



Unitil Energy Systems, Inc.
Major Storm Cost Reserve Fund Report
2022

Prepared By: Business Resiliency & Compliance and Accounting

February 28, 2023

Introduction

Unitil Energy Systems, Inc. (“UES” or the “Company”) submits this annual Major Storm Cost Reserve (“MSCR”) Fund Report for the 12 month period ending December 31, 2022. This filing complies with the New Hampshire Public Utilities Commission (“Commission”) requirements set forth in the Company’s Rate Plan Settlement Docket No. DE 10-055 and as ordered in the Commission’s Order in DE 11-277 Order No. 25,351 *Order Granting Increase to Storm Recovery Adjustment Factor* (“SRAF”) issued April 24, 2012 (requiring UES “to file annual reports on the Storm Reserve Fund and storm recovery updates for those storms where costs are recovered through the SRAF”). The rate levels resulting from the distribution revenue changes specified in Section 2 of the Settlement Agreement approved in docket DE 10-055 and revised in Docket No. DE 13-065 (Order No. 25,502 issued April 29, 2013) include \$0.8 million annually for the MSCR, which will be used to recover costs associated with preparing for, responding to and recovering from, qualifying major storms. The MSCR Fund Balance at December 31, 2022 is in a deficit position of (\$2,482,939).

Please refer to the *UES MSCR Fund Reconciliation as of December 31, 2022* on page 3 for a summary of the costs.

Beginning May 1, 2022, revenue included in the SRAF decreased by \$0.00047 per kWh due to the completion of the recovery of the costs of extraordinary storm Winter Storm Quinn, which occurred in March 2018. In accordance with Schedule SRAF, the costs associated with this extraordinary storm were to be recovered at a rate of \$0.00047 per kWh over 3 years ending April 30, 2022. As part of its Annual Reconciliation and Rate filing, dated June 17, 2022, in DE 22-038, UES proposed to include the reconciliation balance associated with its SRAF in its External Delivery Charge for effect August 1, 2022. This balance is comprised of the reconciliation associated with Winter Storm Quinn, as well as the balances from the December 2008 Ice Storm and February 2010 Wind Storm which ended recovery in April 2019, and October 2017 Wind Storm which ended recovery in April 2021. The final reconciliation balance was approved in Order No. 26,655 in DE 22-038. The resulting SRAF effective May 1, 2022 is \$0.00000 per kWh, as there are no storms currently being recovered through the SRAF.

Section 8 of the Settlement Agreement approved by the Commission in DE 10-055 provides, in part, that:

8.1 The rate levels resulting from the distribution revenue changes specified in Section 2 include \$800,000 annually for the Major Storm Cost Reserve, which will be used to recover costs associated with responding to and recovering from qualifying major storms. Qualifying major storms shall include severe weather events causing 16 concurrent troubles (interruption events occurring on either primary or secondary lines) and 15 percent of customers interrupted, or 22 concurrent troubles, in either the Capital or Seacoast regions of Unitil, as well as costs associated with planning and preparation activities in advance of severe weather if a qualifying major storm is likely to occur.

Planning and preparation activities will include pre-staging of crews, standby arrangements with external contractors, incremental compensation of employees, and other costs that may be incurred to prepare for a qualifying major storm. A qualifying major storm will be considered likely to occur if the Energy Event Index (“EEI”) from the Company’s professional weather forecaster reaches an EEI level of 3 or greater with a “high” (greater than 60 percent) level of confidence.

8.2 The parties recognize that certain weather events may result in extraordinary expenditures to prepare for, or recover from, storms or natural disasters that do not meet the defined criteria for a qualifying major storm. The Company may petition the Commission to recover the extraordinary costs of such events from the Major Storm Cost Reserve and has the burden to demonstrate the reasonableness of its expenditures.

Unitil Energy Systems, Inc.
Major Storm Cost Reserve Fund – Reconciliation
As of December 31, 2022

Section #	Date	Description	Surplus (Deficit)
	12/31/2021	MSCR BALANCE (As Filed on 2/28/2022)	\$ (3,140,898)
Adjustments to 2021 Report as Filed			
	3/1/2021	Wind Event Adjustment ¹	67,626
Adjusted Opening Balance 1/1/2022			\$ (3,073,272)
2022 Deferred Charges			
1.0	01/17/2022	Nor'easter	(20,648)
2.0	01/29/2022	Nor'easter	(64,361)
3.0	12/23/2022	Wind Event	(0)
2022 Recovery			
2022	Current Annual Recovery Rate		800,000
2022	Interest Rate		4.01%
2022 Carrying Charges			(124,658)
	12/31/2022	MSCR BALANCE	\$ (2,482,939)

¹ Refer to the Department of Energy's September 2, 2022 Technical Statement in DE 22-008.

Unitil Energy Systems, Inc.

Storm Recovery Adjustment Factor Reconciliation

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
	Beginning	Total	Total	Ending	Average	Interest	Computed	Ending
	Balance	Costs	Revenue	Balance	Monthly	Rate	Interest	Balance
				Before	Balance			with Interest
				Interest	((a+d) / 2)			(d + g)
				(a + b - c)				
Jan-22	\$130,419 (1)	\$0	\$50,673	\$79,746	\$105,083	5.22%	\$466	\$80,212
Feb-22	\$80,212	\$0	\$48,365	\$31,847	\$56,029	5.22%	\$224	\$32,071
Mar-22	\$32,071	\$0	\$46,074	\$(14,003)	\$9,034	5.22%	\$44	\$(13,959)
Apr-22	\$(13,959)	\$0	\$39,795	\$(53,754)	\$(33,857)	5.22%	\$(149)	\$(53,903)
May-22	\$(53,904)	\$0	\$17,745	\$(71,648)	\$(62,776)	5.22%	\$(278)	\$(71,927)
Jun-22	\$(71,927)	\$0	\$1	\$(71,928)	\$(71,927)	4.01%	\$(237)	\$(72,165)
Jul-22	\$(72,165)	\$0	\$(1)	\$(72,164)	\$(72,164)	4.01%	\$(246)	\$(72,410)
Aug-22	\$0 (2)	\$0	\$0	\$0	\$0	4.01%	\$0	\$0
Sep-22	\$0	\$0	\$0	\$0	\$0	4.01%	\$0	\$0
Oct-22	\$0	\$0	\$0	\$0	\$0	4.01%	\$0	\$0
Nov-22	\$0	\$0	\$0	\$0	\$0	4.01%	\$0	\$0
Dec-22	\$0	\$0	\$0	\$0	\$0	4.01%	\$0	\$0
Total			\$202,653				\$(176)	

(1) As filed in Unitil Energy Systems, Inc.'s Major Storm Cost Reserve Fund Report, February 28, 2022.

(2) Pursuant to Order No. 26,655 in DE 22-038, balances associated with Winter Storm Quinn, the December 2008 Ice Storm and February 2010 Wind Storm, and the October 2017 Wind Storm, totaling (\$72,410), have been moved for final reconciliation in the External Delivery Charge.

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Attachments

[Attachment A - Notification of Change to Weather Provider Services](#)

[Attachment B - Weather Energy Event Index \(EEI\)](#)

[Attachment C - Sample DTN Weather Forecast](#)

1. January 17th, 2022 (Nor'easter)

1.1. Description of the Storm

Beginning on Thursday, January 13th, Unitil’s weather service provider and other weather services began forecasting the development of a strong winter storm system bringing a wintry mix of snow, sleet and rain with strong hazardous wind speeds Sunday through Monday, January 16th and 17th. As the system approached, forecasters predicted high winds up to 65 mph along the coast and snow amounts between 4-8 inches in Unitil’s Capital Region with the possibility of heavier, wet snow occurring in some areas. Winter Storm and High Wind Warnings as well as several severe weather watches were issued throughout the State (see Figure 1). As the system moved across Unitil’s service area, elevated winds with gusts up to 49 mph were experienced with snow totals ranged between 1 and 8 inches across Unitil’s NH territory.



Figure 1 – NWS Winter Storm (Pink) and High Wind Warnings (Yellow) January 16th

1.2. Summary of the Extent of the Storm Damage

UES experienced the following impacts as detailed in the table below.

UES Region	Total # Outages	Peak # Outages	Total Customers Interrupted	Peak Customers Interrupted	Percentage Affected (Peak)
Seacoast	21	9	4,366	2,856	5.98%
Capital	2	2	32	19	0.06%

1.3. Preparations

Unitil began communicating internally on Thursday, January 13th to coordinate initiation of preparation activities, including public notifications (via press releases) and outreach to life support customers, municipal, regulatory and elected officials, and state emergency management agencies (via email). Additional preparation activities such as contractor availability outreach and checking inventory, stock levels and fleet vehicles were also completed prior to the event. The Company held internal coordination calls leading up to the event and activated key response employees to staff the Seacoast Emergency Operations Center throughout the event to respond to any interruptions and communicate with affected stakeholders. Though the Capital and System Emergency Operations Centers were not formally activated, personnel were prepared to respond as needed.

1.4. Restoration

Scattered outages occurred (listed in Section 1.2) in both the Seacoast and Capital Regions and were mostly attributed to broken limbs and tree damage. Interruptions began at approximately 5:20 AM on Monday, January 17th with all affected customers restored by 6:00 PM that evening. Unitil had its normal contingent of internal crews (10), on system contractors (12), and tree crews (12) and secured additional contractor line crews (3) and wires down personnel (12) for the NH territory.

1.5. Exclusionary Criteria

This event qualified for recovery of preparation costs (due to the EEI of 3) for hazardous wind gusts in the Seacoast Region. The actual experience of this event did not meet the concurrent trouble requirement in either the Seacoast or Capital Regions; therefore restoration costs do not qualify for recovery. Preparation only costs recovered through the MSCR are summarized in Section 3.6.

Energy Event Index for UNITIL Your forecast administrator: uibanj@unitil.com
Valid Time: January 16, 2022 6:00 PM EST Forecaster: Kyle.Schanus

Parameter	Region	Day 1	Day 2	Day 3
Wind Speed	Capital	1	1	1
	Fitchburg	1	1	1
	Portland	1	1	1
	Seacoast	1	1	1
Wind/Gust	Capital	1	2	1
	Fitchburg	1	2	1
	Portland	1	3	1
	Seacoast	1	3	1
Snow	Capital	1	2	1
	Fitchburg	1	1	1
	Portland	1	1	1
	Seacoast	1	1	1
Ice	Capital	1	1	1
	Fitchburg	1	1	1
	Portland	1	1	1
	Seacoast	1	1	1
Confidence Level	Capital	High	Medium	High
	Fitchburg	High	Medium	High
	Portland	High	High	High
	Seacoast	High	High	High

Energy Event Index Definition

EEI	Wind Speed	Wind/Gust	Snow	Ice	Confidence Level
1	< 40 mph	< 45 mph	< 6 in.	< 1/10 in.	Low
2	>= 40 mph	>= 45 mph	>= 6 in.	>= 1/10 in.	Medium
3	>= 50 mph	>= 55 mph	>= 8 in.	>= 1/8 in.	High
4	>= 60 mph	>= 70 mph	>= 12 in.	>= 1/2 in.	High
5	>= 70 mph	>= 85 mph	>= 24 in.	>= 1 in.	High

*Note: Confidence is NOT a measure of probability of an event occurring; if you have an accompanying forecast discussion, that information can be found there. Confidence is a measure of how likely the forecasted index level will stay at that level from now through the event, or a way to measure the potential for variability in the forecast. So for example, if it is Monday and there are level 2 gusts forecasted on Wednesday with high confidence, and if your customizable threshold for high confidence is set at 60%, it means the following: There is a >>60% chance the most likely forecasted gusts will remain at level 2 with all updates from now through Wednesday.

Forecast for Unitil from DTN
For Phone Consulting: 1-800-361-4972
Issued Date: 01/16 1800
Forecaster: Kyle Schanus

Zones (Forecast for next 48 hrs)	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event	GUSTS/RAIN	SNOW/GUSTS	SNOW/GUSTS	GUSTS
Event Begin Time	6am Mon	1am Mon	12am Mon	7am Mon
Event End Time	12pm Mon	1pm Mon	11am Mon	2pm Mon
Event Confidence	High	High	Medium	High
Rain Amount	0.75-1.50"			
Snow Amount	Tr-1"	4-8"	3-6"	Tr-2"
Snow Character	Wet	Wet-Normal	Wet-Normal	Wet
Radial Ice Amount				
Max Sustained Winds	25-35 mph	20-30 mph	20-30 mph	25-35 mph
Wind Gusts	55-65 mph	40-50 mph	40-50 mph	55-65 mph
Temp. Extremes	46/19	44/12	45/20	46/18

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: Snow develops after 1am Monday, possibly mixing with/changing to sleet and rain late Monday morning before ending by early afternoon. Snow may be heavy Monday morning. Rainfall: Up to 0.20". A period of hazard gusts is possible Monday morning, strongest from 7am-11am Mon. See table above for details. Drying out by Monday evening with winds gradually relaxing switching to northwesterly.

Confidence: High that EEI-2 snowfall occurs Sunday night into Monday morning. EEI-2/3 snow chance: 70%/10%. Medium that hazard gusts occur on Monday. EEI-2 gust chance Monday: 30%.

SEACOAST: Rain/snow develops after 2am Monday, changing over all rain by 7-8am Monday morning before ending early afternoon. Rain may be locally heavy. Rainfall: 0.75-1.50". A period of hazard gusts is likely Monday morning, strongest from 7am-11am Mon and along the coast. See table above for details. Drying out by Monday evening with winds gradually relaxing switching to northwesterly.

Confidence: High that hazard gusts occur on Monday morning. EEI-2/3 gust chance: 80%/60%. Confidence is high that rainfall of >1" occurs Monday. Chance of >1" rain: 70%.

1.6. Qualifying Costs Charged to the Storm Reserve

The total amount charged to the storm reserve for this event was \$20,648 with a breakdown of charges in the following table:

Payroll	\$5,655
Materials & Supplies	\$0
Transportation	\$0
Contractor Invoices & Other	\$14,993
Less Amount Capitalized	(\$0)
<hr/>	
Total To Storm Reserve	\$20,648

2. **January 28th, 2022 (Nor'easter)**

2.1. Description of the Storm

Beginning on Monday, January 24th, weather services began forecasting a powerful coastal storm with the potential to produce heavy, wet snow and strong winds with gusts up to 55mph predicted across the service area Friday night into Saturday (Jan 28-29th). Blizzard and Winter Storm Warnings were issued across the region as confidence grew in predictions of breezy conditions and snow totals across the State of 8-18 inches with the higher amounts expected along the coast (see Figure 2). Snow began to fall across Unitil’s service territory around 1:00 am on January 29th and continued for 24 hours with totals between 7 and 17 inches recorded across the service area and winds gusts as high as 47 mph along the coastal areas.

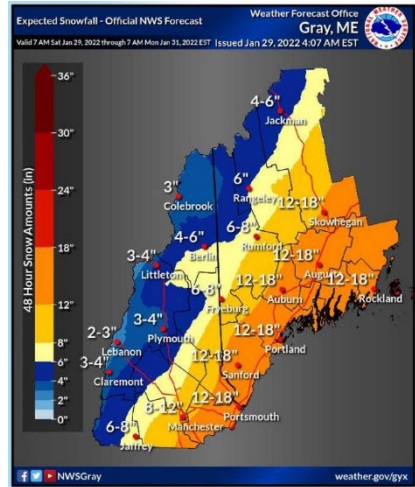


Figure 2 – Jan 28-29th
Projected Snow Totals

2.2. Summary of the Extent of the Storm Damage

UES experienced no impacts from this event as detailed in the table below:

Region	Total # Outages	Peak # Outages	Total Customers Interrupted	Peak Customers Interrupted	Percentage Affected (Peak)
Seacoast	0	0	0	0	0%
Capital	0	0	0	0	0%

2.3. Preparations

Unitil began communicating internally on Monday, January 24th to coordinate initiation of preparation activities, including public notifications (via press releases) and outreach to life support customers, municipal, regulatory and elected officials, and state emergency management agencies (via email). Additional preparation activities such as contractor availability outreach and checking inventory, stock levels and fleet vehicles were also completed prior to the event. The Company held internal coordination calls leading up to the event to ensure key response employees were prepared to respond to any interruptions and communicate with affected stakeholders.

2.4. Restoration

As noted in Section 2.2, Unitil did not experience any outages in its NH Territory during this event. Unitil had internal crews (10), on system contractors (10) and tree crews (13) and secured additional contractor line crews (3) and wires down personnel (4) to respond to any interruptions.

2.5. Exclusionary Criteria

This event qualified for recovery of preparation costs due to the EEI of 4 in Seacoast and 3 in Capital for snow with a high confidence level (see attached forecast). The actual experience of this event did not meet the concurrent trouble requirement in either the Seacoast or Capital Regions; therefore restoration costs do not qualify for recovery. Preparation only costs recovered through the MSCR are summarized in Section 2.6.

Energy Event Index for UNITIL Your forecast administrator: ulbanj@unitil.com
Valid Time: January 28, 2022 5:00 PM EST Forecaster: cody.fishman1

Parameter	Region	Day 1	Day 2	Day 3
Wind Speed	Capital	1	1	1
	Fitchburg	1	1	1
	Portland	1	1	1
	Seacoast	1	1	1
Wind/Gust	Capital	1	1	1
	Fitchburg	1	1	1
	Portland	1	3	3
	Seacoast	1	2	2
Snow	Capital	1	3	3
	Fitchburg	1	3	3
	Portland	1	4	4
	Seacoast	1	4	4
Ice	Capital	1	1	1
	Fitchburg	1	1	1
	Portland	1	1	1
	Seacoast	1	1	1
Confidence Level	Capital	High	Medium	Medium
	Fitchburg	High	High	High
	Portland	High	High	High
	Seacoast	High	High	High

Energy Event Index Definition
No Leaves (Nov 16 - Apr 30)

EEI	Wind Speed	Wind/Gust	Snow	Ice	Confidence Level
1	< 40 mph	< 45 mph	< 6 in.	< 1/10 in.	Low
2	>= 40 mph	>= 45 mph	>= 6 in.	>= 1/10 in.	Medium
3	>= 50 mph	>= 55 mph	>= 8 in.	>= 3/8 in.	High
4	>= 60 mph	>= 70 mph	>= 12 in.	>= 1/2 in.	
5	>= 70 mph	>= 85 mph	>= 24 in.	>= 1 in.	

*Note: Confidence is NOT a measure of probability of an event occurring, if you have an accompanying forecast discussion, that information can be found there. Confidence is a measure of how likely the forecasted index level will stay at that level from now through the event, or a way to measure the potential for variability in the forecast. So for example, if it is Monday and there are level 2 gusts forecasted on Wednesday with high confidence, and if your customizable threshold for high confidence is set at 60%, it means the following: There is a >=60% chance the most likely forecasted gusts will remain at level 2 with all updates from now through Wednesday.

Forecast for Unitil from DTN
For Phone Consulting: 1-800-361-4972
Issued Date: 01/28 1800
Forecaster: Cody Fishman

Zones (Forecast for next 48 hrs)	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event	SNOW/GUSTS	SNOW/GUSTS	SNOW/GUSTS	SNOW/GUSTS
Event Begin Time	4AM SAT	5AM SAT	3AM SAT	6AM SAT
Event End Time	5AM SUN	5AM SUN	3AM SUN	5AM SUN
Event Confidence	HIGH	HIGH	HIGH	HIGH
Rain Amount				
Snow Amount	12-22"	8-14"	8-15"	10-20"
Snow Character	DRY	DRY	DRY	DRY
Radial Ice Amount				
Max Sustained Winds	18-30	15-25	15-25	18-30
Wind Gusts	50-60	35-45	40-50	55-65
Temp. Extremes	33/8	31/5	30/6	32/5

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: A few light flurries can't be completely ruled out this evening, but more dry periods are expected than wet. Snowfall: Trace, if any. Snow associated with an approaching Nor'easter moves into the area early Saturday morning. Snow becomes moderate to heavy at times Saturday, mainly between 11am Sat-12am Sun. Snow will decrease Saturday night and will end Sunday morning. Snow Ratio: 16-21:1. Gusty winds will also develop Saturday and Saturday night. Common gusts of 30-40 mph and peak gusts to 40-45 mph may occur. Main wind timing: 12pm Sat-12am Sun. See table above.

Confidence: Confidence is high hazard snow will occur Saturday. Chance of EEI-2/3/4 snow Saturday: 90%/60%/20%. Confidence is medium gusts remain below hazard levels Saturday: Chance for EEI-2 gusts: 40%.

SEACOAST: A few light flurries can't be completely ruled out this evening, but more dry periods are expected than wet. Snowfall: Trace, if any. Snow associated with an approaching Nor'easter moves into the area early Saturday morning. Snow becomes moderate to heavy at times Saturday, mainly between 10am Sat-12am Sun. Snow will decrease Saturday night and will end early Sunday morning. Snow Ratio: 12-18:1. Gusty winds will also develop Saturday and Saturday night. Common gusts of 35-45 mph and peak gusts to 50-55 mph may occur, strongest along the coast. Main wind timing: 12pm-11pm Sat. See table above.

Confidence: Confidence is high hazard snow and gusts will occur Saturday. Chance of EEI-2/3/4 snow Saturday: 100%/100%/70%. Chance for EEI-2/3 gusts Saturday: 80%/40%.

2.6. Qualifying Costs Charged to the Storm Reserve

The total amount charged to the storm reserve for this event was \$64,361 with a breakdown of charges in the following table:

Payroll	\$9,586
Materials & Supplies	\$0
Transportation	\$0
Contractor Invoices & Other	\$54,775
Less Amount Capitalized	(\$0)
<hr/> Total To Storm Reserve	<hr/> \$64,361

3. December 23th, 2022 (Winter Storm Elliot)

3.1. Description of the Storm

Beginning on December 18th, weather services began forecasting a low-pressure system developing into a significant storm system with hazardous snow and winds expected across the entire northeast arriving December 23rd into the 24th. As the storm moved across the Midwest and into the Northeast, wind speed predictions grew increasingly worrisome and by Tuesday, December 20th multiple weather outlets were reporting the potential for up to 60 mph winds, 1.5-2.5 inches of rain, and flooding risks across Unitil’s service territories. The weather event was expected to begin around 11 PM Thursday night continuing until early Saturday morning with two distinct waves of hazardous winds expected in the morning and evening on Friday (23rd). Precipitation started late Thursday evening (Between 7:00 PM and midnight) across the region and continued throughout the day Friday, causing severe coastal and inland flooding. Hazardous winds and gusts occurred across both regions, with the initial wave being more impactful to Unitil’s Seacoast Region and the stronger afternoon winds having a significant impact to the Capital Region. Frequent hazardous wind gusts, some as high as 71mph, were recorded throughout the event causing significant damage to trees and utility infrastructure.



Figure 3 – Damage caused by Winter Storm Elliot

3.2. Summary of the Extent of the Storm Damage

UES experienced the following impact as detailed in the table below

Region	Total # Outages	Peak # Outages	Total Customers Interrupted	Peak Customers Interrupted	Percentage Affected (Peak)
Seacoast	153	98	9,579	6,039	12.64%
Capital	262	154	26,663	15,857	51.42%

3.3. Preparations

Unitil began communicating internally on Monday December 19th to coordinate initiation of preparation activities, including public notifications (via press releases) and outreach to life support customers, municipal, regulatory and elected officials, and state emergency management agencies (via email). Additional preparation activities such as contractor availability outreach and checking inventory, stock levels and fleet vehicles were also completed prior to the storms arrival. The Company held several internal coordination calls leading up to the event and activated key response employees to staff the Seacoast, Capital and System Emergency Operations Centers throughout the event to respond to any interruptions and communicate with affected stakeholders.

3.4. Restoration

As noted in Section 3.2, the impacts of this event were widespread and highly impactful to the Company's system. In addition to this event, a large snowstorm the weekend prior had left neighboring utilities with extensive damage that was still being addressed as this storm approached. The large size and widespread impacts of the storm, paired with additional strong weather events occurring simultaneously throughout the country created a resource deficit impacting Unitil's ability to acquire additional contractors in the region and the availability of mutual aid resources. Unitil had its normal contingent of internal crews (10), on system contractors (8) and tree crews (14) and was able to secured an additional (3) contractor line crews to respond to interruptions and activated additional EOC support staff to remain onsite to assist. This storm left Unitil with over 34 broken poles and a significant number of outages affecting at least 40 communities. The majority of customers were restored by 6:00pm on December 25th with single customer restorations being completed the following day, December 26th.

3.5. Exclusionary Criteria

This event had a considerable impact to the area. The wind conditions, resource constraints, and the significant timing of the event (two days before Christmas) made this a particularly challenging restoration. Though we did not meet exclusionary criteria for preparation (EEI of 2 with High and EEI of 3 with Medium Confidence) prudent measures had to be taken to coordinate operations, acquire resources and prepare for possible impact. The Company met the criteria for recovery in both the Seacoast (concurrent outages) and Capital (concurrent outages and percentage of customers) Regions. See Section 3.2 for breakdown of outages.

Energy Event Index for UNITIL

Your forecast administrator: ulbanj@unitil.com

Valid Time: December 22, 2022 5:00 PM EST

Forecaster: jordan.oconnell

Parameter	Region	Day 1	Day 2	Day 3
Wind Speed	Capital	1	1	1
	Fitchburg	1	1	1
	Portland	1	1	1
	Seacoast	1	1	1
Wind/Gust	Capital	1	2	2
	Fitchburg	1	2	1
	Portland	1	3	3
	Seacoast	1	3	3
Snow	Capital	1	1	1
	Fitchburg	1	1	1
	Portland	1	1	1
	Seacoast	1	1	1
Ice	Capital	1	1	1
	Fitchburg	1	1	1
	Portland	1	1	1
	Seacoast	1	1	1
Confidence Level	Capital	High	High	High
	Fitchburg	High	High	High
	Portland	High	High	High
	Seacoast	High	High	High

Energy Event Index Definition

No Leaves (Nov 16 - Apr 30)

EEI	Wind Speed	Wind/Gust	Snow	Ice	Confidence Level
1	< 40 mph	< 45 mph	< 6 in.	< 1/10 in.	Low
2	>= 40 mph	>= 45 mph	>= 6 in.	>= 1/10 in.	Medium
3	>= 50 mph	>= 55 mph	>= 8 in.	>= 3/8 in.	High
4	>= 60 mph	>= 70 mph	>= 12 in.	>= 1/2 in.	
5	>= 70 mph	>= 85 mph	>= 24 in.	>= 1 in.	

*Note: Confidence is NOT a measure of probability of an event occurring; if you have an accompanying forecast discussion, that information can be found there. Confidence is a measure of how likely the forecasted index level will stay at that level from now through the event, or a way to measure the potential for variability in the forecast. So for example, if it is Monday and there are level 2 gusts forecasted on Wednesday with high confidence, and if your customizable threshold for high confidence is set at 60%, it means the following: There is a >=60% chance the most likely forecasted gusts will remain at level 2 with all updates from now through Wednesday.

Forecast for Unitil from DTN
For Phone Consulting: 1-800-361-4972
Issued Date: 12/22 1800
Forecaster: Jordan O'Connell

Zones (Forecast for THU/FRI/SAT)	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event	RAIN/GUSTS	RAIN/GUSTS	RAIN/GUSTS	RAIN/GUSTS
Event Begin Time	10pm Thu	11pm Thu	9pm Thu	12am Fri
Event End Time	3am Sat	12am Sat	11pm Fri	4am Sat
Event Confidence	HIGH	MEDIUM-HIGH	MEDIUM-HIGH	HIGH
Rain Amount				
Snow Amount				
Snow Ratio/Character				
Radial Ice Amount				
Rain Amount	1.5-2.5"	1.5-2.5"	1.5-2.5"	1.5-2.5"
Sustained Winds	ESE-SSW 20-35	ESE-S 15-30	ESE-SSW 15-30	ESE-SSW 20-36
Wind Gusts	45-60 mph	40-55 mph	40-55 mph	45-65 mph
Temp. Extremes	55/13	52/11	54/11	49/14

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: Rain and maybe a few brief snow showers continue to build in throughout the overnight as a warm front begins to lift north, any snow should transition to all rain by midnight. Rain will be moderate to heavy at times. Winds will be on the increase throughout the night as well with hazardous winds expected a few hours after the onset of rain. See table above for details. Snowfall: Tr-0.50". Snow Ratio: 8-15:1 (Wet to normal). Friday, rain will likely continue across the region through the afternoon, before gradually coming to an end through the evening. Winds will remain gusty throughout the day, with hazard gusts likely through

the evening. See table above for details. A brief snow shower may be seen through the overnight, however little to no snowfall accumulations are expected. Snowfall: Tr-1.0". Snow Ratio: 15-18:1 (Dry).

Confidence: Confidence is high that no winter hazards will be seen. Confidence is high that hazard gusts are seen tonight and lasting through the day Friday. Chance of EEI-2/3 Wind Gusts: 90%/20%

SEACOAST: Rain showers continue to build in throughout the overnight as a warm front begins to lift north, any snow should transition to all rain by midnight. Rain will be moderate to heavy at times. Winds will be on the increase throughout the night as well with hazardous winds expected a few hours after the onset of rain. See table above for details. Friday, rain will likely continue across the region through the afternoon, before gradually coming to an end through the evening. Winds will remain gusty throughout the day, with hazard gusts likely through the evening. See table above for details. A brief snow shower may be seen through the overnight, however little to no snowfall accumulations are expected. Snowfall: Tr-1.0". Snow Ratio: 15-18:1 (Dry).

Confidence: Confidence is high that no winter hazards will be seen. Confidence is high that hazard gusts are seen tonight and lasting through the day Friday, but medium gusts will reach EEI-3. Chance of EEI-2/3 Wind Gusts: 90%/50%.

3.6. Qualifying Costs Charged to the Storm Reserve

Final costs for this event were not available at the time of this report and will be included in the 2023 MSCR Report.

Attachment A

To: NH PUC

Topic: Change in Weather Provider Services at Unitil Service Corp

During the technical sessions of UES' most recent rate case, the Company asserted that it had worked with its weather provider, Weather Systems Inc. (WSI), to develop a Power Disruption Index (PDI) that better reflects the potential impact of adverse weather conditions. As an outcome of that discussion and for conditions with a PDI of 2 with a high confidence level, the Company may recover its preparation cost.

Following this, WSI abruptly notified its electric utility clients that it would no longer offer weather services as of April 1, 2011. As a result, the Company reviewed several, alternate weather providers and selected Telvent DTN (DTN).

Unitil worked with DTN to perfect a methodology for delivering the same level of service we enjoyed with WSI. DTN has created an Energy Event Index (EEI) similar to the PDI (see Attachment B for the criteria composing the EEI). The Company worked closely to ensure the same criteria discussed at the technical sessions continue to apply to the DTN equivalent.

Below are the specific levels associated with the EEI; however, to better align the EEI levels with the operational levels in Unitil's Emergency Response Plan (ERP), we began the EEI at Level 1, which differs from the former PDI that began at Level 0. Therefore, an EEI Level 3 is equivalent to the PDI Level 2.

The Estimated Impact Indices or EEI is summarized by day as a table within a typical daily weather forecast (see Attachment C).

- Five levels starting at 1. Estimates the impact for forecasted Wind Speeds, Wind Gusts, Ice Accretions, and Snow Amounts and the forecast's Confidence Level (Low, Medium, or High) to calculate the EEI:
 - Level 1 (Normal Operations/Blue Sky Day, None or Few Outages)
 - Level 2 (Moderate Weather, Isolated Outages)
 - Level 3 (Moderate-Severe Weather, Scattered Outages)
 - Level 4 (Moderate-Severe Weather, Widespread Outages)
 - Level 5 (Severe Weather, Extensive Outages)

Attachment B

Event Energy Index (EEI) Criteria

Forecasted Wind Speed/Wind Gusts

For “With Leaves” Period (May 1 – Nov 16)			For “No Leaves” Period (Nov 17 – Apr 30)		
Level	Wind Speed	Wind Gusts	Level	Wind Speed	Wind Gusts
EEI = 1	< 30 mph	< 35 mph	EEI = 1	< 40 mph	< 45 mph
EEI = 2	> = 30 mph	> = 35 mph	EEI = 2	> = 40 mph	> = 45 mph
EEI = 3	> = 45 mph	> = 50 mph	EEI = 3	> = 50 mph	> = 55 mph
EEI = 4	> = 60 mph	> = 65 mph	EEI = 4	> = 60 mph	> = 70 mph
EEI = 5	> = 70 mph	> = 75 mph	EEI = 5	> = 70 mph	> = 85 mph

Forecasted Ice Accretion (assumes “normal” wind speed)

Level	Ice Accretion
EEI = 1	< 1/10 inch
EEI = 2	> = 1/10 inch
EEI = 3	> = 3/8 inch
EEI = 4	> = 1/2 inch
EEI = 5	> = 1 inch

Forecasted Snow Amounts (*assumes dry snow consistency*). These amounts are factored with wind speed more so than actual accumulation.

Level	Snow
EEI = 1	< 6 inches
EEI = 2	> = 12 inches
EEI = 3	> = 18 inches
EEI = 4	> = 24 inches
EEI = 5	< 24 inches

Forecasted Snow Amounts (*assumes wet snow consistency*). Season will modify amount within level – A fall storm (with leaves) will have a significantly increased impact.

Level	Snow (Without Leaves)	Snow (With Leaves)
EEI = 1	< 6 inches	< 4 inches
EEI = 2	> = 6 inches	> = 4 inches
EEI = 3	> = 8 inches	> = 6 inches
EEI = 4	> = 12 inches	> = 12 inches
EEI = 5	> = 24 inches	> = 24 inches

Forecast Confidence Levels

Low	Medium	High
< 30% Chance	≥ 30 ≤ 60% Chance	> 60% Chance

Attachment C

Sample Weather Forecast with EEI Table

Energy Event Index for UNITIL Your forecast administrator: ulbanj@unitil.com
Valid Time: March 1, 2019 1:00 PM EST Forecaster: jim.murphy

Parameter	Region	Day 1	Day 2	Day 3
Wind Speed	Capital	1	1	1
	Fitchburg	1	1	1
	Portland	1	1	1
	Seacoast	1	1	1
Wind/Gust	Capital	1	1	1
	Fitchburg	1	1	1
	Portland	1	1	1
	Seacoast	1	1	1
Snow	Capital	1	1	3
	Fitchburg	1	1	2
	Portland	1	1	3
	Seacoast	1	1	2
Ice	Capital	1	1	1
	Fitchburg	1	1	1
	Portland	1	1	1
	Seacoast	1	1	1
Confidence Level	Capital	High	High	Medium
	Fitchburg	High	High	Medium
	Portland	High	High	Medium
	Seacoast	High	High	Medium

Energy Event Index Definition

No Leaves (Nov 17 - Apr 30)

EEI	Wind Speed	Wind/Gust	Snow	Ice
1	< 40 mph	< 45 mph	< 6 in.	< 1/10 in.
2	>= 40 mph	>= 45 mph	>= 6 in.	>= 1/10 in.
3	>= 50 mph	>= 55 mph	>= 8 in.	>= 3/8 in.
4	>= 60 mph	>= 70 mph	>= 12 in.	>= 1/2 in.
5	>= 70 mph	>= 85 mph	>= 24 in.	>= 1 in.

Confidence Level	
Low	<30% chance the most likely index level remains at that level through the event
Medium	30-60% chance the most likely index level remains at that level through the event
High	>=60% chance the most likely index level remains at that level through the event

*Note: Confidence is NOT a measure of probability of an event occurring; if you have an accompanying forecast discussion, that information can be found there. Confidence is a measure of how likely the forecasted index level will stay at that level from now through the event, or a way to measure the potential for variability in the forecast. So for example, if it is Monday and there are level 2 gusts forecasted on Wednesday with high confidence, and if your customizable threshold for high confidence is set at 60%, it means the following: There is a >=60% chance the most likely forecasted gusts will remain at level 2 with all updates from now through Wednesday.

Date: March 1, 2019
Time: 1:00 PM EST
Forecaster: J Murphy

Zones	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event Starting in 30hrs				
Event Begin Time				
Event End Time				
Event Confidence				
Tstrm Wind Gusts				
Ltng Intensity				
Storm Mvmt Dir				
Rain Amount				
Snow Amount				
Snow Character				
Ice Amount				
Sustained Wind				
Wind Gust				
Temp. Extremes	36/23	35/17	35/20	35/19

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: This afternoon and tonight will be dry and hazard-free. A storm system will spread snow showers over the area after 7am Saturday morning and end by 11pm Saturday. Snowfall: 2-3". Snow character: Normal-wet.

Confidence: High confidence that no hazards will occur in the next 48 hours.

FITCHBURG: This afternoon and evening will be dry and hazard-free. A storm system will spread snow over the area after 3am Saturday morning and end by 11pm Saturday. Snowfall: 2-4". Snow character: Normal-wet.

Confidence: High confidence that no hazards will occur in the next 48 hours.

SEACOAST: This afternoon and evening will be dry and hazard-free. A storm system will spread snow over the area after 3am Saturday morning and end by 11pm Saturday. Snowfall: 3-5". Snow character: Normal-wet.

Confidence: High confidence that no hazards will occur in the next 48 hours. Chance of EEI-2 snow: 10%.

PORTLAND: Today and tonight will be dry and hazard-free. A storm system will spread snow showers over the area after 8am Saturday morning and end by 12am Sunday. Snowfall: 2-4". Snow character: Normal-wet.

Confidence: High confidence that no hazards will occur in the next 48 hours.

UNITIL SERVICE AREA 3-5 DAY OUTLOOK: Another stronger storm system could bring anywhere from 6-15" of additional Normal-wet snow Sunday evening into Monday, but confidence is only medium at this point due to significant model differences in track and strength. The higher snow amounts will be across Capital and Portland where up to 10-15" will be possible with 6-10" expected across Seacoast and Fitchburg. Winds will be breezy Sunday night into Monday with gusts of 30-40 mph possible. Dry and hazard-free conditions are expected on Tuesday.

Confidence: Confidence is medium on Sunday and Monday. Chance for EEI-2/3/4 snow for Sunday night into Monday: 80%/60%/30% Capital and Portland; 70%/40%/- Seacoast and Fitchburg. Confidence is high that no hazards will occur on Tuesday