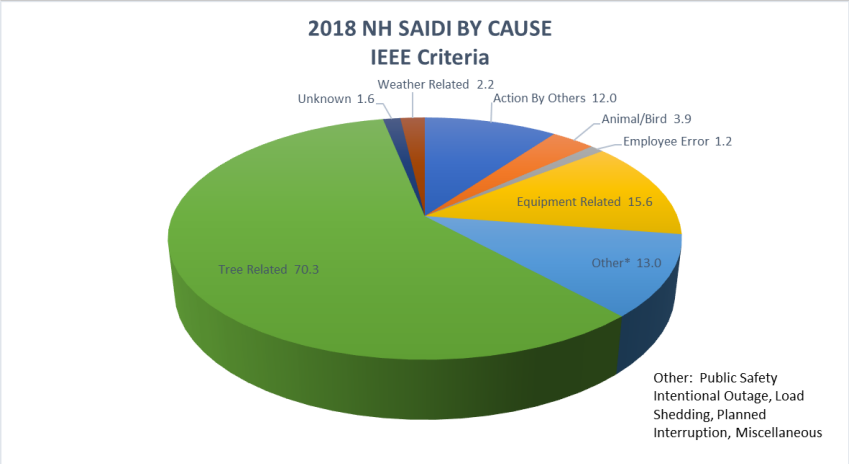
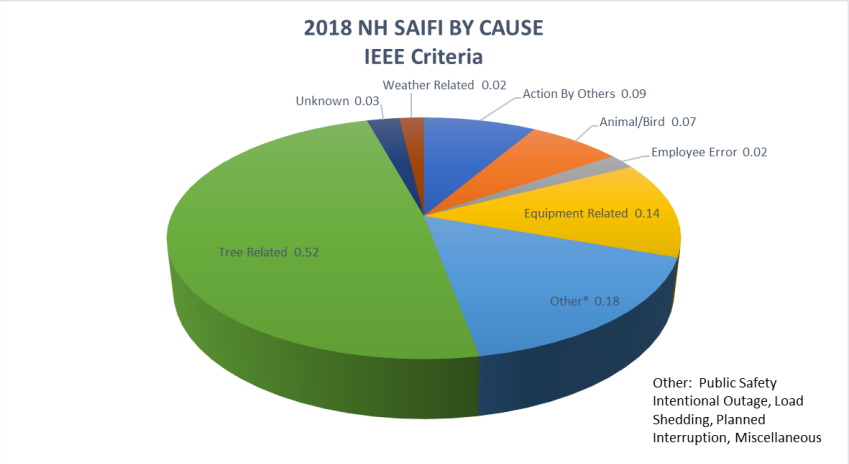


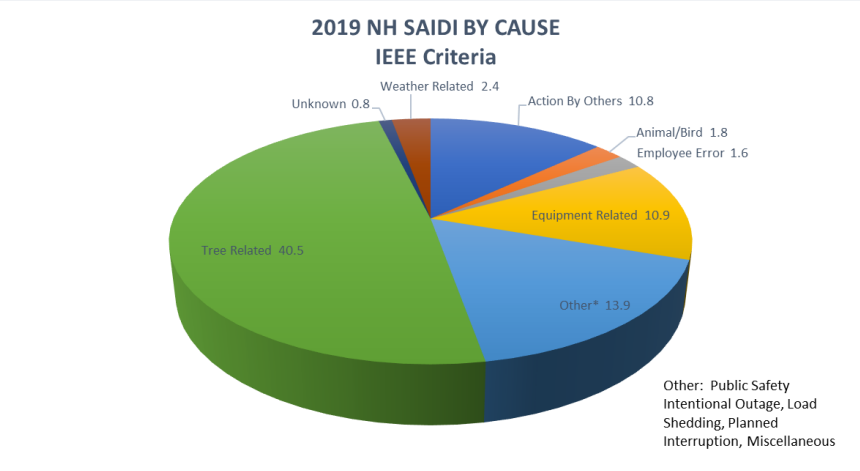


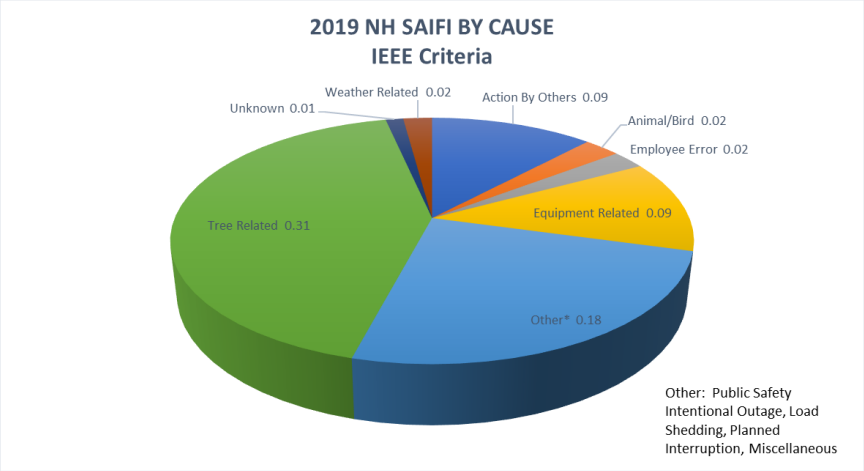
Cause	SAIDI
Tree Related	70.3
Equipment Related	15.6
Other	13.0
Action By Others	12.0
Animal/Bird	3.9
Weather Related	2.2
Unknown	1.6
Employee Error	1.2

Cause	SAIFI
Tree Related	0.52
Other	0.18
Equipment Related	0.14
Action By Others	0.09
Animal/Bird	0.07
Unknown	0.03
Employee Error	0.02
Weather Related	0.02

Section 1.7 cont'd SAIDI and SAIFI by Cause – Total System - IEEE Criteria

2019:



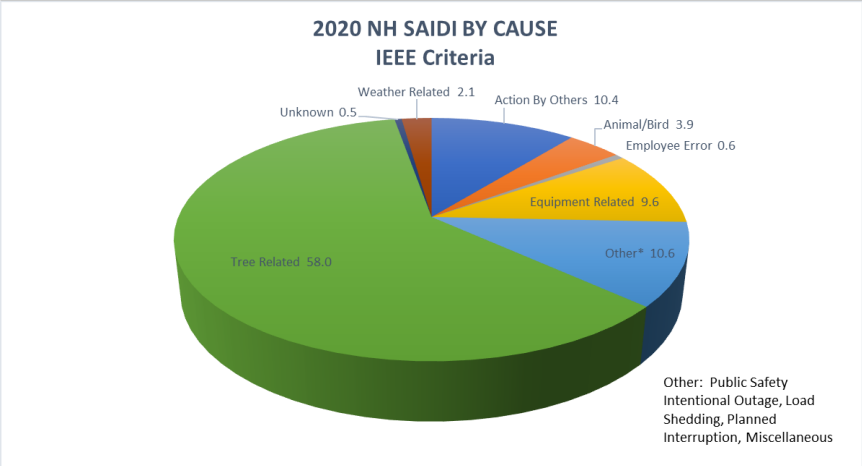


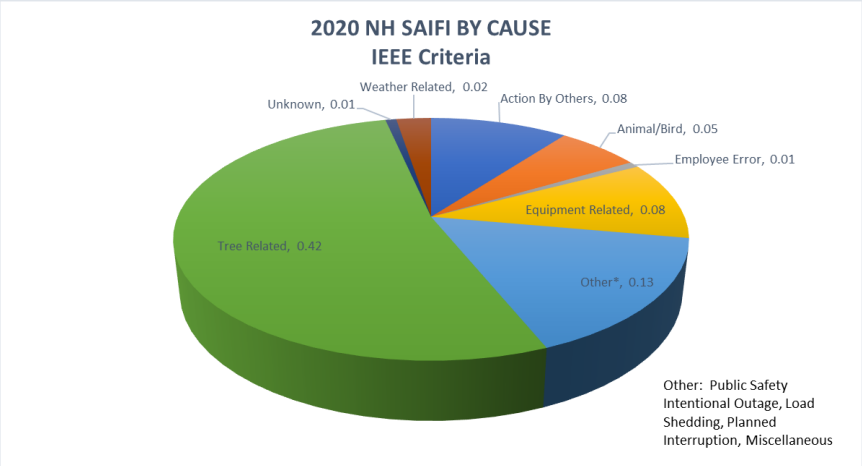
Cause	SAIDI
Tree Related	40.5
Other	13.9
Equipment Related	10.9
Action By Others	10.8
Weather Related	2.4
Animal/Bird	1.8
Employee Error	1.6
Unknown	0.8

Cause	SAIFI
Tree Related	0.31
Other	0.18
Action By Others	0.09
Equipment Related	0.09
Animal/Bird	0.02
Employee Error	0.02
Weather Related	0.02
Unknown	0.01

Section 1.7 cont'd SAIDI and SAIFI by Cause – Total System - IEEE Criteria

2020:



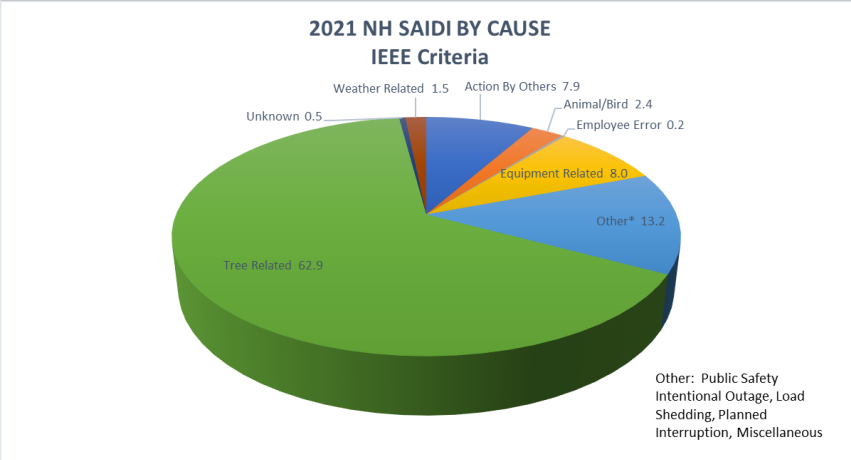


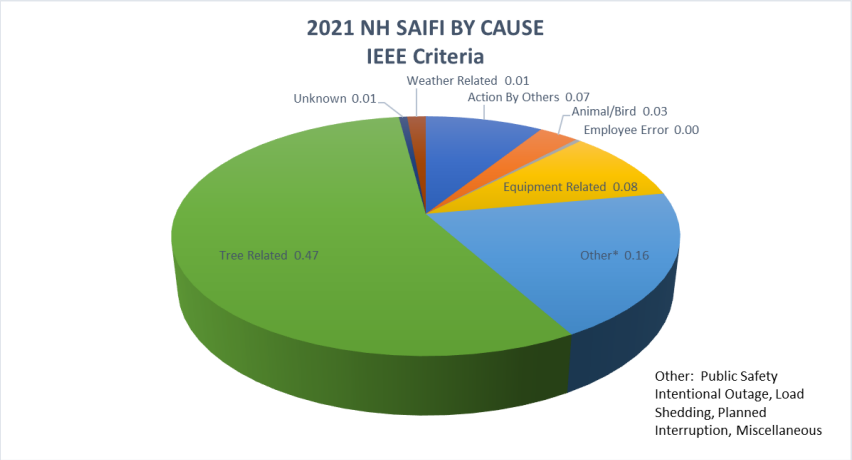
Cause	SAIDI
Tree Related	58.0
Other	10.6
Action By Others	10.4
Equipment Related	9.6
Animal/Bird	3.9
Weather Related	2.1
Employee Error	0.6
Unknown	0.5

Cause	SAIFI
Tree Related	0.42
Other	0.13
Action By Others	0.08
Equipment Related	0.08
Animal/Bird	0.05
Weather Related	0.02
Employee Error	0.01
Unknown	0.01

Section 1.7 cont'd SAIDI and SAIFI by Cause – Total System - IEEE Criteria

2021:



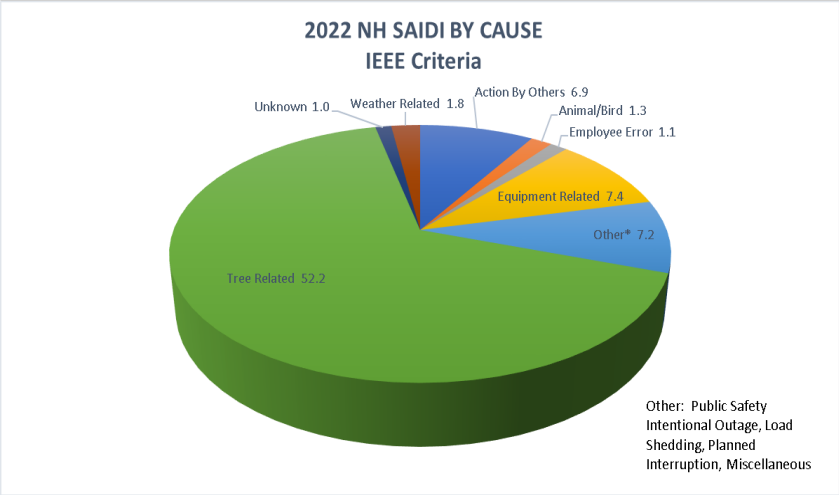


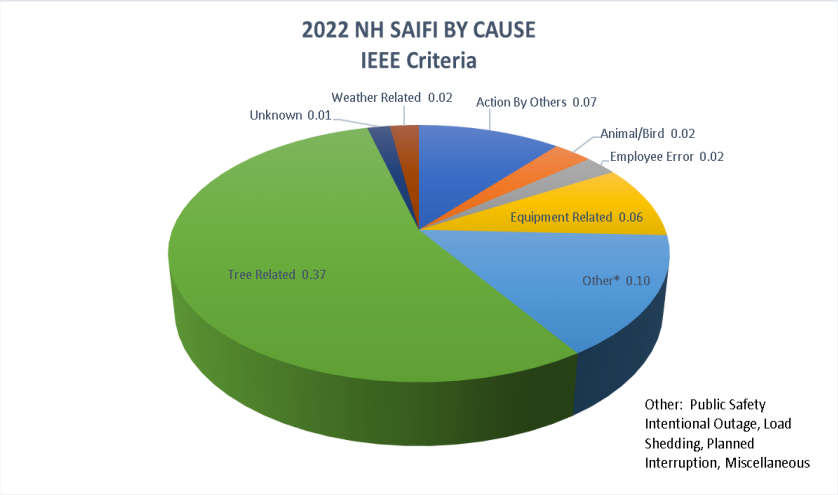
Cause	SAIDI
Tree Related	62.9
Other	13.2
Equipment Related	8.0
Action By Others	7.9
Animal/Bird	2.4
Weather Related	1.5
Unknown	0.5
Employee Error	0.2

Cause	SAIFI
Tree Related	0.47
Other	0.16
Equipment Related	0.08
Action By Others	0.07
Animal/Bird	0.03
Weather Related	0.01
Unknown	0.01
Employee Error	0.00

Section 1.7 cont'd SAIDI and SAIFI by Cause – Total System - IEEE Criteria

2022:





Cause	SAIDI
Tree Related	52.0
Equipment Related	7.4
Other	7.2
Action By Others	6.9
Weather Related	1.8
Animal/Bird	1.3
Employee Error	1.1
Unknown	1.0

Cause	SAIFI
Tree Related	0.37
Other	0.10
Action By Others	0.07
Equipment Related	0.06
Animal/Bird	0.02
Employee Error	0.02
Weather Related	0.02
Unknown	0.01

Section 2

O&M Activity Summary
January 1, 2022 – December 31, 2022

Section 2.1 Pole Inspections

Program Description: Inspect for decayed or damaged poles to ensure reliable and safe use of this asset.

Total Unit Population: Eversource is responsible for ground line inspection of approximately 250,000 poles. Eversource performs ground line inspection of poles in Eversource set areas only. A visual overhead inspection is performed on all poles to which the Company is attached.

Maintenance Cycle: Wood poles are inspected on a 10-year cycle in accordance with Eversource Maintenance Plan Chapter 5.61 and Intracompany Operating Procedures in place with joint owners in the State of NH.

Reliability Benefit: Replacement of decayed poles results in a more reliable and resilient distribution system.

Results: Pole inspection plans are developed based on the total number of poles in the towns to be inspected. Copper, Chrome, Arsenic ("CCA") treated poles less than 20 years old, and those treated with other preservatives and less than 10 years old, are not checked for ground line decay (sound and bore and/or ground line excavation). In 2022, 18,151 poles were ground line inspected plus an additional 28,171 poles in joint owner maintenance area were visually inspected for overhead issues.

$ Plan	$ Actual	$ Variance
$689,000	$633,436	($55,564)

Expenses were lower than anticipated due to the number of newer poles which did not require inspection, based on age, in the towns inspected in 2022.

Section 2.2 National Electrical Safety Code (NESC) Repairs

Program Description: Repair non-capital items documented as part of circuit inspections or other NESC compliance surveys such as during surveys for third party attachments.

Total Unit Population: Eversource has approximately 12,200 miles of overhead distribution line and approximately 2,000 miles of underground distribution line.

Results: In 2022, 12 NESC repair maintenance orders were completed and 0 corrective maintenance orders are outstanding. Extensive repairs were completed as part of make-ready work for CATV expansion into the Lakes Region area as well as other areas of concentrated third-party activity.

$ Plan	$ Actual	$ Variance
n/a*	n/a*	n/a*

*Budgets are not developed or tracked at this level or for this activity. Work is completed under a variety of Field Work Orders ("FWOs")

Section 2.3 Underground Circuit Inspections

Program Description: Inspect Direct Buried facilities including cable in conduit installations. Periodic inspections of Direct Buried and associated equipment at the specified interval allows preventative and corrective actions to be performed prior to situations becoming hazardous to the public or resulting in equipment failure.

Total Unit Population: Eversource is responsible for approximately 28,800 assets which are located in underground developments or are underground facilities providing service from the company's overhead system totaling approximately 2,000 miles of underground line.

Maintenance Cycle: Direct buried (including cable in conduit) facilities are inspected on a 10-year cycle, in accordance with Eversource Maintenance Plan chapter 5.11. As needed, replace fault indicators on a scheduled basis at the time of inspection.

Reliability Benefit: Proactively inspect underground developments, padmounted transformers, and associated equipment to identify potential issues and to ensure they function when needed.

Results: In 2022, 2,701 assets were inspected.

$ Plan	$ Actual	$ Variance
n/a*	n/a*	n/a*

*Budgets are not developed or tracked at this level or for this activity. Inspection work is completed under a variety of Field Work Orders (FWOs).

Section 2.4 Overhead Circuit Patrols

Program Description: Patrol overhead distribution lines. Patrols may be done for a variety of reasons including infrared patrols, post-storm patrols, or other reasons. Each reason for patrolling has different criteria regarding how far into the circuit the patrol is performed. For example, infrared patrols cover only the backbone while post-storm patrols may include all circuitry out to a certain size protective device.

Total Unit Population: Eversource has approximately 12,200 miles of overhead distribution line.

Maintenance Cycle: Overhead roadside distribution line backbones are inspected with infrared imaging equipment at least once annually in accordance with Eversource Maintenance Plan chapter 5.22. Aerial patrols of lines in rights-of-way (ROW) are completed at least once per year in accordance with the Eversource Maintenance Plan chapter 5.45

Reliability Benefit: Infrared patrols are intended to identify overheated equipment which may cause an outage or damage other equipment. Post-storm patrols are intended to find leftover damage not repaired during the storm or imminent dangers, either of which may cause an outage in the future. Aerial ROW patrols are intended to identify items needing repair which may cause an outage in the future.

Results: Patrols completed in 2022:

ROW aerial patrols: All ROW lines or line segments were patrolled in February, and August of 2022, with additional patrols of certain lines over the course of the year associated with project work, in response to momentary events, or following storm events. A list of lines patrolled is included in Section 2.4(a) below.

Patrols of poor performing roadside circuits were conducted in 2022 to identify unfused transformers and laterals. A project was approved to add fusing to these locations to improve the reliability for these customers by preventing isolated events from affecting larger numbers of customers.

In addition, focused post storm circuit sweeps were conducted following multiple weather events throughout the year. Circuits with moderate or higher impacts were patrolled. Three phase backbone and large single and three phase laterals were patrolled. These patrols were conducted to identify anything which might cause an imminent outage, a danger to public safety, Eversource debris left beside the road, limbs on or over the primary, and broken or uprooted trees leaning on or over the primary conductors. All items were addressed immediately by entry and tracking in the Outage Management System.

The vegetation management ("VM") organization performs post event assessments following all tree related events that result in a permanent outage affecting 100 or more customers as well as when "three or more" outages occur in a circuit segment within 90 days to ensure no additional VM follow up is required. Additionally, VM performs a "reliability" assessment of the system during the 100% quality control inspection of the trimming that is completed annually. Arborists record locations where they observe electrical hardware issues and report them into the System Operations Center.

Infrared ("IR") patrols were reinstated in 2022 (they were paused in 2020 and 2021 due to COVID-19 precautions). The surveys are performed on substation equipment and circuit three phase backbones to identify situations which could lead to equipment failure due to heating from poor connections or failing equipment.

The roadside circuits patrolled are listed below in Section 2.4(b).

$ Plan	$ Actual	$ Variance
n/a*	n/a*	n/a*

*Budgets are not developed or tracked at this level or for this activity.

Section 2.4(a) ROW Patrols

Area Work Center	Circuit
Bedford	312
Bedford	314
Bedford	322
Bedford	323
Bedford	324
Bedford	328
Bedford	354
Bedford	358
Bedford	359
Bedford	378
Bedford	3108
Bedford	3138
Bedford	3143
Bedford	3151
Bedford	3155
Bedford	3164
Bedford	3194
Bedford	3212
Bedford	3392
Bedford	3467
Bedford	314X12
Bedford	3194X1
Bedford	3194X2
Bedford	3271
Bedford/Hooksett	325
Bedford/Hooksett	334
Bedford/Hooksett	357
Bedford/Hooksett	3142
Bedford/Hooksett	334R
Bedford/Hooksett	335X56
Bedford/Hooksett	387
Bedford/Nashua	329
Bedford/Nashua	3217
Berlin	352
Berlin	3521
Berlin	350X
Berlin	350X2
Berlin	350X2
Berlin	3525X
Chocorua	346
Chocorua	347
Chocorua	390
Chocorua	395
Chocorua	3218
Chocorua	3218
Chocorua	336X
Chocorua	346X2
Derry	3184X
Derry	3184X10
Derry	32W1
Derry	32W4
Derry	32W5
Derry	365X
Epping	377
Epping	380
Epping	3103
Epping	3162
Epping	3229
Epping	3152X
EppIng	49W1
Hooksett	318
Hooksett	321
Hooksett	335
Hooksett	356
Hooksett	370
Hooksett	393
Hooksett	3182
Hooksett	3613
Hooksett	3614
Hooksett	334G
Hooksett	372 A&B
Keene	382
Keene	3178
Keene	3235
Keene	313X4
Keene	3140X1
Keene	382X2
Keene	4W1
Keene	76W1
Keene	76W3
Keene	76W4
Keene	76W7
Keene	W110
Keene	W15
Keene	W15
Keene	W15
Keene	W185
Keene	W2
Keene	W9
Keene	313
Keene/Newport	311
Lancaster	348
Lancaster	355X10
Lancaster	355
Lancaster	384
Lancaster	348X3
Lancaster	376L
Lancaster	376W
Lancaster	384X1
Lancaster/Berlin	351
Lancaster/Tilton	348X2
Nashua	353
Nashua	383
Nashua	389
Nashua	3110
Nashua	3136
Nashua	3144
Nashua	3146
Nashua	3147
Nashua	3154
Nashua	3159
Nashua	3175
Nashua	3177
Nashua	3445
Nashua	3445
Nashua	3750
Nashua	3020X
Nashua	3110X

Nashua	3168X
Nashua	3891X
Newport	315
Newport	316
Newport	3410
Newport	311 Tap
Newport	317 Tap
Newport	4181
Newport	4435
Newport	55W2
Newport	61W2
Portsmouth	3191
Portsmouth	339
Portsmouth	367
Portsmouth	3101
Portsmouth	3102
Portsmouth	3105
Portsmouth	3106
Portsmouth	3111
Portsmouth	3112
Portsmouth	3165

Portsmouth	3171
Portsmouth	3172
Portsmouth	3214
Portsmouth	3850
Portsmouth	3153X
Rochester	32
Rochester	340
Rochester	362
Rochester	371
Rochester	386
Rochester	392
Rochester	399
Rochester	3157
Rochester	3157
Rochester	3174
Rochester	3228
Rochester	3425
Rochester	3601
Rochester	3148X
Rochester	386A
Rochester	399X1

Rochester	W122
Tilton	310
Tilton	319
Tilton	337
Tilton	338
Tilton	343
Tilton	345
Tilton	368
Tilton	398
Tilton	3025
Tilton	3122
Tilton	3149
Tilton	3196
Tilton	3548
Tilton	3625
Tilton	3798
Tilton	3222X
Tilton	342A
Tilton	342B
Tilton/Epping	3137X
Tilton/Newport	317

Section 2.4(b) Roadside Circuit Patrols

Bedford
3108
3138
12W2
12W3
18W1_12
23X2_12
23X4_12
23X5_22
23X6_22
3108_12
3108X1_12
311X1_12
311X3_12
311X5_12
311X6_12
311X8

312X_12
3151X10_12
3151X9_12
3164X3_12
3164X8_12
3173X1_12
317X1_12
317X2
317X3_12
317X7
3194X1_12
322X10_12
322X12_12
323X5_12
3271X1_12
3271X2_12
3271X3_12
3271X45_12

3271X5_12
327X10_12
327X8_12
328X1_12
328X9_12
334G_12
334X14_12
335X1_12
335X15_12
335X2_12
335X3_12
33H1_12
35H1_12
360X1_12
360X11_12
360X14_12
360X2_12
360X5_12

360X7_12
37W1_12
3W1_12
3W2
5W1
5W2
79W4_12
85W1_12
JACKMAN
Berlin
21H1_77
21H2
21H4
21H5
25W1_77
350X_77
350X1_77
350X2_77
351X4_77
3525X1_77
3525X2_77
3525X3_77
3525X4_77
3525X5_77
Chocorua
19W1
19W2
3116X1_45
3218_45
336X_45
336X1_45
346X1_45
347_45
395_45
Derry
31280
31840
26W1_23
3115X_23
3128X_23
3133X_23
3141X_23

3156X
3184X_23
32W1
32W3
32W4
32W5
365X_23
8W1_23
Epping
13H1
13H2
3103_65
3103X1_65
3115X11_65
3115X12_65
3115X7_65
3115X9_65
3137X1_65
3137X10_65
3137X3_65
3137X5_65
3137X6_65
3137X7_65
3137X8_65
3137X80_65
3152X_65
3152X1_65
3162X1_65
3229X1_65
3229X2_65
3229X3_65
3229X5_65
3229X6_65
377X1_65
377X11_65
377X15_65
377X16_65
377X19_65
377X2_65
377X20_65
377X29_65
377X3_65

377X5_65
377X6_65
377X7_65
380X1_65
380X2_65
380X3_65
49W1_65
63W1
Hooksett
13W1
14H4
14H7
14H8
14W1
14W2
14W7_11
14X126A_11
14X188_11
18W1_12
18W3
21W1
22W1
22W2
23W1
23W2
23W3
23W4
24H2
27W2
29H2_11
318X2_11
321X11_11
324X10_11
324X8_11
325X7_11
334X18_11
34W18_11
3614X3_11
3615X1_11
3615X2_11
3615X3_11
370X_11

393X11_11
393X20_11
393X8_11
44W2
7W1_11
Keene
3140
24X1_36
26H1_36
26H2_36
28W1_36
3120X1_31
3120X2_31
3120X3_36
3120X4_36
3139X_31
313X1_36
313X2_36
313X4_36
313X7_36
3140_36
3140X1_36
3140X2_36
3140X3_36
3155X4_36
3173_36
3178_31
3178X3_31
3178X4_31
3178X5_31
3179X
33W1
35W1
382X2_36
382X3_36
4W1
4W2
51W1_36
53H1_31
53H2_36
55H1_36
76W1

76W3
76W4
76W5_31
76W7_31
CHESTNUT
TB95L
W1
W110
W15
W175_31
W185
W2
W9_31
Lancaster
12W1_43
17W1_43
1W1
1W2
348X1_76
348X19_43
348X2_76
348X20_43
348X3
348X4_76
348X5_76
348X7_76
348X8_76
348X9_76
351X1_76
351X16_76
351X17_76
351X2_76
355X_76
355X1_76
355X10_76
355X14_76
355X15_76
355X16_76
355X2_76
355X3_76
355X4_76
355X5_76

355X6_76
355X7_76
36W1_76
376X1_76
376X2_76
376X3_76
376X4_76
376X5_76
376X6_76
384_76
41W1_43
43W1_43
45W1_43
59W1
59W2
5H1
5H2
Nashua
32170
03168X
15H2
15H3
15H4
15H5
15H6
15W1
16H1
16H2
16H3
17H1
17H2
17H3
18H1_21
18H2
18H3
23H3
23W7
24W1_21
27H1_22
27H2_22
27H3_22
2H1

2H2
3010X_21
3020X
3110X_21
3136X_21
3143X_22
3144_21
3144X1_21
3144X3_21
314X12_22
314X14_22
314X15_22
314X23_22
314X26_22
314X3_22
314X4_22
314X46_22
314X54_22
3154X1_21
3154X2_21
3155X_22
3155X2_22
3155X3_22
3155X7_22
3155X8_22
3155X9_22
3168X_21
3175X_21
3175X1_21
3175X3_21
3177X1_21
3177XA_21
3212X_22
3217X_22
3445X_21
3750_21
383X1_21
383X2_21
383X3_21
3H1_21
3H2_21
40W1

6W1_21
72W1_21
9H1
9H2
9H2_21
HUDSON
Newport
16W1
16W3
315X2_32
316_32
316X1_32
316X2_32
3410_32
3410X1_32
42X1
42X3_32
42X4
44H1
46W1
47W1_32
48W1_32
54W1
55W2
60W1
61W2
74W1
75W2
NEW_LONDON
TB92L
Portsmouth
15W4
16W4_63
2W4
2W5
3102_63
3105X1_63
3105X4_63
3111X1_63
3112X1_63
3112X3_63
3112X4_63

3153X
3172X1_63
3191X3_63
3191X9_63
339X8_63
367X2_63
3850X1_63
3850X7_63
48H1
48H2
48W2
58W1
64W1
64W2
64W2_63
67W1_63
67W2
6H1_63
6H2_63
71W1
71W2
71W3
71W4
Rochester
115
122
3137
3148X_62
3148X1_62
3148X2_62
3148X3_62
3157X1_61
3157X2_61
3174X1_61
3174X4_61
32X3_62
32X4_62
32X6_61
340X1_61
340X5_61
34W2
34W3

34W4
34W4_61
362X1_61
362X2_61
371X1_61
371X14_62
371X30_62
371X8_62
371X9_62
38W1
38W2
392X
392X1_61
392X2_61
392X4_61
392X5_61
392X7_62
399X1_62
399X11_62
399X13_62
399X15_62
399X18_61
399X5_61
39W2_61
40H1
41H1
41H2
42H1_61
42H2
51H1
53W1

53W2
54H1_61
54H2_61
56H1_61
56H2_61
57W1
73H1
73W1_61
73W2
Tilton
10W1
11W1_41
11W2_41
1X4_42
20W1_42
20W2
27X1_41
29X1_41
2W1_41
2W2_41
30W2_64
310_41
310X3_41
310X5_41
3114W1_42
3114X_42
3137X2_64
319X1_64
31W1
31W2
3216X2_42

337X8_42
338X3_41
342A
343_41
345B
345X1_42
345X5_41
3548_42
3548X2_42
3548X6_42
3548X9_42
3798X4_42
37H1
37H2
37X4
398X2_41
398X3_41
39H1
39H2
39W1
39W2
47H7
47H8
68W6
70W1
70W2
90H1
90H2
90W2
9W1_41
CHICHESTER

Section 3

Capital Activity Summary
January 1, 2022 – December 31, 2022

CAPITAL - 2022

REJECT POLE REPLACEMENT:

Program Description:

Replace poles determined to be defective during the annual inspection cycle.

Eversource maintains approximately 250,000 poles on its system. These are inspected every 10 years or an average of 25,000 poles per year.

Pole inspection plans are developed based on the total number of poles in the towns to be inspected. Copper, Chrome, Arsenic ("CCA") treated poles less than 20 years old, and those treated with other preservatives and less than 10 years old, are not checked for ground line decay (sound and bore and/or ground line excavation).

Joint owned poles maintained by others are visually inspected for overhead issues.

Total Unit Population:

Depending upon inspection results, Eversource estimates 500 poles to replace each year which corresponds to a 2% failure rate.

Results:

In 2022, 18,151 poles were ground line inspected plus an additional 28,171 poles in joint owner maintenance area were visually inspected for overhead issues. 421 poles were found to be defective requiring replacement. (257 Eversource, 164 CCI). Eversource actively replaces all reject poles in Eversource territory and ensures "C" rejects within CCI maintenance area are addressed. Eversource completed approximately 86% of this population by 2022 year-end, with the remainder to be completed in early 2023. The delay was a result of limited pole availability due to ongoing global supply chain issues.

$ Plan	$ Actual	$ Variance
$2,225,000	$1,384,693	($840,307)

DIRECT BURIED CABLE REPLACEMENT:

Program Description:

Replace direct buried cable with cable in conduit.

Approximately 2,000,000 feet of direct buried cable was installed at Eversource prior to 1985 with earliest vintages from 1970. Cable insulation is subject to age failure and bare concentric neutral conductors are subject to corrosion. Testing has indicated that in many locations the concentric neutral is no longer sufficient to provide a path to ground for the electric system. This project is to replace unjacketed direct buried cable in specific developments which have experienced a high failure rate. Live front transformers and/or pre-1987 elbows are replaced along with the cable.

Results:

Two cable replacement projects were completed in 2022. (Isolated replacement of failed cable sections are completed under the Obsolescence ("DQ") Annual project).

Tidewater Farm URD Loop - The underground development off Tidewater Rd in Greenland has a history of outages due to failed direct buried cable. The direct buried cable runs through the woods and the pad mount transformer 17/23S2T1 is in an inaccessible vegetated area. This project installed a new pad mounted

transformer and relocated the inaccessible pad to an accessible location by the roadside. The project replaced direct buried cable with new cable in conduit.

Riverview UG Replacement - Riverview Apartment Complex was built in the early 1970s and the primary and secondary electric service to the five buildings was all direct buried. A secondary cable failed in February 2022 and temporary repairs were made to restore power. The property is undergoing system improvements to the electric services and the various building systems. This presented an opportunity to upgrade the 50 year-old infrastructure while greatly reducing the likelihood of more failures. The feed to the complex was radial with no existing back feed. The new design incorporated a second primary riser and a loop configuration.

$ Plan	$ Actual	$ Variance
$670,000	$550,164	$(119,836)

OTHER CAPITAL RELIABILITY PROJECTS:

Category Description: This category includes all projects with spending in 2022 in excess of $100,000 which were at least partially justified based on reliability.

There were 24 reliability improvement projects established in 2022 with spending greater than $100,000. These projects are listed below. Project descriptions are included in Section 3.1.

Project	Project Description	Authorized Amount	2022 Spend	Status (12/31/22)
A22C01	Manchester Network Cable Replacemen	1,792,000	1,617,922	Under Construction
A22C03	GOFFSTOWN SS ELIM PHASE 2 27W2 CONV	2,420,000	382,543	Under Construction
A22C61	323 Line Underbuild Re-attachment	1,738,000	544,790	Under Construction
A22C77	Mammoth Rd SS TPU Relay Repl	631,000	253,833	Under Construction
A22C85	317 Line ROW Section Rebuild	544,000	514,896	Under Construction
A22E41	RESISTANCE SS RETIREMENT	1,115,400	181,333	Under Construction
A22E47	3148X3 REMOVAL - NORTH DOVER	1,363,000	1,052,103	Under Construction
A22E56	32 Line Pole Replacement	5,670,500	3,207,332	Under Construction
A22E57	371 Line Pole Replacements	6,281,700	3,464,164	Under Construction
A22LS	DISTRIBUTION AUTOMATION LINE SENSOR	360,000	477,644	Completed
A22N60	355 Line Emergent Str Replacement	802,000	567,733	Completed
A22N71	355 Line Pole Replacement	481,000	188,366	Under Construction
A22RPR	Roadside Reject Pole Replacement	2,225,000	1,384,693	Under Construction
A22S10	3217X ROCKY POND RD BACKFEED	350,000	275,809	Under Construction
A22S50	3128X GRIFFIN ROAD CONVERSION	381,000	213,574	Completed
A22W02	3120X2 RT 119 CONVERSION	850,000	350,262	Under Construction
A22W08	3139X SPOFFORD RD RECONDUCTOR	384,000	212,604	Completed
A22W26	317/3410 Reconstruction Phase 2	3,255,000	2,039,405	Under Construction
A22W63	313X1 Riverview UG Replacement	417,000	374,362	Under Construction
A22W68	3140X Stoddard Rebuild	575,000	226,776	Completed
A22X17	2022 WOOD POLE TREATMENT	419,100	232,116	Under Construction
A22X35	2022 CIRCUIT PATROL REPAIRS	946,000	988,879	Completed
A22X67	NH Cutout Installation 2022*	1,869,000	3,169,580	Completed
A22X74	Tripsaver Initiative	946,000	915,233	Completed
Total 2022 Amount for projects initiated in 2022		**35,815,700**	**22,835,951**	
(Note the Authorized Amount includes the total for Multi-year projects)				

*Note: A Supplement Authorization was approved at NHPAC prior to exceeding the authorized amount.

In addition, there were 20 reliability projects established in prior years with spending in 2022 in excess of $100,000. Project descriptions for these projects are included in Section 3.2.

Project	Project Description	Sum of 2022 FY Actual
A16C08	Brook St S/S 13TR1 Replacement	621,483
A17S03	MILLYARD SS REPLACEMENT	6,884,270
A18C07	EDDY SS CONTROL HOUSE	2,474,126
A18N03	WHITE LAKE SS REBUILD	157,341
A18W06	MONADNOCK SS REPLACE TRANSFRMR TB40	297,344
A19C33	Animal Protection at Rimmon SS	555,482
A19S40	AMHERST S/S - PLC AUTOMATION REPLAC	2,219,446
A20S02	Millyard SS Distribution Line Work	3,728,199
A20W18	317/3410 RECON BRADFORD TO WARNER	266,766
A20W37	RIVER ROAD SS UPGRADES	543,107
A20X26	SPARE 345-34.5kV TRANSFORMER	723,107
A21C07	MALVERN VALLEY HANOVER CIRCUIT TIE	137,908
A21C91	393 LINE ROW SECTION REBUILD	4,677,513
A21DA	DISTRIBUTION AUTOMATION POLE TOP	1,242,339
A21E08	CIRCUIT TIE 3191X1B TO 377X2	158,369
A21E16	REPLACE ROCHESTER SS BUS TIE AUTOCL	442,535
A21E94	TIDEWATER FARM URD LOOP	173,152
A21N45	ASHLAND S/S-PLC REPLCMNT& P&C UPGRD	424,047
A21S17	34.5kV CAP BANK SWTCH REP BROAD ST	310,958
A21X93	2021 CIRCUIT PATROL REPAIRS PHASE 2	105,237
Total 2022 spend on projects initiated in prior years		**26,142,728**

Section 3.1

2022 Projects

A22C01 Manchester Network Cable Replacement (Phase 2) - Under Construction
Phase 2 of the Manchester Network Cable Replacement project will reconductor the 13B and 13D cables from just outside Brook Street Substation to Hampshire Plaza on Elm Street in Manchester, NH. The work in 2022 involves 5 of the 33 transformer vaults. Reconductoring the entire network will take place over four years.

A22C03 GOFFSTOWN SS ELIM PHASE 2 27W2 CONV - Under Construction
Phase 2 will convert the 27W2 12.47 kV circuit to 34.5 kV. Phase 1 converted the 45H1 circuit to 34.5 kV and was completed in February 2022. Implementing both phases of these projects eliminate a 64-year-old, islanded substation and non-standard 3.74 kV circuit, optimizing Distribution Automation and improving system reliability in Goffstown.

A22C61 323 Line Under-build Reattachment - Under Construction
Reattach a 2.63-mile long section of the 34.5kV 323 distribution line underbuilt below the V191 Transmission line. 33 of the 41 laminated wood structures on the V191 line will be replaced with lightweight weathering steel structures due to structural integrity failures.

A22C77 Mammoth Rd SS TPU Relay Replacement - Under Construction
Replace one (1) TPU2000R ABB relay in service at Mammoth Road Station with one (1) SEL-387E protection relay. The replacement of this obsolete relay is required as ABB has classified the relays as obsolete and replacement parts are no longer available. Failure could result in a transformer outage, a decrease in system reliability, and unnecessary relay replacement work under emergency conditions.

A22C85 317 Line ROW Section Rebuild - Under Construction
Reconstruction of the 317 line in the right of way between Rt.127 in Warner and the line crossing at Dustin Rd. in Webster. Ten (10) aged wooden poles and deteriorated crossarms will be replaced with new steel structures. In addition to the pole replacements, this project proposes the replacement of 1,900 linear feet of 83-year-old #2 copper conductor with 477 MCM spacer cable. This replacement project will harden the system and provide for future load transfer capabilities.

A22E41 RESISTANCE SS RETIREMENT - Under Construction
Provide partial funding for engineering support and environmental analysis for the Solution Design Committee Review of the Resistance Substation retirement. The Resistance SS has a single 1971 vintage, 44.8MVA transformer, and there are concerns with the aging infrastructure, deteriorating foundations, structures, and broken bushings in the substation. Due to the proximity and recent increased capacity at the Portsmouth SS, it is recommended that Resistance SS be retired.

A22E47 3148X3 REMOVAL - NORTH DOVER - Under Construction
Remove seventeen (17) Poles in the 34.5 kV 3148X3 Right of Way (ROW) alternate supply to North Dover Substation in Dover, NH, and install a tap for the 3148X3 and 371 circuits allowing for the removal

of the switches located at pole 130 off Old Rollinsford Road. The results of the March 2022 survey, including below surface investigation, revealed that the 17 wooden structures are showing signs of advanced degradation due in part of the surrounding wet land area. Removing this portion of the ROW line and moving the tap meets the project objective of mitigating the risks associated with the pole failure.

A22E56 32 Line Pole Replacement - Under Construction
Replace 71 wooden poles on the 32 line identified as requiring replacement during a line inspection completed in March 2022. The wood poles will be replaced with self-weathering steel poles, retaining the existing conductor. The wooden poles have experienced advanced deterioration below groundline that is attributable to the surrounding wet land areas. The objective of the project is to prevent long term unexpected failure of wood structures in wetland areas with difficult access with the least cost solution.

A22E57 371 Line Pole Replacements - Under Construction
Replace 69 wooden poles on the 371 line identified as requiring replacement during a line inspection completed in March 2022. The wood poles will be replaced with self-weathering steel poles, retaining the existing conductor. The wooden poles have experienced advanced deterioration below groundline that is attributable to the surrounding wet land areas. The objective of the project is to prevent long term unexpected failure of wood structures in wetland areas with difficult access with the least cost solution. The line inspection was completed in conjunction with the 32 line (A22E56), which shares a right of way.

A22LS DISTRIBUTION AUTOMATION LINE SENSOR - Completed
Install Tollgrade® line sensors at various locations on the distribution system throughout the state. The sensors will monitor current at the installation location and communicate via exception notifications as well as the vendor portal. Future efforts will enable these devices to communicate with the Eversource NH SCADA. This will increase visibility into the Distribution system and may instigate projects to improve reliability on circuits, reveal load balancing or low voltage situations that need to be resolved, or monitor step transformer loading.

A22N60 355 Line Emergent Str Replacement - Completed
Replace four (4) structures located on the right of way of the 34.5 kV 355 line in Northumberland. One structure was identified as in need of immediate replacement. Aerial patrol of the right of way 355 line revealed pole #102 leaning heavily to one side in standing water. Further field investigation revealed poles #103, #104, and #105 need immediate replacement due to advanced degradation below the ground/water line caused by standing water.

A22N71 355 Line Pole Replacement - Under Construction
Helicopter ROW inspection on all 35 miles of the 355 line identified leaning and or damaged structures. The follow up field investigation of those structures showed pole deterioration for upland poles and those below the groundwater surface, rotted crossarms, broken or missing storm guys and crossarm brace(s). This project authorization approves partial funding to perform a full drone inspection, review alternatives, and finalize the scope, engineering design, and environmental controls.

A22RPR Roadside Reject Pole Replacement - Under Construction
The Eversource Maintenance Program requires that all wood poles in Eversource maintenance territory to be inspected every 10 years. This project funds the replacement of poles which are deemed "rejects" as part of the annual inspection program.

A22S10 3217X ROCKY POND RD BACKFEED - Under Construction
This project creates a new feed for the 280 customers at the end of the radial Rocky Pond 3217X ROW tap as well as creating a back feed for the customers at the beginning of this tap. This also provides a more reliable feed to the customers at the end of the 3155X2 circuit currently on the Old Milford Road step transformer who will be transferred to the new feed.

A22S50 3128X GRIFFIN ROAD CONVERSION - Completed
This 3128X project was initiated to address an overloaded step transformer. Removing the overloaded step transformer and converting the full 5,900 feet specified will allow for removal of a 7.2 kV to 19.9 kV step-up transformer feeding an underground development which was built at the higher voltage and will also provide a backfeed to this development.

A22W02 3120X2 RT 119 CONVERSION - Under Construction
The 3120X2 is a large radial circuit with long single-phase taps feeding 191 customers in portions of Fitzwilliam and Richmond. Route 119 in Richmond is fed by Rhododendron Road, which is heavily treed and has several off-road sections. Over the last four years, Rhododendron Road has experienced 28 outages resulting in over 610,000 customer minutes interrupted. To improve reliability, this project will convert 11,300 feet of 2.4 kV to 7.2 kV and construct 2,400 feet of new single-phase to feed Richmond from Route 119.

A22W08 3139X SPOFFORD RD RECONDUCTOR - Completed
The 3193X Distribution line on Spofford Road is the long radial backbone feed into Westmoreland Village with over 600 customers. The road is heavily treed. Outage information revealed that a 2,000 foot section had 10 outages in the last four years caused by trees, resulting in 505,000 customer minutes interrupted. This area has had enhanced tree trimming and danger tree removal but is still susceptible to tree related outages. To improve the resilience of this line, this project will install spacer cable in this high impact line.

A22W26 317/3410 Reconstruction Phase 2 - Under Construction
The 317/3410 line is in poor condition and in a very difficult area due to rugged topography and extensive wetlands. A roadside solution along Route 103 from Bradford to Exit 9 on Interstate 89 in Warner has been approved to improve access to the line at lower cost than rebuilding in the ROW. Phase 1 of this project was completed under project number A20W18. The scope included reconstructing 2.5 miles of the line, from Bradford to Melvin Mills. Phase 2 of this project is to complete the 4.5 miles of roadside construction from Melvin Mills to Warner Exit 9 and to remove the ROW line from Bradford to Warner. Upon completion of Phase 2, the roadside circuit will be fully operational, and the removal of the ROW line can commence.

A22W63 313X1 Riverview UG Replacement - Under Construction
Riverview Apartment Complex was built in the early 1970s and the primary and secondary electric service to the five buildings is all direct buried. A secondary cable failed in February 2022 and temporary repairs were made to restore power. The property is undergoing system improvements to the electric

services and the various building systems. This presents an opportunity to upgrade the 50-year old infrastructure while greatly reducing the likelihood of more failures. The feed to the complex is radial with no existing back feed. The new design incorporates a second primary riser and a loop configuration.

A22W68 3140X Stoddard Rebuild - Completed
The project is to replace a 2,100 foot section of distribution line that was installed in the 1940's and is in poor condition, including three (3) poles that were temporarily repaired during a storm. The line is in a narrow Right of Way (ROW) which is inaccessible because of the rocky terrain and dense vegetation. The new line will be a single phase spacer cable construction on Class 1 poles. A portion of the line will be moved to the roadway and the remaining ROW section will be trimmed to be more accessible.

A22X17 2022 WOOD POLE TREATMENT - Completed
Wood pole treatment of approximately 1,539 structures located on Distribution Right of Way lines in the state of New Hampshire. The treatment is designed to provide a "booster shot" of preservatives to improve the expected performance of the wood poles through the application of a product that provides additional protection against decay and extends the useful life of the pole. Systematic and programmatic implementation of Distribution Wood Pole Treatment has proven to substantially lengthen the service life of wood pole assets.

A22X35 2022 CIRCUIT PATROL REPAIRS - Completed
This project is intended to repair or replace distribution plant discovered to be deficient as a result of the circuit patrols completed in December 2021 and January 2022. The patrols targeted identification of damaged equipment which may result in future outages. The list of items found was assembled and prioritized. A total of approximately 475 items on 2 circuits were repaired or replaced, including broken, leaning, or damaged poles, broken or decayed crossarms and braces, damaged primary conductors, broken or loose guy wires and anchors, damaged insulators or bent pins, broken insulator ties, missing spacer cable spacers, and unfused transformers.

A22X67 NH Cutout Installation 2022 - Completed
To add cutouts to unfused transformers and unfused laterals to improve system reliability. The addition of cutouts to these locations will reduce the number of customers impacted for a fault beyond an unfused location. Specific locations have been identified using patrols and prioritized based upon customer impact.

A22X74 Tripsaver Initiative - Completed
This project is intended to replace approximately 142 existing cut outs with Tripsavers® Cutout-Mounted Reclosers. The installation of these Tripsavers® will increase reliability for Eversource customers by eliminating momentary outages. Tripsavers® will be installed at preselected locations identified through reliability data analytics.

Section 3.2
Prior Years Projects

A16C08 Brook Street S/S 13TR1 Replacement – Under Construction
The 13TR1 switchgear at Brook St S/S is 65 years old and has experienced multiple equipment failures over the last ten years causing the network system to completely lose power. This project will replace the old 13TR1 switchgear with a new 6 bay 15kV metal clad switchgear to provide a reliable power source to the network system.

A17S03 Millyard SS Replacement – Under Construction
This multi-year project rebuilds the Millyard Substation at a new site in Nashua, NH. The existing substation transformers are 68 and 71 years old and the switchgear is of the same vintage. Additionally, over the last few years 3 of the 6 circuit feeders have failed. The substation currently serves 2,700 customers.

A18C07 Eddy SS Control House – Completed
This project is to build a control house in the Eddy Substation yard. The existing control house is in the Public Service Company of New Hampshire Amoskeag Powerhouse adjacent to the Eddy Substation. The Amoskeag generation facilities were sold in 2018 as a result of the generation divestiture in NH. The new control house was needed to house transmission and distribution protection and control systems in a secure building under Eversource access and control.

A18N03 White Lake SS Rebuild – Under Engineering
White Lake Substation in Tamworth, NH became a two (2) transformer 115-34.5 kV substation in the mid-1950s when a 115 kV line (B-112) was constructed as a source to the area. A combustion turbine (CT) generator was added to the substation in 1968 to provide black start capability to the system. The White Lake CT was sold in 2018. This project will rebuild the White Lake SS to address, capacity deficiency, aging equipment, and generation divestiture issues.

A18W06 MONADNOCK SS REPLACE TRANSFRMR TB40 – Under Construction
Full rebuild of Monadnock Substation to address the asset condition of transformer TB40 and the design deficiencies of the existing substation (there are no transformer breakers nor high-side circuit switchers). The rebuild will prevent an outage to the 12,900 customers served by the substation.

A19C33 Animal Protection at Rimmon SS – Completed
There have been sixteen (16) events on the 34.5kV system caused by ravens. TransGard® laser bird defense system will be installed as an engineered solution for this ongoing problem.

A19S40 Amherst SS – PLC Automation Replace - Completed
This project engineers and replaces the PLC designed automation scheme at Amherst Substation. The

PLC designed automation scheme is outdated and a challenge to update and maintain. There are numerous software, firmware, design, and equipment issues with this legacy system.

A20S02 Millyard SS Distribution Line Work – Under Construction
This project is the distribution line work associated with the Millyard Substation rebuild project. The substation project added a pole top SCADA controlled device at Front Street Substation, installed a manhole, and replaced of a section of direct buried cable to a new riser to support the new pole top device.

A20W18 317/3410 Reconductor Bradford to Warner - Completed
The 317/3410 line runs 13.5 miles in ROW from Davisville (Bedford AWC) to Bradford (Newport AWC). The assets are in poor condition and in an area where the terrain is a mixture of year-round water bodies and ravines. Access to the line is challenging for maintenance and emergency repairs. The line does not have a neutral. This project funded the first phase of improving the 317/3410 line. This project constructed a new 2.5 mile roadside 477 MCM spacer cable line from Bradford switching station along Route 103 into Warner.

A20W37 RIVER ROAD SS UPGRADES – Completed
In 2004, Eversource NH purchased the assets and customers from the Connecticut Valley Electric Company (CVEC) including the Sugar River SS in Claremont, NH. The substation has equipment that has been defined as obsolete and replacement parts are no longer available according to the manufacturer. This substation was targeted for upgrades by installing new equipment to improve reliability and to allow the installation of Distribution Automation equipment.

A20X26 Spare 345-34.5 kV Transformer – Under Construction
This is a full funding request to procure a spare 140 MVA 345-34.5 kV transformer, to be designed and installed at Timber Swamp Substation in Hampton, NH. The design and installation will include a new foundation, oil containment, AC power, and alarm inputs to the transformer. In order to provide reliable and timely support to the 34.5kV distribution system transformers at Amherst, Lawrence Road, and Timber substations, an installed spare transformer is necessary.

A21C07 MALVERN VALLEY HANOVER CIRCUIT TIE – Completed
Loss of the Malvern Substation transformer would result in isolation of load because of the Valley 22W1 circuit capacity. Extend the circuit tie between Hanover 16W1 and Malvern 23W2 to increase the backup capability through the 12 kV system for Valley, Malvern, and Hanover substations and reduce the exposure to isolation of load.

A21C91 393 LINE ROW SECTION REBUILD – Completed
Twenty-One (21) aged wooden poles and associated hardware will be replaced with new steel structures along the 393 line in the right of way between Huse Road Substation and Mammoth Road in Manchester, NH. The poles have been identified for replacement due to condition and age. There is no opportunity to relocate this line to a roadway or to rebuild in another location to avoid the wetland area.

A21DA DISTRIBUTION AUTOMATION POLE TOP – Under Construction
This will fund the installation of approximately 75 pole top SCADA controlled devices. These devices provide indication of circuit conditions and allow for remote operation to sectionalize the system and

restore power remotely. Installation of these devices over the last four years have resulted in significant savings in the impact and duration of outages on the distribution system.

A21E08 Circuit Tie 3191X1B to 377X2 – Completed
This project created a new circuit tie between the 3191X1B and 377X2 circuits. The 3191X1B is a radial circuit feeding 1,178 customers and experiences, on average, one fault on the backbone each year impacting the whole circuit. This project reconductored and converted 2,300 feet of #4 bare Cu conductor with 477 spacer cable on the 377X2 on Exeter Road to create a new 34.5 kV circuit tie between the 3191X1B and the 377X2 on Bennett Way in Newmarket, providing a back feed to the 3191X1B from the 377 line.

A21E16 REPLACE ROCHESTER SS BUS TIE AUTOCLOSE – Completed
This project replaced the inoperable GE FANUC 9030 programmable logic controller (PLC) - based auto close scheme at the Rochester substation 34.5kV bus tie breaker BT32 with an updated scheme using a SEL-2411 programmable automatic controller.

A21E94 TIDEWATER FARM URD LOOP – Completed
The underground development off Tidewater Rd in Greenland has a history of outages due to failed direct buried cable. The direct buried cable runs through the woods. And the pad mount transformer 17/23S2T1 is in an inaccessible vegetated area. This project installs a new pad mounted transformer and relocates the inaccessible pad to an accessible location by the roadside. The project replaces direct buried cable with new cable in conduit.

A21N45 Ashland SS – PLC Replacement & P&C Upgrade – Under Construction
This project replaces the Programmable Logic Controller (PLC) based automation scheme at Ashland Substation in Ashland, NH. The PLC based automation scheme is obsolete (approximately 16 years old) and has been difficult to update and maintain.

A21S17 34.5 kV Capacitor Bank Switch Replacement Broad Street – Under Construction
21 vacuum switches were identified as needing replacement in 2008. These switches were prioritized based on age, condition, operating problems, and uniqueness. Seven (7) of these capacitor switches are to be replaced with a vacuum circuit breaker as part of this program.

A21X93 2021 Circuit Patrol Repairs Phase 2 – Completed
This project repaired or replaced distribution plant discovered to be deficient as a result of the circuit patrols on poor performing circuits completed in the Fall, 2021. Repairs and replacements include broken, leaning, or damaged poles, broken or decayed crossarms and braces, damaged primary conductors, broken or loose guy wires and anchors, damaged insulators, bent pins, and broken insulator ties.

Section 4

Worst Performing Circuit Lists

2022 Circuit Hit List - Ranked By COSAIDI - IEEE Criteria - Allocated data

Rank	Circuit	COSAIDI	CAIDI	Circuit MBI	CIII	# Outages	Customers Interrupted (CI)	Customer Minutes (CMI)	Customers Served By Circuit	Circuit Miles	Cust Inter Per Mile	Outages Per Mile	Circuit SAIDI	Circuit SAIFI	# Cust_3 Or Mores	#Cust >4Hr Outage	Customer Weighting	Region	AWC
1	316X1_32	4.30	224	4.0	107	97	10,408	2,334,639	3,475	158.8	66	0.6	671.77	2.9948	-	3,158	708.8	NH WESTERN	NEWPORT AWC
2	3139X_31	2.28	133	3.4	51	184	9,298	1,240,152	2,663	151.4	61	1.2	465.65	3.4912	776	732	428.0	NH WESTERN	KEENE AWC
3	31W1_64	1.73	182	3.3	75	69	5,173	939,980	1,428	73.8	70	0.9	658.13	3.6219	1,062	1,467	662.8	NH NORTHERN	TILTON AWC
4	316_32	1.57	196	9.0	34	129	4,361	854,126	3,279	172.4	25	0.7	260.50	1.3301	72	1,216	288.0	NH WESTERN	NEWPORT AWC
5	20W2_42	1.39	190	5.2	86	46	3,970	755,422	1,711	48.9	81	0.9	441.55	2.3205	456	1,707	501.8	NH NORTHERN	TILTON AWC
6	3410_32	1.28	117	7.9	55	108	5,924	696,039	3,879	183.8	32	0.6	179.45	1.5273	1,300	735	433.1	NH WESTERN	NEWPORT AWC
7	319X1_64	1.23	145	6.4	76	61	4,621	667,736	2,474	116.7	40	0.5	269.89	1.8678	-	1,102	259.8	NH NORTHERN	TILTON AWC
8	355X10_76	1.18	183	8.2	43	81	3,509	640,406	2,390	123.4	28	0.7	267.99	1.4684	-	302	139.1	NH NORTHERN	LANCASTER AWC
9	3217X_22	1.10	292	21.7	33	63	2,048	597,081	3,708	97.3	21	0.6	161.04	0.5524	534	652	261.0	NH SOUTHERN	NASHUA AWC
10	336X1_45	1.06	167	1.2	104	33	3,441	576,331	346	30.2	114	1.1	1,664.49	9.9379	1,871	361	1,010.9	NH NORTHERN	CHOCORUA AWC
11	60W1_32	1.03	248	7.3	40	57	2,264	560,767	1,379	33.8	67	1.7	406.62	1.6417	245	597	280.9	NH WESTERN	NEWPORT AWC
12	314X4_22	1.03	98	3.2	70	82	5,756	561,829	1,551	99.0	58	0.8	362.22	3.7110	2,499	67	636.6	NH SOUTHERN	NASHUA AWC
13	3116X1_45	0.98	169	5.0	37	85	3,162	533,971	1,307	86.8	36	1.0	408.52	2.4191	962	474	406.5	NH NORTHERN	CHOCORUA AWC
14	20W1_42	0.98	135	7.5	60	66	3,935	531,860	2,446	63.8	62	1.0	217.45	1.6088	240	937	264.7	NH NORTHERN	TILTON AWC
15	348X3_76	0.97	95	4.2	90	62	5,572	527,631	1,968	110.5	50	0.6	268.15	2.8318	24	78	110.4	NH NORTHERN	LANCASTER AWC
16	392X7_62	0.90	132	8.7	47	79	3,708	487,711	2,679	100.2	37	0.8	182.04	1.3841	164	534	176.6	NH EASTERN	ROCHESTER AWC
17	23X6_22	0.89	172	10.1	85	33	2,794	481,865	2,359	74.2	38	0.4	204.28	1.1845	-	1,124	240.1	NH CENTRAL	BEDFORD AWC
18	85W1_12	0.86	110	4.2	87	49	4,267	467,331	1,476	70.5	61	0.7	316.53	2.8901	-	137	131.3	NH CENTRAL	BEDFORD AWC
19	63W1_65	0.81	126	6.9	85	41	3,482	438,698	2,017	77.0	45	0.5	217.55	1.7267	48	28	89.9	NH EASTERN	EPPING AWC
20	56H2_61	0.74	57	2.2	1,010	7	7,069	400,905	1,306	7.9	892	0.9	306.91	5.4117	-	-	107.4	NH EASTERN	ROCHESTER AWC
21	24X1_36	0.74	132	8.1	33	91	3,024	400,492	2,052	128.9	23	0.7	195.15	1.4735	80	151	107.0	NH WESTERN	KEENE AWC
22	23X5_22	0.70	122	14.4	38	81	3,110	380,819	3,742	122.3	25	0.7	101.78	0.8312	123	131	79.9	NH CENTRAL	BEDFORD AWC
23	362X2_61	0.67	102	7.4	76	47	3,589	365,348	2,210	81.1	44	0.6	165.33	1.6242	-	10	59.4	NH EASTERN	ROCHESTER AWC
24	3155X4_36	0.67	109	7.8	88	38	3,333	364,798	2,171	91.3	37	0.4	168.05	1.5354	-	9	60.2	NH WESTERN	KEENE AWC
25	3108_12	0.65	103	6.4	80	43	3,420	351,035	1,817	62.1	55	0.7	193.25	1.8827	-	90	81.1	NH CENTRAL	BEDFORD AWC
26	37W1_12	0.62	116	6.0	57	51	2,914	337,346	1,463	61.6	47	0.8	230.59	1.9918	52	21	94.3	NH CENTRAL	BEDFORD AWC
27	2W2_41	0.60	70	5.4	113	41	4,649	326,192	2,084	51.1	91	0.8	156.51	2.2306	-	1	54.9	NH NORTHERN	TILTON AWC
28	399X18_61	0.59	53	1.6	608	10	6,077	319,519	808	15.2	399	0.7	395.57	7.5234	-	358	192.2	NH EASTERN	ROCHESTER AWC
29	347_45	0.59	97	12.2	49	68	3,306	321,847	3,354	100.0	33	0.7	95.95	0.9856	-	101	48.7	NH NORTHERN	CHOCORUA AWC
30	3615X2_11	0.58	179	9.9	89	20	1,770	317,368	1,453	42.9	41	0.5	218.37	1.2179	-	609	167.8	NH CENTRAL	HOOKSETT AWC
31	23X4_12	0.58	244	1.0	321	4	1,285	313,002	110	6.7	192	0.6	2,856.29	11.7262	-	878	1,131.4	NH CENTRAL	BEDFORD AWC
32	19W2_45	0.58	143	14.3	34	64	2,183	312,670	2,602	102.1	21	0.6	120.16	0.8389	180	503	153.5	NH NORTHERN	CHOCORUA AWC
33	42X3_32	0.57	133	11.0	44	54	2,349	311,916	2,146	77.1	30	0.7	145.36	1.0947	30	342	108.2	NH WESTERN	NEWPORT AWC
34	317X3_12	0.57	225	11.6	35	39	1,382	310,966	1,333	68.0	20	0.6	233.30	1.0368	-	714	188.8	NH CENTRAL	BEDFORD AWC
35	3133X_23	0.57	136	25.7	43	53	2,287	311,358	4,906	126.8	18	0.4	63.47	0.4862	-	466	92.1	NH SOUTHERN	DERRY AWC
36	W15_31	0.56	97	6.5	53	60	3,170	305,991	1,718	78.9	40	0.8	178.11	1.8452	623	225	220.7	NH WESTERN	KEENE AWC
37	75W2_32	0.53	155	11.6	44	42	1,844	286,507	1,782	53.2	35	0.8	160.82	1.0350	21	323	108.9	NH WESTERN	NEWPORT AWC
38	3271X2_12	0.53	92	7.1	57	55	3,152	289,250	1,861	74.6	42	0.7	155.47	1.6942	1,082	20	273.8	NH CENTRAL	BEDFORD AWC
39	310X3_41	0.52	169	6.1	44	38	1,657	280,632	847	19.3	86	2.0	331.23	1.9554	182	496	226.7	NH NORTHERN	TILTON AWC
40	333X_45	0.50	120	6.7	59	38	2,247	269,935	1,247	44.1	51	0.9	216.54	1.8025	303	8	137.6	NH NORTHERN	CHOCORUA AWC
41	3140X2_36	0.50	92	6.9	49	59	2,912	269,236	1,666	95.8	30	0.6	161.63	1.7482	120	82	92.9	NH WESTERN	KEENE AWC
42	11W1_41	0.50	148	12.9	42	44	1,834	271,143	1,975	38.9	47	1.1	137.27	0.9285	548	211	189.3	NH NORTHERN	TILTON AWC
43	3173X1_12	0.48	93	6.6	68	41	2,795	260,329	1,547	72.4	39	0.6	168.33	1.8072	78	2	74.8	NH CENTRAL	BEDFORD AWC
44	3148X2_62	0.48	122	16.6	60	36	2,145	261,035	2,971	17.1	125	2.1	87.87	0.7220	-	93	44.7	NH EASTERN	ROCHESTER AWC
45	3141X_23	0.48	75	16.5	52	67	3,460	261,132	4,771	113.4	31	0.6	54.74	0.7253	-	156	42.6	NH SOUTHERN	DERRY AWC
46	313X1_36	0.48	124	13.9	33	64	2,099	260,864	2,440	113.3	19	0.6	106.92	0.8603	-	160	61.4	NH WESTERN	KEENE AWC
47	3010X_21	0.48	116	15.0	118	19	2,233	258,337	2,796	41.8	53	0.5	92.41	0.7988	-	98	47.0	NH SOUTHERN	NASHUA AWC
48	399X15_62	0.47	43	2.3	858	7	6,006	256,049	1,146	17.5	343	0.4	223.51	5.2427	-	-	78.2	NH EASTERN	ROCHESTER AWC
49	399X13_62	0.47	43	0.9	1,174	5	5,869	252,608	422	12.9	456	0.4	598.36	13.9021	-	1	209.6	NH EASTERN	ROCHESTER AWC
50	3120_31	0.47	110	7.8	78	30	2,337	257,706	1,514	67.7	35	0.4	170.19	1.5433	-	13	61.5	NH WESTERN	KEENE AWC

2022 Circuit Hit List - Ranked By Circuit SAIFI - IEEE Criteria

Circuit SAIFI Rank	CoSAIDI Rank	Circuit	COSAIDI	CAII	Circuit M	CIII	# Outa	Customers Affecte	Customer Minutes	Customers Served	Total Miles	Customers Affected Per Mile	Outages Per Mi	Circuit SAIDI	Circuit SAIFI	# Cust_3 Or Mor	#Cust_>4 HrOutag	Customer Weight	Region	AWC
1	62	399X87_61	0.41	40	0.0	5,623	1	5,623	224,920	1	0.2	31,618	5.6	224,920	5,623.00	-	-	78,722.0	NH EASTERN	ROCHESTER AWC
2	370	317_64	0.02	20	0.1	418	1	418	8,360	2	24.9	17	0.0	4,180	209.00	-	-	1,463.0	NH CENTRAL	BEDFORD AWC
3	66	399X10_62	0.41	40	0.1	5,623	1	5,623	224,920	58	0.8	7,087	1.3	3,878	96.95	-	-	1,357.3	NH EASTERN	ROCHESTER AWC
4	59	399X4_61	0.42	40	0.2	1,878	3	5,635	226,316	87	0.6	9,085	4.8	2,601	64.77	-	-	910.5	NH EASTERN	ROCHESTER AWC
5	63	399X42_61	0.41	40	0.2	5,623	1	5,623	224,920	91	1.1	5,208	0.9	2,472	61.79	-	-	865.1	NH EASTERN	ROCHESTER AWC
6	562	18H3_21	-	6	0.3	107	2	213	1,318	5	0.2	1,046	9.8	264	42.60	-	-	92.3	NH SOUTHERN	NASHUA AWC
7	64	399X2_61	0.41	40	0.3	5,623	1	5,623	224,920	138	1.3	4,238	0.8	1,630	40.75	-	-	570.5	NH EASTERN	ROCHESTER AWC
8	65	399X14_62	0.41	40	0.3	5,623	1	5,623	224,920	158	1.9	2,910	0.5	1,424	35.59	-	-	498.2	NH EASTERN	ROCHESTER AWC
9	426	3165_63	0.01	66	0.4	97	1	97	6,400	3	8.1	12	0.1	2,133	32.33	-	2	747.0	NH EASTERN	PORTSMOUTH
10	56	56H1_61	0.42	40	0.4	2,816	2	5,631	226,360	138	3.4	1,651	0.6	1,145	28.48	-	-	400.6	NH EASTERN	ROCHESTER AWC
11	60	399X12_62	0.42	40	0.5	1,879	3	5,636	226,010	226	2.6	2,128	1.1	1,000	24.94	-	-	350.0	NH EASTERN	ROCHESTER AWC
12	193	3164X7_12	0.11	187	0.5	314	1	314	58,718	13	0.1	4,683	14.9	4,517	24.15	-	-	1,580.9	NH CENTRAL	BEDFORD AWC
13	57	54H2_61	0.42	40	0.5	813	7	5,693	229,653	247	8.1	699	0.9	928	23.01	-	-	324.9	NH EASTERN	ROCHESTER AWC
14	61	399_62	0.42	40	0.6	1,882	3	5,645	227,534	269	11.5	491	0.3	847	21.01	-	5	297.2	NH EASTERN	ROCHESTER AWC
15	49	399X13_62	0.47	43	0.9	1,174	5	5,869	252,608	422	12.9	456	0.4	598	13.90	-	1	209.6	NH EASTERN	ROCHESTER AWC
16	31	23X4_12	0.58	244	1.0	321	4	1,285	313,002	110	6.7	192	0.6	2,856	11.73	-	878	1,131.4	NH CENTRAL	BEDFORD AWC
17	58	54H1_61	0.42	40	1.0	569	10	5,692	226,435	493	5.5	1,040	1.8	459	11.55	-	-	160.8	NH EASTERN	ROCHESTER AWC
18	10	336X1_45	1.06	167	1.2	104	33	3,441	576,331	346	30.2	114	1.1	1,664	9.94	1,871	361	1,010.9	NH NORTHERN	CHOCORUA AWC
19	418	322X15_12	0.01	11	1.4	529	1	529	5,819	61	0.0	18,872	35.7	95	8.67	-	-	33.4	NH CENTRAL	BEDFORD AWC
20	28	399X18_61	0.59	53	1.6	608	10	6,077	319,519	808	15.2	399	0.7	396	7.52	-	358	192.2	NH EASTERN	ROCHESTER AWC
21	20	56H2_61	0.74	57	2.2	1,010	7	7,069	400,905	1,306	7.9	892	0.9	307	5.41	-	-	107.4	NH EASTERN	ROCHESTER AWC
22	48	399X15_62	0.47	43	2.3	858	7	6,006	256,049	1,146	17.5	343	0.4	224	5.24	-	-	78.2	NH EASTERN	ROCHESTER AWC
23	170	79W4_12	0.13	88	3.0	68	12	810	70,949	202	12.4	65	1.0	351	4.01	-	117	140.4	NH CENTRAL	BEDFORD AWC
24	12	314X4_22	1.03	98	3.2	70	82	5,756	561,829	1,551	99.0	58	0.8	362	3.71	2,499	67	636.6	NH SOUTHERN	NASHUA AWC
25	3	31W1_64	1.73	182	3.3	75	69	5,173	939,980	1,428	73.8	70	0.9	658	3.62	1,062	1,467	662.8	NH NORTHERN	TILTON AWC
26	2	3139X_31	2.28	133	3.4	51	184	9,298	1,240,152	2,663	151.4	61	1.2	466	3.49	776	732	428.0	NH WESTERN	KEENE AWC
27	72	3115X11_65	0.38	152	3.5	124	11	1,359	206,509	393	6.3	215	1.7	526	3.46	1,187	397	481.1	NH EASTERN	EPPING AWC
28	419	322X14_12	0.01	11	3.6	529	1	529	5,819	157	1.4	374	0.7	37	3.37	-	-	13.0	NH CENTRAL	BEDFORD AWC
29	375	310X6_41	0.02	215	3.8	47	1	47	10,105	15	0.6	77	1.6	674	3.13	-	-	235.8	NH NORTHERN	TILTON AWC
30	142	355X1_76	0.17	145	3.9	36	18	649	93,779	210	13.0	50	1.4	446	3.08	226	55	209.4	NH NORTHERN	LANCASTER AWC
31	139	360X7_12	0.18	60	4.0	83	20	1,661	100,273	551	26.1	64	0.8	182	3.01	-	-	63.6	NH CENTRAL	BEDFORD AWC
32	1	316X1_32	4.30	224	4.0	107	97	10,408	2,334,639	3,475	158.8	66	0.6	672	2.99	-	3,158	708.8	NH WESTERN	NEWPORT AWC
33	18	85W1_12	0.86	110	4.2	87	49	4,267	467,331	1,476	70.5	61	0.7	317	2.89	-	137	131.3	NH CENTRAL	BEDFORD AWC
34	15	348X3_76	0.97	95	4.2	90	62	5,572	527,631	1,968	110.5	50	0.6	268	2.83	24	78	110.4	NH NORTHERN	LANCASTER AWC
35	225	348X8_76	0.08	101	4.5	34	12	411	41,620	153	8.2	50	1.5	271	2.68	-	21	98.1	NH NORTHERN	LANCASTER AWC
36	448	17H1_21	0.01	13	4.7	49	5	245	3,235	97	0.9	265	5.4	33	2.53	-	-	11.7	NH SOUTHERN	NASHUA AWC
37	51	30W2_64	0.47	123	4.9	60	35	2,092	257,233	846	48.8	43	0.7	304	2.47	624	168	256.4	NH NORTHERN	TILTON AWC
38	525	323X3_12	-	57	4.9	13	3	39	2,238	16	0.1	279	21.4	140	2.44	-	-	49.0	NH CENTRAL	BEDFORD AWC
39	13	3116X1_45	0.98	169	5.0	37	85	3,162	533,971	1,307	86.8	36	1.0	409	2.42	962	474	406.5	NH NORTHERN	CHOCORUA AWC
40	147	3137X5_65	0.17	84	5.0	84	13	1,091	91,312	458	15.8	69	0.8	199	2.38	-	15	72.0	NH EASTERN	EPPING AWC
41	157	3155X8_22	0.15	136	5.1	50	12	594	80,824	251	19.2	31	0.6	322	2.37	-	1	112.9	NH SOUTHERN	NASHUA AWC
42	5	20W2_42	1.39	190	5.2	86	46	3,970	755,422	1,711	48.9	81	0.9	442	2.32	456	1,707	501.8	NH NORTHERN	TILTON AWC
43	164	323X10_12	0.14	158	5.2	470	1	470	74,260	205	0.2	2,070	4.4	362	2.29	-	-	126.8	NH CENTRAL	BEDFORD AWC
44	110	318X2_11	0.25	82	5.3	69	24	1,662	136,957	730	31.3	53	0.8	188	2.28	-	-	65.6	NH CENTRAL	HOOKSETT AWC
45	104	377X3_65	0.27	138	5.4	90	12	1,081	148,998	483	19.4	56	0.6	308	2.24	-	279	149.8	NH EASTERN	EPPING AWC
46	27	2W2_41	0.60	70	5.4	113	41	4,649	326,192	2,084	51.1	91	0.8	157	2.23	-	1	54.9	NH NORTHERN	TILTON AWC
47	113	3525X5_77	0.24	68	5.5	146	13	1,894	128,477	861	61.8	31	0.2	149	2.20	-	-	52.2	NH NORTHERN	BERLIN AWC
48	166	314X14_22	0.14	171	5.5	76	6	456	77,990	207	8.2	56	0.7	376	2.20	-	-	131.6	NH SOUTHERN	NASHUA AWC
49	230	3137X80_6	0.08	102	5.5	58	7	409	41,914	187	8.9	46	0.8	225	2.19	-	5	79.3	NH EASTERN	EPPING AWC
50	133	377X16_65	0.20	104	5.7	107	10	1,067	110,756	504	11.9	90	0.8	220	2.12	-	152	99.7	NH EASTERN	EPPING AWC