



Unitil Energy Systems, Inc.
Major Storm Cost Reserve Fund Report
2018

Prepared By: Business Resiliency & Compliance and Accounting

February 27, 2019

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, 2018. 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, 2018 is in a deficit position of **(\$4,992,050)**. In a separate filing (the Company’s 2019 Step Adjustment filing), the Company is seeking recovery of the March 7, 2018 Winter Storm Quinn through its SRAF.

Please refer to the *UES MSCR Fund Reconciliation as of December 31, 2018* on page 4 for a summary of the costs.

Please refer to the Storm Recovery Adjustment Factor Reconciliation which provides the reconciliation of the SRAF through December 31, 2018 on page 5. Beginning May 1, 2018, revenue included in the Storm Recovery Adjustment Factor Reconciliation decreased due to the completion of recovery of the costs incurred as result of extraordinary storm Hurricane Sandy, which occurred in October 2012. In accordance with its tariff Storm Recovery Adjustment Factor, Schedule SRAF, effective May 1, 2013, and for a period of 5 years, the cost associated with this extraordinary storm was recovered through the SRAF at a rate of \$0.00043 per kWh. UES filed the final disposition of the balance for this cost piece on June 20, 2018. Beginning May 1, 2019, the SRAF will decrease by \$0.00096 per kWh due to the completion of the recovery of the costs of two extraordinary storms: the December 2008 ice storm and the February 2010 wind storm. In accordance with its tariff, Schedule SRAF, the costs associated with these extraordinary storms were to be recovered at a rate of \$0.00096 per kWh over 8 years ending April 30, 2019. UES will file the final disposition of the balance for this cost piece by June 30, 2019. The net change to the SRAF effective May 1, 2019 is a decrease of \$0.00049 per kWh, factoring in the proposed increase to the SRAF to recover the costs of the March 7, 2018 Winter Storm Quinn.

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 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, 2018**

Section #	Date	Description	Surplus (Deficit)
	12/31/2017	MSCR BALANCE (As Filed on 3/16/18)	\$ (4,539,995)
Adjustments to 2017 Report as Filed			
	3/14/2017	Tree Trimming Adjustments	2,183
1.0	10/30/2017	October Windstorm Event – Additions ¹	(32,106)
1.0	10/30/2017	Windstorm Event – Re-classed to SRAF ²	1,257,109
		Adjusted Opening Balance 1/1/2018	\$ (3,312,809)
2018 Deferred Charges			
2.0	01/04/2018	Winter Storm Grayson	(147,046)
3.0	02/07/2018	Winter Storm Liam	(19,726)
4.0	03/02/2018	Winter Storm Riley	(78,412)
5.0	03/07/2018	Winter Storm Quinn	(1,550,964)
6.0	03/12/2018	Winter Storm Skylar	(17,131)
7.0	05/04/2018	Thunderstorm Event	(111,714)
8.0	06/18/2018	Thunderstorm Event	(150,616)
9.0	07/17/2018	Thunderstorm Event	(80,652)
10.0	11/03/2018	Thunderstorm Event	(33,354)
11.0	11/15/2018	Wintery Mix Event	(40,682)
2018 Recovery			
2018	Current Annual Recovery Rate		800,000
2018	Interest Rate		5.20%
	2018 Carrying Charges		(248,944)
	12/31/2018	MSCR BALANCE	\$ (4,992,050)

¹The Company's 2017 MSCR Report reported costs for the 10/30/2017 Windstorm Event totaling \$1,233,742. An additional \$32,106 in costs was identified subsequent to that report, bringing the total costs to \$1,265,848, as reported in Section 1.6.

²Per Order No. 26,123, the Company moved \$1,257,109 in costs related to the 10/30/17 Windstorm Event (costs reported in the 2017 MSCR Report, plus associated carrying charges) to the SRAF.

Unitil Energy Systems, Inc.

Storm Recovery Adjustment Factor Reconciliation

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
	Beginning Balance	Total Costs	Total Revenue	Ending Balance Before Interest (a + b - c)	Average Monthly Balance ((a+d) / 2)	Interest Rate	Computed Interest	Ending Balance with Interest (d + g)
Jan-18	\$1,626,347 (1)	\$0	\$164,414	\$1,461,933	\$1,544,140	5.20%	\$6,820	\$1,468,752
Feb-18	\$1,468,752	\$0	\$141,023	\$1,327,730	\$1,398,241	5.20%	\$5,578	\$1,333,307
Mar-18	\$1,333,307	\$0	\$134,187	\$1,199,120	\$1,266,214	5.20%	\$5,592	\$1,204,713
Apr-18	\$1,204,713	\$0	\$126,417	\$1,078,296	\$1,141,504	5.20%	\$4,879	\$1,083,175
May-18	\$1,083,175	\$1,257,109 (2)	\$121,877	\$2,218,406	\$1,650,791	5.20%	\$7,291	\$2,225,697
Jun-18	\$2,225,697	\$0	\$132,147	\$2,093,550	\$2,159,624	5.20%	\$9,230	\$2,102,781
Jul-18	\$2,102,781	\$0	\$146,574	\$1,956,206	\$2,029,493	5.20%	\$8,963	\$1,965,169
Aug-18	\$1,901,499 (3)	\$0	\$164,800	\$1,736,699	\$1,819,099	5.20%	\$8,034	\$1,744,733
Sep-18	\$1,744,733	\$0	\$146,168	\$1,598,565	\$1,671,649	5.20%	\$7,145	\$1,605,710
Oct-18	\$1,605,710	\$0	\$122,971	\$1,482,739	\$1,544,224	5.20%	\$6,820	\$1,489,559
Nov-18	\$1,489,559	\$0	\$117,995	\$1,371,564	\$1,430,561	5.20%	\$6,114	\$1,377,678
Dec-18	\$1,377,678	\$0	\$137,023	\$1,240,655	\$1,309,167	5.20%	\$5,782	\$1,246,437

(1) As filed in Unitil Energy Systems, Inc.'s Major Storm Cost Reserve Fund Report, March 16, 2018.

(2) Pursuant to Order No. 26,123 in DE 18-036, the costs associated with the October 2017 Windstorm, inclusive of carrying charges, have been moved to the SRAF for recovery.

(3) Pursuant to Order No. 26,160 in DE 18-096, balances associated with Hurricane Sandy, Hurricane Irene, and the Snowtober storm (\$63,670) have been moved for final reconciliation to the External Delivery Charge.

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

1. October 30th 2017 (Wind Event)

Note: This event was reported in the previous year's report. It has been updated with final accounting.

1.1. Description of the Storm

Beginning on October 26th (Thu), weather forecasters began reporting a significant storm system expected to impact the northeast late Sunday (Oct 29th) into Monday (Oct 30th) with heavy rain, lightning and gusty winds. Over the weekend, forecasters increased the severity and likelihood of the storm system predicting moderate to heavy amounts of rain and frequent gusts between 35-50 mph with isolated gusts predicted up to 60 mph. High wind watches and warnings were issued for nearly all portions of the northeast especially for coastal parts of RI, MA and NH. Following the storms passing nearly 1.4 million customers were without power in the northeast due to severe flash flooding and tree damage and debris.

1.2. Summary of the Extent of the Storm Damage

Unitil Energy Systems experienced the following impact as detailed in the table below.

UES Region	Total # Outages	Peak # Outages	Total Customers Interrupted	Peak Customers Interrupted	Percentage Affected (Peak)
Seacoast	167	104	34,007	21,857	46.4%
Capital	237	180	19,325	12,479	41.1%

1.3. Preparations

Unitil began holding daily internal coordination conference calls beginning on Friday (the 27th) with key internal personnel to coordinate preparation activities in response to the pending wind/rain event. Based on the forecasted weather and potential for outages, the Company began issuing its preparatory communication messages and initiated contact with life support customers, regulators, emergency response, and municipal officials. The EOCs were setup prior to the storm and quickly took local control once the amount of outages exceeded the capabilities of the centralized dispatch center. The Seacoast, Capital, and System (Hampton) EOCs were formally opened at 6 AM on Monday (the 30th) with the System (Hampton) EOC providing essential logistical and communications support for responding resources.

1.4. Restoration

As noted (in Section 1.2) outages occurred across both of Unitil's NH service territories which were mostly attributed to tree damage and branches on powerlines. The Company had retained additional resources, however ongoing hazardous winds initially prevented line crews from safely responding¹. Unitil had its normal contingent of UES internal crews (10) and on system contractors (11) while also retaining additional contractor line crews (55), tree crews (15), wire down guards and damage assessors (18). At peak Unitil had approximately 33,354 customers interrupted (43% of total customers) with crews responding to outages as possible (given ongoing hazardous working conditions) power was restored to the majority of customers by 6:00 AM Wednesday (Nov 1st) with isolated outages and single services completed the following day.

¹ Line and tree crews cannot safely raise the bucket if winds are gusting over 35 MPH.

1.5. Exclusionary Criteria

This event qualified for recovery of both preparation and restoration costs due to the events predicted EEI levels (see attached forecast) and the impact exceeding the outage criteria as noted in Section 1.2. All costs associated with the event recovered through the MSCR are summarized in Section 1.6.

Energy Event Index for UNITIL

Your forecast administrator: murphyt@unitil.com

Valid Time: October 29, 2017 6:00 PM EDT

Forecaster: tony.dello

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

Energy Event Index

Definition

With Leaves (Apr 1 - Nov 14)

EEI	Wind Speed	Wind/Gust
1	< 20 mph	< 30 mph
2	>= 20 mph	>= 30 mph
3	>= 25 mph	>= 40 mph
4	>= 40 mph	>= 50 mph
5	>= 45 mph	>= 60 mph

Confidence Level	
Low	
Medium	30-60% chance the most likely EEI level remains at that level through the event
High	>=60% chance the most likely EEI 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: October 29, 2017

Time: 6:00 PM EDT

Forecaster: Tony Dello

Video briefing covering high impact weather: <https://vimeo.com/240362451>

Zones	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event Starting in 30hrs	RAIN/WIND	RAIN/WIND	RAIN/WIND	RAIN/WIND
Event Begin Time	10PM SUN	10PM SUN	9PM SUN	11PM SUN
Event End Time	6PM MON	5PM MON	8PM MON	7PM MON
Tstrm Wind Gusts	25-40 mph	25-40 mph	25-40 mph	25-40 mph
Ltng Intensity	Low	Low	Low	Low
Storm Mvmt Dir	NNE	NNE	NNE	NNE
Rain Amount	1.5-3"	1.5-3"	1.5-3"	1.5-3"
Snow Amount				
Snow Character				
Ice Amount				
Sustained Winds	25-35 mph	20-30 mph	20-30 mph	30-40 mph
Common Gusts	40-50 mph	35-45 mph	35-45 mph	45-55 mph
Peak Gusts	50-60 mph	45-50 mph	45-50 mph	55-65 mph
Timing of Peak Gusts	2AM-9AM MON	2AM-9AM MON	1AM-9AM MON	2AM-10AM MON
Chance EEI-2 Gusts	90%	80%	80%	100%
Chance EEI-3 Gusts	60%	60%	50%	70%
Chance EEI-4 Gusts	-	-	-	10%
Temp. Extremes	64/57	65/55	66/58	61/55

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: Isolated to scattered showers into this evening. Moderate to heavy rain likely between 10pm tonight to 7am Mon. Embedded thunderstorms also possible now to 2am Mon. Best t-storm timing: after 8pm tonight. Rain tapering to showers on Monday morning and ending by 6pm Mon. Rainfall Sun-Mon: 1.5-3". Dry for the remainder of Monday. Hazard gusts will be likely between 9pm today to 5pm Mon. See table above for wind details. After 9am Mon, winds will be sustained 12-22 mph, gusting 30-40 mph, isolated peak gusts 40-45

mph possible into the early afternoon. Wind direction: East-southeast this evening/tonight; becoming west-southwest Mon.

Confidence: Confidence is high in wind and rain impacts tonight and Monday. See table above for EEI gusts chances. Confidence is low in t-storms occurring tonight. T-storm chance: 20%.

SEACOAST: Isolated to scattered showers into this evening. Moderate to heavy rain likely between 10pm tonight to 7am Mon. Embedded thunderstorms also possible from 7pm tonight to 5am Mon. Best t-storm timing: after 10pm tonight. Rain tapering to showers on Monday morning and ending by 3pm Mon. Rainfall Sun-Mon: 1.5-3". Dry for the remainder of Monday. Hazard gusts will be likely between 11pm tonight to 6pm Mon. See table above for wind details. After 9am Mon, winds will be sustained 12-22 mph, gusting 30-40 mph, isolated peak gusts 40-45 mph possible into the early afternoon. Wind direction: East-southeast this evening/tonight; becoming west-southwest Mon.

Confidence: Confidence is high in wind and rain impacts tonight and Monday. See table above for EEI gusts chances. Confidence is low in t-storms occurring this evening/tonight. T-storm chance: 20%.

1.6. Qualifying Costs Charged to the Storm Reserve

The amount charged to the storm reserve for this event was \$1,265,848 with a breakdown of charges in the following table:

Payroll	\$ 138,946
Materials & Supplies	22,699
Transportation	20,244
Contractor Invoices & Other	1,315,735
Less Amount Capitalized	(231,776)
Total To Storm Reserve	\$ 1,265,848

2. January 4th, 2018 (Winter Storm Grayson)

2.1. Description of the Storm

Beginning on Monday January 1st, Unitil's weather service provider began forecasting the possibility for a winter storm expected to impact the region Thursday, January 4th however there was uncertainty as to the track of the system. Initially, snowfall amounts predicted for the region were between 3-7 inches with common gusts of 30-45 mph and peak gusts up to 55 mph. On Tuesday, weather models began to converge, increasing the predicted strength with snowfall amounts between 4-12 inches and peak winds gusts up to 60 mph. Winter storm warnings from national weather services also indicated a significant nor'easter to impact the region Thursday into Friday. Significant snow amounts and winds impacted Unitil's territory as the storm moved across with gusts exceeding hazardous levels frequently in the coastal Seacoast area and snow totals between 8 and 14 inches reported across the region.



Figure 1 - Visible Satellite Image Jan 4th 2018
(provided by DTN)

2.2. Summary of the Extent of the Storm Damage

Unitil Energy Systems experienced the following impact as detailed in the table below.

UES Region	Total # Outages	Peak # Outages	Total Customers Interrupted	Peak Customers Interrupted	Percentage Affected (Peak)
Seacoast	8	5	1,710	1,509	3.2%
Capital	5	5	677	480	1.6%

2.3. Preparations

Unitil began communicating internally on Monday January 1st to coordinate preparation activities including public notifications (via press release) and outreach to life support customers, municipal and elected officials, regulatory 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 notified and activated key response employees to staff the Seacoast and Capital operating centers throughout the event and opened the Seacoast Municipal Room to coordinate with local municipal officials due to the expectation of higher wind gusts along the coast.

2.4. Restoration

Scattered outages occurred (listed in Section 2.2) mostly attributed to broken limbs and tree damage, were promptly responded to and restored by crews throughout the afternoon and evening on Thursday with Unitil reverting back to normal operations at approximately 9 PM. Unitil had its normal contingent of internal crews (10) and on system contractors (8) and retained an additional 5 contractor line crews to support Seacoast operations.

2.5. Exclusionary Criteria

This event qualified for recovery of preparation costs due to the EEI of 3 for hazardous snow totals 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: murphyt@unitil.com
Valid Time: January 4, 2018 6:00 AM EST Forecaster: nathan.hamblin

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	2	1	1
	Fitchburg	2	1	1
	Portland	2	1	1
	Seacoast	2	1	1
Snow	Capital	3	1	1
	Fitchburg	3	1	1
	Portland	3	1	1
	Seacoast	3	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 15 - Mar 31)

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.

Date: January 4, 2018

Time: 6:00 AM EST

Forecaster: Nate Hamblin

Zones	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event Starting in 30hrs	SNOW/WIND	SNOW/WIND	SNOW/WIND	SNOW/WIND
Event Begin Time	6AM THU	6AM THU	6AM THU	6AM THU
Event End Time	2AM FRI	12AM FRI	12AM FRI	2AM FRI
Tstrm Wind Gusts				
Ltng Intensity				
Storm Mvmt Dir				
Rain Amount				
Snow Amount	12-16"	11-15"	12-16"	12-15"
Snow Character	NORMAL	NORMAL/DRY	NORMAL/DRY	NORMAL
Ice Amount				
Sustained Wind	22-32 MPH	20-28 MPH	20-28 MPH	22-32 MPH
Wind Gust	40-50 MPH	35-45 MPH	35-45 MPH	40-50 MPH
Temp. Extremes	29/14	26/7	28/14	28/14

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: Winter storm likely today. Snow timing: 6am-9pm Thu. Heaviest: 11am-6pm where most accumulation will occur. Worst case scenario: 16-18" if banding sets up overhead. Chances of trending less are decreasing. Dry conditions take over the remainder of the night tonight. Hazard winds also expected, detailed above. Wind timing: 2pm Thu-12am Fri. Winds will gust to 25-35 mph for the rest of the night. Friday: Dry weather is expected. Winds from 8am-10pm Fri: Northwest at 16-24 mph, with gusts of 25-35 mph. Peak gusts: 35-40 mph. Winds could gust to 20-25 mph later at night, with peak gusts of 25-30 mph.

Confidence: Confidence is high that hazard snow will impact the region. Snow chance: EEI-2/3 90%/60%. Confidence is high that hazard winds will impact the region. Wind chance: EEI-2 60%.

SEACOAST: Winter storm likely today. Snow timing: 6am-9pm Thu. Heaviest: 11am-7pm where most accumulation will occur. Worst case scenario: 16-18" if banding sets up overhead. Chances of trending less are decreasing. Dry conditions take over the remainder of the night tonight. Hazard winds are expected, detailed above. Wind timing: 2pm Thu-2am Fri. Winds will gust to 25-35 mph for the rest of the night, with peak gusts of 35-40 mph. Friday: Dry weather is expected. Winds from 6am Fri-12am Sat: Northwest at 18-26 mph, with gusts of 27-37 mph. Peak gusts: 37-42 mph. Winds could gust to 20-25 mph later at night, with peak gusts of 25-30 mph.

Confidence: Confidence is high that hazard snow will impact the region. Snow chance: EEI-2/3 90%/80%. Confidence is high that hazard winds will impact the region. Wind chance: EEI-2 80%.

2.6. Qualifying Costs Charged to the Storm Reserve

The total amount charged to the storm reserve for this event was \$147,046 with a breakdown of charges in the following table:

Payroll	\$23,865
Materials & Supplies	0
Transportation	0
Contractor Invoices & Other	123,181
Less Amount Capitalized	0
Total To Storm Reserve	\$ 147,046

3. **February 7th, 2018 (Winter Storm Liam)**

3.1. **Description of the Storm**

Beginning on Sunday February 4th, Unitil received indications of a possible winter storm system expected to track near the region with heavy (and possibly wet) snowfall on Wednesday (Feb 7th). Over the days leading up to the storm, forecasters reported a mix of sleet, freezing rain and wet snow with totals up to 10 inches and a chance for possible icing in the southern areas of Unitil's service territory. While wind gusts were not expected to exceed hazardous criteria, the amount of wet snow possible in the Capital area was of concern. Winter Storm Liam impacted the Midwest before blanketing the Northeast with up to a foot of snow however most of the hazardous sleet and icing remained well south of Unitil's territory.

3.2. **Summary of the Extent of the Storm Damage**

Unitil Energy Systems experienced the following impact as detailed in the table below.

UES Region	Total # Outages	Peak # Outages	Total Customers Interrupted	Peak Customers Interrupted	Percentage Affected (Peak)
Seacoast	0	0	0	0	0%
Capital	1	1	1	1	~0%

3.3. **Preparations**

Unitil began communicating internally on Monday February 5th to coordinate preparation activities including public notifications (via social media) and outreach to municipal, elected and regulatory officials (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 ensured that staff was available at the operating centers throughout the duration of the event to respond to any interruptions.

3.4. **Restoration**

Only one outage occurred (listed in Section 2.2) in the Capital region attributed to a pole hit in Canterbury which was promptly responded to and restored by crews. Unitil had its normal contingent of internal crews (10) and on system contractors (3) in addition to 8 tree crews and secured an additional 6 contractor line crews for the Capital area.

3.5. **Exclusionary Criteria**

This event qualified for recovery of preparation costs due to the EEI of 3 for hazardous snow with a high confidence level for the Capital Region (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 3.6.

Unitil Energy Systems, Inc. d/b/a Unitil Corp
Major Storm Cost Reserve Fund Report 2018

Energy Event Index for UNITIL

Your forecast administrator: murphyt@unitil.com

Valid Time: February 7, 2018 6:00 AM EST

Forecaster: tanner.verstegen

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	3	1	1
	Fitchburg	2	1	1
	Portland	3	1	1
	Seacoast	2	1	1
Ice	Capital	1	1	1
	Fitchburg	2	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 15 - Mar 31)

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 Table for Wednesday:

Zones	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event Starting in 30hrs	SNOW/ICE	SNOW	SNOW/ICE	SNOW/ICE
Event Begin Time	12pm Wed	12pm Wed	11am Wed	1pm Wed
Event End Time	2am Thu	1am Thu	1am Thu	3am Thu
Tstrm Wind Gusts				
Ltng Intensity				
Storm Mvmt Dir				
Rain Amount				
Snow Amount	4-6"	7-11"	5-7"	6-10"
EEI2 Snow Chance	60%	80%	70%	80%
EEI3 Snow Chance	10%	60%	40%	60%
Snow Character	Wet	Normal-Wet	Normal-Wet	Normal
Ice Amount	0.03-0.05"	-	0.10-0.20"	Tr-0.05"
Ice start	6pm Wed	-	5pm Wed	9pm Wed
Ice End	10pm Wed	-	10pm Wed	11pm Wed
EEI2 Ice Chance	20%	-	80%	20%
Sustained Wind				
Wind Gust				
Temp. Extremes	34/18	29/13	35/18	31/15

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: Light to moderate snow arrive after 12pm and continues through midnight. Periods of heavy snow possible from 1-7pm. Periods of sleet may mix in from 8-10pm. Freezing rain is not expected for Capital. See table above for snow details. Winds increase overnight, with a few gusts of 30-35 mph possible from 1am-7am Thursday. Dry weather then expected Thursday.

Confidence: Confidence is high in EEI-2 snow occurring Wednesday. Confidence is high in no hazards Thursday.

SEACOAST: Light to moderate snow will move in after 12pm, changing to freezing rain after 6pm, and all rain after 8pm. Dry weather settles in by 1am. See table above for snow/ice details. Winds increase overnight, with a few gusts of 30-35 mph possible from 1am-7am Thursday. Dry weather then expected Thursday.

Confidence: Confidence is high for hazard snow west of I-95, and medium for hazard snow closer to the coast. Hazard ice is not expected, with only a light glaze before changing to all rain. Confidence is high in no hazards Thursday.

3.6. Qualifying Costs Charged to the Storm Reserve

The total amount charged to the storm reserve for this event was \$19,726 with a breakdown of charges in the following table:

Payroll	\$ 989
Materials	0
Transportation	0
Contractor Invoices & Other	18,737
Less Amount Capitalized	0
Total To Storm Reserve	\$ 19,726

4. March 2nd, 2018 (Winter Storm Riley)

4.1. Description of the Storm

Beginning late Monday, February 26th Unitil received weather information indicating the possibility for a significant coastal storm with concerns of hazardous wind speeds and coastal flooding to impact the region late in the week. As the week progressed, additional forecasts indicated a mix of precipitation with heavy wet snow expected across much of the region. As the system moved across the region temperatures were favorable with NH receiving mostly rain. Significant coastal flooding occurred and winds gusted throughout the day with long periods of hazardous winds over 40 mph gusting frequently in the Seacoast area.

4.2. Summary of the Extent of the Storm Damage

Unitil Energy Systems experienced the following impact as detailed in the table below.

UES Region	Total # Outages	Peak # Outages	Total Customers Interrupted	Peak Customers Interrupted	Percentage Affected (Peak)
Seacoast	24	10	1,761	877	1.9%
Capital	0	0	0	0	0%



Figure 2 - Broken Pole Damage (Hampton, NH)



Figure 3 - Coastal Flooding (Seabrook, NH)

4.3. Preparations

Unitil began communicating internally on Monday February 26th to coordinate preparation activities including public notifications (via press release) and outreach to life support customers, municipal and elected officials, regulatory 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 notified and activated key response employees to staff the Seacoast and Capital operating centers throughout the event and opened the Seacoast Municipal Room to coordinate with local municipal officials.

4.4. Restoration

Small, scattered outages occurred (listed in Section 4.2) mostly attributed to broken limbs and tree damage, were promptly responded to and restored by crews throughout the afternoon and evening on Friday (March 2nd). Unitil had its normal contingent of internal crews (10) and on system contractors (9) and retained an additional 6 contractor line crews to support Seacoast operations.

4.5. Exclusionary Criteria

This event qualified for recovery of preparation costs due to the EEI of 3 for hazardous snow with a high confidence level for the Seacoast Region (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 4.6.

Energy Event Index for UNITIL Your forecast administrator: murphyt@unitil.com
Valid Time: March 2, 2018 5:00 AM EST Forecaster: justin.wegwerth

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	2	1	1
	Fitchburg	2	1	1
	Portland	2	1	1
	Seacoast	3	1	1
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 15 - Mar 31)

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.

Date: March 2, 2018

Time: 6:00 AM EST

Forecaster: J Wegwerth

Zones	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event Starting in 30hrs	RAIN/WIND	WIND/RAIN	RAIN/WIND	WIND
Event Begin Time	6AM FRI	6AM FRI	6AM FRI	10AM FRI
Event End Time	6AM SAT	9PM FRI	2AM SAT	1AM SAT
Tstrm Wind Gusts				
Ltng Intensity				
Storm Mvmt Dir				
Rain Amount	0.75-1.50"	0.50-1.25"	1.00-2.00"	
Snow Amount				
Snow Character				
Ice Amount				
Sustained Wind	30-40	18-28	18-28	20-30
Wind Gust	45-60	35-43	40-50	40-55
Temp. Extremes	43/35	42/30	45/33	45/32

WORST CASE HAZARDS (20-30% chance of occurrence)

Parameter	Region	Day 1	Day 2
Wind gusts	Capital	EEI-2	EEI-1
-	Fitchburg	EEI-2	EEI-1
-	Portland	EEI-2	EEI-2
-	Seacoast	EEI-3	EEI-2

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: Periods of rain/snow expected 6am-10am. Mostly rain 10am-4pm, then mixing with/changing to snow. Snow likely ending by 11pm Friday. Rainfall: 0.50-1.25". Snowfall: 0.50-1.00". Snow character: Wet. Winds: North-northeast at 18-28 mph, gusting 30-40 mph, peak gusts 40-43 mph. Peak wind timing: 1pm-9pm Fri. After 9pm, gusts will be below 40 mph. On Saturday, mostly dry. Winds: North-northeast at 12-20 mph, gusting 25-35 mph, peak gusts 35-38 mph possible in the late morning/afternoon.

Confidence: Confidence is high in hazard gusts occurring. Hazard gust chance: 60%.

SEACOAST: Mostly rain through the day. Rain could mix with/change to snow after 6pm. Snow will likely end around 1-2am Saturday. Rainfall: 0.75-1.50". Snowfall: Less than 1". Snow character: Wet. Winds: North-northeast at 30-40 mph, gusting 45-55 mph, peak gusts 55-60 mph. Peak wind timing: 12pm-11pm Fri. After 11pm, gusts to 30-40 mph expected. On Saturday, mostly dry. Winds: North-northeast at 15-25 mph, gusting 30-40 mph, peak gusts 40-45 mph. There will also be a risk for moderate coastal flooding due to the combination of long duration/strong northeasterly winds and elevated astronomical high tides. On Saturday, mostly dry. Winds: North-northeast at 12-20 mph, gusting 25-35 mph, peak gusts 35-40 mph possible in the late morning/afternoon. Minor/moderate coastal flooding will be possible on Saturday as well.

Confidence: Confidence is high in hazard gusts occurring. Hazard gust chance: 80% EEI-2/30% EEI-3. Any gusts that approach EEI-3 will likely focus along/east of US-1. Confidence is high in hazard rainfall occurring. Hazard gust chance on Saturday: 60% EEI-2.

4.6. Qualifying Costs Charged to the Storm Reserve

The total amount charged to the storm reserve for this event was \$78,412 with a breakdown of charges in the following table:

Payroll	\$ 6,912
Materials & Supplies	0
Transportation	0
Contractor Invoices & Other	71,500
Less Amount Capitalized	0
Total To Storm Reserve	\$ 78,412

5. March 7th 2018 (Winter Storm Quinn)

5.1. Description of the Storm

Only days after the previous storm event on March 2nd forecasters began predicting another similar significant system making its way towards the region. Although winds with this event were not expected to be hazardous, there was dispute regarding where the rain/snow line would develop with forecasters initially predicting between 8-18 inches of snow for New England. The defined rain/snow line across the territory resulted in the Capital areas receiving between 8-10 inches of dry (non-hazardous) snow and areas in the Seacoast region experiencing between 6-10 inches of heavier, wet snow which caused significant troubles and damage.

5.2. Summary of the Extent of the Storm Damage

Unitil Energy Systems experienced the following impact as detailed in the table below.

UES Region	Total # Outages	Peak # Outages	Total Customers Interrupted	Peak Customers Interrupted	Percentage Affected (Peak)
Seacoast	249	130	43,520	23,011	48.6%
Capital	1	1	3	3	~0%



Figure 4 - Sub-T Damage (Seacoast Region)



Figure 5 - Tree Damage (Seacoast Region)

5.3. Preparations

Unitil began communicating internally on Monday March 5th to coordinate preparation activities including public notifications (via press release) and outreach to life support customers, municipal and elected officials, regulatory 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 notified and activated key response employees to staff the System and Regional EOCs in Seacoast and Capital throughout the event.

5.4. Restoration

Although the Capital region experienced only 1 outage, the Seacoast region was significantly impacted with most outages attributed to broken limbs and tree damage caused by the heavy snow. Three (3) sub-transmission and twelve (12) distribution circuits were impacted interrupting nearly 50% of Seacoast customers at peak. Once it was determined that the Capital region was not experiencing additional damage, many of those resources were shifted to aid the Seacoast region restoration efforts. Crews actively responded to and made repairs throughout the afternoon and evening as weather conditions allowed with all customers restored by 2 AM on the morning of March 10th. Unitil had its normal contingent of internal crews (10) and secured 32 additional contractor line crews and 23 contractor tree crews to support NH operations.

5.5. Exclusionary Criteria

This event qualified for recovery of preparation costs for both Regions due to the events predicted EEI levels (see attached forecast) and for restoration costs for Seacoast due to the impact exceeding the outage criteria as noted in Section 5.2. All costs associated with the event recovered through the MSCR are summarized in Section 5.6.

Energy Event Index for UNITIL Your forecast administrator: murphyt@unitil.com
Valid Time: March 6, 2018 6:00 AM EST Forecaster: justin.wegwerth

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	3	3
	Fitchburg	1	4	4
	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	High	High
	Fitchburg	High	High	High
	Portland	High	High	High
	Seacoast	High	High	High

Energy Event Index Definition

No Leaves (Nov 15 - Mar 31)

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.

Date: March 6, 2018

Time: 6:25 AM EST

Forecaster: J Wegwerth

Zones	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event Starting in 30hrs	SNOW/GUSTS	SNOW	SNOW	SNOW
Event Begin Time	8AM WED	9AM WED	6AM WED	11AM WED
Event End Time	12AM FRI	10PM THU	10PM THU	1AM FRI
Tstrm Wind Gusts				
Ltng Intensity				
Storm Mvmt Dir				
Rain Amount				
Snow Amount	10-16"	12-16"	12-18"	10-16"
Snow Character	WET	NRM-WET	NRM-WET	WET
Ice Amount				
Sustained Wind	15-25			
Wind Gust	32-42			
Temp. Extremes	40/29	41/25	44/28	40/28

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: On Tuesday, dry and hazard-free. On Wednesday, periods of light snow could begin around 9am. Snow will increase in intensity Wednesday afternoon. Moderate/heavy snow is possible between 7pm Wed-9am Thu. Snow will continue but will gradually decrease in intensity Thursday afternoon/evening before ending around 8-10pm Thu. Mostly dry weather is expected Thursday night. Snowfall: 12-16". Snow consistency: Normal- Wet. Winds could gust 20-30 mph Wednesday late afternoon and evening.

Confidence: Confidence is high in hazard snow occurring Wednesday/Thursday. Hazard snow chance: 70% EEI-3/50% EEI-4.

SEACOAST: On Tuesday, dry and hazard-free. On Wednesday, periods of light snow could begin around 8am. Snow will increase in intensity Wednesday afternoon. Moderate/heavy snow is possible between 6pm Wed-10am Thu. Snow will continue but will gradually decrease in intensity Thursday afternoon/evening before ending around 10pm Thu-12am Fri. Mostly dry weather is expected Thursday night. Snowfall: 10-16", highest away from the coast. Snow consistency: Wet. Winds could gust 32-42 mph Wednesday late afternoon and evening. Coastal flooding will also be a threat on Wednesday with strong easterly winds with tidal departures around 1-2 feet expected.

Confidence: Confidence is high in hazard snow occurring Wednesday/Thursday. Hazard snow chance: 60% EEI-4. Confidence is medium in gusts reaching hazard-levels. Hazard gust chance: 50% EEI-2.

5.6. Qualifying Costs Charged to the Storm Reserve

The total amount charged to the storm reserve for this event was \$1,550,964 with a breakdown of charges in the following table:

Payroll	\$ 132,465
Materials & Supplies	20,562
Transportation	17,202
Contractor Invoices & Other	1,545,705
Less Amount Capitalized	(164,970)
Total To Storm Reserve	\$ 1,550,964

6. March 13th, 2018 (Winter Storm Skylar)

6.1. Description of the Storm

Immediately following restoration from the previous event (Winter Storm Quinn), weather forecasters began reporting yet another system moving from the west expected to impact the Northeast beginning on the 13th and lasting through the following day. Winter storm Skylar was expected to bring between 10-16 inches of snow and periods of hazardous wind gusts (in excess of 35 mph) across the service territory. While most hazardous gusts remained isolated to the immediate coast and areas south of Unitil's territory, the storm brought over a foot of snow and moderate winds to the Seacoast area.

6.2. Summary of the Extent of the Storm Damage

Unitil Energy Systems 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	16	10	2,550	1,410	3%
Capital	0	0	0	0	0%

6.3. Preparations

Unitil began communicating internally on Monday (March 12th) to coordinate preparation activities including public notifications (via press release) and outreach to life support customers, municipal and elected officials, regulatory 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 ensured that staff was available at the operating centers throughout the duration of the event to respond to any interruptions.

6.4. Restoration

Small, scattered outages occurred (listed in Section 6.2) mostly attributed to broken limbs and tree damage, were promptly responded to and restored by crews throughout the day and overnight with all affected customers restored by the afternoon of March 14th. Unitil had its normal contingent of internal crews (10) and on system contractors (7) to support restoration efforts and was even able to assist its neighboring utilities in restoration once all Unitil customers were restored.

6.5. Exclusionary Criteria

This event qualified for recovery of preparation costs due to the EEI of 3 for hazardous snow with a high confidence level for the Seacoast & Capital Region (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 6.6.

Unitil Energy Systems, Inc. d/b/a Unitil Corp
Major Storm Cost Reserve Fund Report 2018

Energy Event Index for UNITIL

Your forecast administrator: murphyt@unitil.com

Valid Time: March 12, 2018 6:00 AM EDT

Forecaster: craig.eckstein

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	3	3	1
	Fitchburg	3	3	1
	Portland	4	4	1
	Seacoast	3	3	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 15 - Mar 31)

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.

Date: March 12, 2018

Time: 6:00 AM EST

Forecaster: C Eckstein

Zones	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event Starting in 30hrs	SNOW	SNOW	SNOW	SNOW
Event Begin Time	12AM TUE	12AM TUE	12AM TUE	12AM TUE
Event End Time	12AM WED	12AM WED	12AM WED	12AM WED
Tstrm Wind Gusts				
Ltng Intensity				
Storm Mvmt Dir				
Rain Amount				
Snow Accumulation	10-16"	10-16"	10-16"	15-20"
Snow Character	NORMAL	NORMAL	NORMAL	NORMAL
Ice Amount				
Sustained Wind				
Wind Gust				
Temp. Extremes	41/30	42/27	43/30	40/27

UNITIL SERVICE AREA 72 HOUR OUTLOOK:

CAPITAL: Dry and hazard-free through most of today. Snow will move in after midnight and continue through Wednesday. Moderate to heavy snow, with snowfall rates of up to 1" per hour are possible between 7am-7pm Tuesday.

Confidence: Confidence is high hazard snow will occur tonight into Tuesday. Chance EEI-2 snow: 80%. Chance EEI-3 snow: 50%.

SEACOAST: Dry and hazard-free through most of today. Snow will move in after midnight and continue through Wednesday. Moderate to heavy snow, with snowfall rates of up to 1" per hour are possible between 7am-7pm Tuesday. Wind gusts of 40-45 mph will be possible during the daytime hours Tuesday.

Confidence: Confidence is high hazard snow will occur tonight into Tuesday. Chance EEI-2 snow: 80%. Chance EEI-3 snow: 50%. Confidence is high that wind gusts will not exceed 45 mph Tuesday.

6.6. Qualifying Costs Charged to the Storm Reserve

The total amount charged to the storm reserve for preparation activities was \$17,131 with a breakdown of charges in the following table:

Payroll	\$ 5,006
Materials and Supplies	0
Transportation	0
Contractor Invoices & Other	12,125
Less Amount Capitalized	0
Total To Storm Reserve	\$ 17,131

7. May 4th, 2018 (Thunderstorm Event)

7.1. Description of the Storm

Beginning on Wednesday May 2nd forecasters began predicting thunderstorm activity including a period of hazardous wind gusts up to 50 mph to pass through the region late Friday night (May 4th) into the following day Saturday. Throughout the overnight hours of Friday the region experienced an extended periods of gusty winds with several gusts over 45 mph being reported in the Capital region causing damage.

7.2. Summary of the Extent of the Storm Damage

Unitil Energy Systems experienced the following impact as detailed in the table below

UES Region	Total # Outages	Peak # Outages	Total Customers Interrupted	Peak Customers Interrupted	Percentage Affected (Peak)
Seacoast	11	6	421	335	0.7%
Capital	43	24	3,402	2,817	9.3%



Figure 6 - Wind Damage (Broken Pole)



Figure 7 - Wind Damage (Tree Across Road)

7.3. Preparations

Unitil began communicating internally on Wednesday (May 2nd) to coordinate preparation activities including such as contractor availability outreach and checking inventory, stock levels and fleet vehicles. The Company ensured that extra staff was available at the operating centers throughout the duration of the event to respond to any interruptions and to communicate with affected stakeholders.

7.4. Restoration

Scattered outages occurred (listed in Section 7.2) mostly in the Capital Region and were mainly attributed to broken limbs and tree damage including 12 broken poles. Outages were promptly responded to and restored by crews overnight and throughout the following day with all affected customers being restored by the afternoon of the 6th. Unitil had its normal contingent of internal crews (10) and on system contractors (4) and secured an additional (4) line crews with internal resources being transferred to support the Capital region once the EOC was opened.

7.5. Exclusionary Criteria

Although predicted EEI levels (see attached forecast) did not reach the criteria for recovery of preparation costs, the impact exceeded the outage criteria (22 concurrent outages) for restoration costs in the Capital Region as noted in Section 7.2. All costs associated with the event recovered through the MSCR are summarized in Section 7.6.

Unitil Energy Systems, Inc. d/b/a Unitil Corp
Major Storm Cost Reserve Fund Report 2018

Energy Event Index for UNITIL Your forecast administrator: murphyt@unitil.com
Valid Time: May 4, 2018 1:00 PM EDT Forecaster: brad.nelson

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	2	2	1
	Fitchburg	2	2	1
	Portland	1	2	1
	Seacoast	1	2	1
Confidence Level	Capital	High	High	High
	Fitchburg	High	High	High
	Portland	High	High	High
	Seacoast	High	High	High

Energy Event Index

Definition

With Leaves (May 1 - Nov 14)

EEI	Wind Speed	Wind/Gust
1	< 30 mph	< 35 mph
2	>= 30 mph	>= 35 mph
3	>= 45 mph	>= 50 mph
4	>= 60 mph	>= 65 mph
5	>= 70 mph	>= 75 mph

Confidence Level	
Low	
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: May 4, 2018

Time: 1:00 PM EDT

Forecaster: B NELSON

Zones	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event Starting in 30hrs	TSTRM/GUST	TSTRM/GUST	TSTRM/GUST	TSTRM/GUST
Event Begin Time	6PM FRI	5PM FRI	6PM FRI	6PM FRI
Event End Time	8AM SAT	6AM SAT	6AM SAT	9AM SAT
Tstrm Wind Gusts	30-40	35-45	35-45	30-40
Ltng Intensity	LOW	LOW	LOW	LOW
Storm Mvmt Dir	E	E	E	E
Rain Amount				
Snow Accumulation				
Snow Character				
Ice Amount				
Sustained Wind	14-22	16-24	16-24	14-22
Wind Gust	30-45	30-45	30-45	30-40
Temp. Extremes	73/53	78/51	85/54	71/51

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: A round of showers is moving through the area this afternoon. A higher chance for thunderstorms will move through later today from 5-9pm. Thunderstorms could produce strong winds. T-storm gusts: 35-45 mph. Lightning amounts: Low. Rainfall: 0.10-0.30", isolated 0.50" in t-storms. Wind gusts 5-10pm: 25-30 mph. Wind gusts 12-6am Sat: 30-35 mph, isolated peak gusts 35-45 mph possible. On Saturday, dry. Winds could gust 25-35 mph, peak gusts 35-38 mph in the morning, then weakening.

Confidence: High in thunderstorms occurring today. T-storm chance: 70%. Medium confidence in hazard t-storm gusts. Hazard t-storm gust chance: 50% EEI-2. High confidence in hazard gusts outside of storms late today into early Saturday. Hazard gust chance: 70% EEI-2.

SEACOAST: A round of showers is moving through the area this afternoon. A higher chance for thunderstorms will move through later today from 6-10pm. Thunderstorms could produce strong winds. T-storm gusts: 30-40 mph. Lightning amounts: Low. Rainfall: 0.10-0.30", isolated 0.50" in t-storms. Wind gusts 5-10pm: 25-30 mph. Wind gusts 1-8am Sat: 30-35 mph, isolated peak gusts 35-45 mph possible. On Saturday, dry. Winds could gust 25-35 mph, peak gusts 35-40 mph in the morning, then weakening.

Confidence: High confidence in thunderstorms occurring today. T-storm chance: 70%. Medium confidence in hazard t-storm gusts. Hazard t-storm gust chance: 40% EEI-2. High confidence in hazard gusts outside of storms late today into early Saturday. Hazard gust chance: 70% EEI-2.

7.6. Qualifying Costs Charged to the Storm Reserve

The amount charged to the storm reserve for this event is \$111,714 with a breakdown of charges in the following table:

Payroll	\$21,813
Materials & Supplies	19,957
Transportation	19,861
Contractor Invoices & Other	160,534
Less Amount Capitalized	110,451
Total To Storm Reserve	\$111,714

8. June 18th, 2018 (Thunderstorm Event)

8.1. Description of the Storm

During the midst of a with issued heat advisories, forecasters indicated the possibility for strong thunderstorms to develop. Although forecasters had been reporting on heat indices for several days, confidence in the chance for severe thunderstorms did not develop until early Sunday (June 17th). A line of strong, scattered thunderstorms developed across the service territory late on the evening of Monday the 18th bringing damaging winds (frequent gusts over 30 mph) and heavy rains especially in the Capital area.

8.2. Summary of the Extent of the Storm Damage

Unitil Energy Systems experienced the following impact as detailed in the table below

UES Region	Total # Outages	Peak # Outages	Total Customers Interrupted	Peak Customers Interrupted	Percentage Affected (Peak)
Seacoast	29	22	1,171	1,089	2.3%
Capital	27	18	11,351	10,747	35.4%



Figure 8 - Tree Damage (Concord, NH)



Figure 9 - Equipment Damage (Kingston, NH)

8.3. Preparations

Unitil began communicating internally on Sunday (June 17th) to coordinate preparation activities including such as contractor availability outreach and checking inventory, stock levels and fleet vehicles. The company ensured that extra staff was available at the operating centers throughout the duration of the event to respond to any interruptions and to communicate with affected stakeholders. Once outages escalated, additional staff was activated to support operational activities.

8.4. Restoration

Scattered outages occurred (listed in Section 8.2) occurred in the Seacoast Region but the Capital Region experienced severe isolated thunderstorm activity. Most outages were attributed to broken limbs and tree damage and were promptly responded to and restored by crews overnight and throughout the following day as conditions allowed. Nearly all affected customers were restored by the afternoon of the 19th. Unitil had its normal contingent of internal crews (10) and on system contractors (4) and secured an additional (7) contractor line crews to support restoration efforts.

8.5. Exclusionary Criteria

Although predicted EEI levels (see attached forecast) did not reach the criteria for recovery of preparation costs, the impact exceed the outage criteria for restoration costs in both Regions as noted in Section 8.2. All costs associated with the event recovered through the MSCR are summarized in Section 8.6.

Energy Event Index for UNITIL Your forecast administrator: murphyt@unitil.com
Valid Time: June 18, 2018 1:00 PM EDT Forecaster: allan.persons

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	2	1	1
	Fitchburg	2	1	1
	Portland	1	1	1
	Seacoast	2	1	1
Confidence Level	Capital	High	High	High
	Fitchburg	High	High	High
	Portland	High	High	High
	Seacoast	High	High	High

Energy Event Index

Definition

With Leaves (May 1 - Nov 14)

EEI	Wind Speed	Wind/Gust
1	< 30 mph	< 35 mph
2	>= 30 mph	>= 35 mph
3	>= 45 mph	>= 50 mph
4	>= 60 mph	>= 65 mph
5	>= 70 mph	>= 75 mph

Confidence Level	
Low	
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: June 18, 2018
Time: 1:00 PM EDT
Forecaster: Allan Persons

Zones	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event Starting in 30hrs	TSTMS	TSTMS	TSTMS	TSTMS
Event Begin Time	6PM MON	5PM MON	5PM MON	6PM MON
Event End Time	4AM TUE	3AM TUE	3AM TUE	4AM TUE
Tstrm Wind Gusts	35-50 mph	40-55 mph	40-55 mph	35-45 mph
Ltng Intensity	LOW-MED	MEDIUM	MEDIUM	LOW-MED
Storm Mvmt Dir	SE	SE	SE	SE
Rain Amount	0.25-1.25"	0.25-1.25"	0.25-1.25"	0.25-1.25"
Snow Accumulation				
Snow Character				
Ice Amount				
Sustained Wind				
Wind Gust				
Temp. Extremes	92/69	94/67	93/69	87/65

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: Showers/storms develop this evening and remain possible early tonight. Activity may come in two waves, with a break later this evening. Strong storms are possible. Strong storm timing: 5pm-8pm. See table above for strong storm details. Storms after 8pm will contain low amounts of lightning and gusts up to 35 mph. Rainfall: 0.25-0.75", with local amounts to 1.25". Hot and humid conditions are expected Monday with highs reaching the middle/upper 90s and heat indices reaching 97-102F. Dry and hazard-free on Tuesday.

Confidence: Confidence is high that thunderstorms will occur this evening/tonight. Thunderstorm chance: 70%. EEI-2/3 t-storm gust chance: 60%/10%. Confidence is high that t-storm gusts will remain EEI-1 tonight. Confidence is high that no hazards will occur on Tuesday.

SEACOAST: Showers/storms develop this evening and remain possible early tonight. Activity may come in two waves, with a break later this evening. Strong storms are possible. Strong storm timing: 6pm-9pm. See table above for strong storm details. Storms after 9pm will contain low amounts of lightning and gusts up to 35 mph. Rainfall: 0.25-0.75", with local amounts to 1.25". Hot and humid conditions are expected Monday with highs reaching the lower/middle 90s and heat indices reaching 95-100F. Dry and hazard-free on Tuesday.

Confidence: Confidence is high that thunderstorms will occur this evening/tonight. Thunderstorm chance: 60%. EEI-2/3 t-storm gust chance: 50%/5%. Confidence is high that t-storm gusts will remain EEI-1 tonight. Confidence is high that no hazards will occur on Tuesday.

8.6. Qualifying Costs Charged to the Storm Reserve

The amount charged to the storm reserve for this event is \$150,616 with a breakdown of charges in the following table:

Payroll	\$31,570
Materials & Supplies	2,100
Transportation	4,772
Contractor Invoices & Other	126,111
Less Amount Capitalized	13,937
Total To Storm Reserve	\$150,616

9. July 17th, 2018 (Thunderstorm Event)

9.1. Description of the Storm

Beginning on Sunday, July 15th forecasters predicted the possibility for thunderstorm activity to develop both Monday evening (the 16th) and the afternoon and evening of the following day (Tuesday, the 17th). A quick moving cold front was predicted to move through on Tuesday with high confidence of it producing strong isolated thunderstorms with gusts up to 50 mph and moderate amounts of lighting. As the system moved over the region, it produced periods of strong gusts in some areas resulting in small but scattered outages across the UES territory.

9.2. Summary of the Extent of the Storm Damage

Unitil Energy Systems 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	6	2	215	175	0.4%
Capital	5	2	256	204	0.6%

9.3. Preparations

Unitil began communicating internally on Monday (July 16th) to coordinate preparation activities including public notifications (via press release) and outreach to life support customers, municipal and elected officials, regulatory 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 opened and staffed its emergency operations centers the afternoon of the 17th to monitor interruptions throughout the duration of the event.

9.4. Restoration

Small, scattered outages occurred (listed in Section 9.2) mostly attributed to broken limbs and tree damage. Outages were promptly responded to and restored by crews throughout the afternoon and evening with all affected customers being restored by 1:40 AM the following morning. Unitil had its normal contingent of internal crews (10) and on system contractors (5) and secured an additional (14) contractor line crews with internal resources at the EOC to support operations.

9.5. Exclusionary Criteria

This event qualified for recovery of preparation costs due to the EEI of 3 for wind gusts with a high confidence level for the Seacoast Region (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 9.6.

Unitil Energy Systems, Inc. d/b/a Unitil Corp
Major Storm Cost Reserve Fund Report 2018

Energy Event Index for UNITIL Your forecast administrator: murphyt@unitil.com

Valid Time: July 17, 2018 6:00 AM EDT

Forecaster: nick.lesser1

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	2	1	1
	Fitchburg	3	1	1
	Portland	2	1	1
	Seacoast	3	1	1
Confidence Level	Capital	High	High	High
	Fitchburg	High	High	High
	Portland	High	High	High
	Seacoast	High	High	High

Energy Event Index Definition

With Leaves (May 1 - Nov 14)

EEI	Wind Speed	Wind/Gust
1	< 30 mph	< 35 mph
2	>= 30 mph	>= 35 mph
3	>= 45 mph	>= 50 mph
4	>= 60 mph	>= 65 mph
5	>= 70 mph	>= 75 mph

Confidence Level	
Low	
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: July 17, 2018

Time: 6:00 AM EDT

Forecaster: Nick Lesser

Zones	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event Starting in 30hrs	TSTM/HVY RN	TSTM/HVY RN	TSTM/HVY RN	TSTM/HVY RN
Event Begin Time	2PM TUE	12PM TUE	1PM TUE	1PM TUE
Event End Time	9PM TUE	9PM TUE	9PM TUE	9PM TUE
Tstrm Wind Gusts	40-55 MPH	45-55 MPH	45-55 MPH	40-55 MPH
Ltng Intensity	MODERATE	MODERATE	MODERATE	MODERATE
Storm Mvmt Dir	ESE	ESE	ESE	ESE
Rain Amount	1.00-2.50"	1.00-2.50"	1.00-2.50"	1.00-2.25"
Snow Accumulation				
Snow Character				
Ice Amount				
Sustained Wind				
Wind Gust				
Temp. Extremes	83/65	84/58	84/62	80/61

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: A fairly strong cold front is expected to move through the region today, with showers and thunderstorms possible between 12-9pm. Strong to severe storms are possible, with gusty winds and heavy rainfall the main threats. An isolated spin-up tornado can't be ruled out as well, but chances are very low in this occurring. Main severe threat/timing: 12-6pm. See chart above for t-storm details. Locally heavy rainfall could also produce some areas of flooding/flash flooding. Dry and hazard-free on Wednesday.

Confidence: Confidence is high that thunderstorms will occur and produce hazard-level wind gusts. Thunderstorm chance Tuesday: 80%. Chance EEI-2/3 t-storm gusts Tuesday: 70%/40%. Confidence is high that no hazards will occur Wednesday.

SEACOAST: A fairly strong cold front is expected to move through the region today, with showers and thunderstorms possible between 2-9pm. Strong to severe storms are possible, with gusty winds and heavy rainfall the main threats. Main severe threat/timing: 2-7pm. See chart above for t-storm details. Locally heavy rainfall could also produce some areas of flooding/flash flooding. Dry and hazard-free on Wednesday.

Confidence: Confidence is high that thunderstorms will occur and produce hazard-level wind gusts. Thunderstorm chance Tuesday: 80%. Chance EEI-2/3 t-storm gusts Tuesday: 70%/50%. Confidence is high that no hazards will occur Wednesday.

9.6. Qualifying Costs Charged to the Storm Reserve

The amount charged to the storm reserve for this event is \$80,652 with a breakdown of charges in the following table:

Payroll	\$3,600
Materials & Supplies	0
Transportation	0
Contractor Invoices & Other	77,052
Less Amount Capitalized	0
<hr/>	
Total To Storm Reserve	\$80,652

10. November 3rd, 2018 (Thunderstorm Event)

10.1. Description of the Storm

Beginning late Wednesday (Oct 31st) into early Thursday, (Nov 1st) forecasters started to predict multiple waves of thunderstorm activity expected to impact the region starting Friday (Nov 2nd) and lasting into Saturday (Nov 3rd). Starting late afternoon Saturday (approximately 3 PM) Unitil began to experience a period of thunderstorms with strong, frequent gusts over 35 mph moving across the service territory causing small, scattered outages.

10.2. Summary of the Extent of the Storm Damage

Unitil Energy Systems 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	4	4	279	197	0.4%
Capital	9	6	486	228	0.8%

10.3. Preparations

Unitil began communicating internally on Thursday (Nov 1st) to coordinate preparation activities including such as contractor availability outreach and checking inventory, stock levels and fleet vehicles. The Company also sent pro-active messaging to customers (via social media) and communicated with other stakeholders such as municipal and elected officials, regulatory and state emergency management agencies (via email). The company ensured that extra staff was available at the operating centers throughout the duration of the event to respond to any interruptions and to communicate with affected stakeholders.

10.4. Restoration

Small, scattered outages occurred (listed in Section 10.2) mostly attributed to broken limbs and tree damage. Outages began around 2 PM on Nov 3rd and were promptly responded to and restored by crews throughout the evening with all affected customers being restored by 11 PM that evening. Unitil had its normal contingent of internal crews (10) and on system contractors (6) and secured an additional (5) contractor line crews with internal resources at the EOC to support operations.

10.5. Exclusionary Criteria

This event qualified for recovery of preparation costs due to the EEI of 3 for wind gusts with a high confidence level for the Seacoast Region (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 10.6.

Unitil Energy Systems, Inc. d/b/a Unitil Corp
Major Storm Cost Reserve Fund Report 2018

Energy Event Index for UNITIL

Your forecast administrator: murphyt@unitil.com

Valid Time: November 3, 2018 1:00 PM EDT

Forecaster: kyle.koval

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	2	1	1
	Fitchburg	2	1	1
	Portland	3	1	1
	Seacoast	3	1	1
Confidence Level	Capital	High	High	High
	Fitchburg	High	High	High
	Portland	High	High	High
	Seacoast	High	High	High

Energy Event Index Definition

With Leaves (May 1 - Nov 14)

EEI	Wind Speed	Wind/Gust	Confidence Level
1	< 30 mph	< 35 mph	Low <30% chance the most likely index level remains at that level through the event
2	>= 30 mph	>= 35 mph	Medium 30-60% chance the most likely index level remains at that level through the event
3	>= 45 mph	>= 60 mph	High >=60% chance the most likely index level remains at that level through the event
4	>= 60 mph	>= 65 mph	
5	>= 70 mph	>= 75 mph	

*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: November 3, 2018

Time: 1:00 PM EDT

Forecaster: K Koval

Zones	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event Starting in 30hrs	GUSTS	GUSTS	GUSTS	GUSTS
Event Begin Time	2PM Sat	Ongoing	Ongoing	2PM Sat
Event End Time	9PM Sat	8PM Sat	8PM Sat	9PM Sat
TSTM Wind Gusts				
Ling Intensity				
Storm Mvmt Dir				
Rain Amount				
Snow Accumulation				
Snow Character				
Ice Amount				
Sustained Wind	15-30	15-25	15-25	15-30
Common Wind Gust	35-45	30-40	30-40	35-45
Peak Wind Gust	45-58	45-55	45-55	45-58
Chances for EEI-2/3 Gusts	100%/60%	100%/40%	100%/40%	100%/60%
Temp. Extremes	56/36	54/30	56/32	56/34

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: Rain showers linger through 4-6pm. Additional rainfall this afternoon: 0.10-0.25". Dry conditions return tonight. Strong winds are expected this afternoon. Winds gradually decrease this evening. Wind gusts today: Common gusts: 30-40 mph. Peak gusts: 45-55 mph. Between 1-6pm, convective shower gusts may be 55-60 mph but would not last more than an hour. Dry and hazard-free conditions expected on Sunday.

Confidence: Confidence is high wind gusts will reach EEI-2 this afternoon and early evening. Confidence is medium on EEI-3 wind gusts, but high confidence gusts will remain below EEI-4. Chance for EEI-4 gusts Saturday 1-6pm: 10%. Chance of EEI-3 gusts is 40%. Confidence is high that no hazards will occur on Sunday.

SEACOAST: Rain showers linger through 3-4pm. Additional rainfall this afternoon: 0.05-0.15". Dry conditions return tonight. Strong winds are expected this afternoon. Winds gradually decrease this evening. Wind gusts today: Common gusts: 30-40 mph. Peak gusts: 45-58 mph. Between 1-4pm, convective shower gusts may be 55-60 mph but would not last more than an hour. Dry and hazard-free conditions expected on Sunday.

Confidence: Confidence is high wind gusts will reach EEI-2/3 this afternoon and early evening. Confidence is high confidence gusts will remain below EEI-4. Chance for EEI-4 gusts Saturday 1-4pm: 10%. Chance of EEI-3 gusts is 60%. Confidence is high that no hazards will occur on Sunday.

10.6. Qualifying Costs Charged to the Storm Reserve

The amount charged to the storm reserve for this event to date is \$33,354 with a breakdown of charges in the following table:

Payroll	\$5,064
Materials & Supplies	0
Transportation	0
Contractor Invoices & Other	28,290
Less Amount Capitalized	0
<hr/>	
Total To Storm Reserve	\$33,354

11. November 15th 2018 (Wintry Mix Event)

11.1. Description of the Storm

Following a week of minor snow accumulations and gusty winds causing scattered outages, forecasters began to predict a wintry mix of snow, sleet and rain accompanied by moderate gusts and the potential for minor icing in certain areas. The system was expected to move across the region overnight on Thursday (November 15th) into the morning on Friday with a potential for wet snow accumulations between 3-10 inches and minor icing to blanketing the service territory. Winter Storm Warnings were issued across the region for this event.

11.2. Summary of the Extent of the Storm Damage

Unitil Energy Systems experienced no impact 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%

11.3. Preparations

Unitil began communicating internally on Tuesday (Nov 13th) to coordinate preparation activities including such as contractor availability outreach and checking inventory, stock levels and fleet vehicles. The Company also sent pro-active messaging to customers (via PSA) and communicated with other stakeholders such as municipal and elected officials, regulatory and state emergency management agencies (via email). The company ensured that extra staff was available at the operating centers throughout the duration of the event to respond to any interruptions and to communicate with affected stakeholders.

11.4. Restoration

No outages occurred (listed in Section 11.2) during this event however Unitil had (8) internal crews and on system contractors (7) and secured an additional (8) contractors line crews to respond to any interruptions. Although the Regional EOCs were staffed early on Friday (the 16th) once no outages occurred the Company reverted back to normal operations by the early afternoon.

11.5. Exclusionary Criteria

This event qualified for recovery of preparation costs due to the EEI of 3 for snow with a high confidence level for the Capital Region (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 11.6.

Unitil Energy Systems, Inc. d/b/a Unitil Corp
Major Storm Cost Reserve Fund Report 2018

Energy Event Index for UNITIL

Your forecast administrator: murphyt@unitil.com

Valid Time: November 15, 2018 1:00 PM EST

Forecaster: gregory.louis

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	2	1
	Seacoast	1	2	1
Snow	Capital	3	3	1
	Fitchburg	3	3	1
	Portland	3	3	1
	Seacoast	2	2	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

With Leaves (May 1 - Nov 16) (summer override)

EEI	Wind Speed	Wind/Gust	Snow	Ice	Confidence Level
1	< 30 mph	< 35 mph	< 4 in.	< 1/10 in.	Low
2	>= 30 mph	>= 35 mph	>= 4 in.	>= 1/10 in.	Medium
3	>= 45 mph	>= 50 mph	>= 6 in.	>= 3/8 in.	High
4	>= 60 mph	>= 65 mph	>= 12 in.	>= 1/2 in.	
5	>= 70 mph	>= 75 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 80%, it means the following: There is a >80% chance the most likely forecasted gusts will remain at level 2 with all updates from now through Wednesday.

Date: November 15, 2018

Time: 1:00 PM EST

Forecaster: G Louis

Zones	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event Starting in 30hrs	SNOW/GUSTS	SNOW	SNOW	SNOW/GUSTS
Event Begin Time	10PM THU	10PM THU	8PM THU	12AM FRI
Event End Time	9AM FRI	1PM FRI	6AM FRI	2PM FRI
Event Confidence	HIGH	HIGH	HIGH	HIGH
TSTM Wind Gusts				
Ltng Intensity				
Storm Mvmt Dir				
Rain Amount				
Snow Accumulation	3-6"	5-10"	5-10"	5-10"
Snow Character	WET	WET	WET	WET
Ice Amount				
Sustained Wind	12-20			12-20
Wind Gust	30-40			30-40
Temp. Extremes	33/29	32/24	33/27	33/27

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: Snow expected to develop at 8pm tonight. Expect a snow/sleet/rain mix from about 5-10am Fri, then all snow from 10am-1pm Fri. A brief period of freezing rain is possible between 5-10am Fri, but ice accretions are expected to remain below hazard levels. Ice accretions: Trace-0.03". Wet snow accumulations are expected to exceed EEI-2 levels. See table for details. Winds are expected to be strong later this evening into Friday, but are not expected to exceed 35 mph. Dry and hazard-free conditions are expected Friday evening/night.

Confidence: High confidence that at least EEI-2 wet snow occurs this evening into Friday. Chances for EEI-2/3 snowfall: 80%/60%. Confidence is high that ice accretions and wind gusts will remain below EEI-2 levels on Friday. Confidence is high in hazard-free conditions Friday evening/night.

SEACOAST: Snow will start around 10pm tonight, mixing with sleet after 3am, then changing to rain by 7am Fri. Rain continues Fri morning, but could mix with light snow at times, with dry conditions by 12pm. Wet snow accumulations are expected to exceed EEI-2 levels through 7am, see table for accumulation. The additional snow Fri morning should be an inch or less. Light freezing rain could occur between 3-7am Fri, but ice accretions are expected to remain

below hazard levels. Ice accretions: Trace-0.02". Winds are expected to be strong early Friday morning, with peak gusts to 40 mph possible between 2am-9am Friday. Dry and hazard-free conditions are expected Friday evening/night.

Confidence: High confidence that at least EEI-2 wet snow occurs. Chance for EEI-2/EEI-3 snow: 80%/30%. Confidence is high that ice accretions will remain below EEI-2 levels on Friday. Confidence is high that gusts will exceed EEI-2 levels near coastal locations. Chance for EEI-2 gusts: 60%. Confidence is high in hazard-free conditions Friday evening/night.

11.6. Qualifying Costs Charged to the Storm Reserve

The amount charged to the storm reserve for this event to date is \$40,682 with a breakdown of charges in the following table:

Payroll	\$3,413
Materials & Supplies	0
Transportation	2,552
Contractor Invoices & Other	34,717
Less Amount Capitalized	0
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Total To Storm Reserve	\$40,682

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 14)			For “No Leaves” Period (Nov 15 – 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

Valid Time: January 17, 2017 6:00 AM EST

Your forecast administrator: murphyt@unitil.com

Forecaster: kyle.koval

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	2	2	1
	Fitchburg	2	2	1
	Portland	2	2	1
	Seacoast	2	2	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	Medium	Medium	High
	Portland	High	High	High
	Seacoast	High	High	High

Energy Event Index Definition

No Leaves (Nov 15 - Mar 31)

EEI	Wind Speed	Wind/Gust	Snow	Ice
1	< 26 mph	< 40 mph	< 18 in.	< 1/10 in.
2	>= 26 mph	>= 40 mph	>= 18 in.	>= 1/10 in.
3	>= 30 mph	>= 45 mph	>= 24 in.	>= 3/8 in.
4	>= 40 mph	>= 50 mph	>= 36 in.	>= 1/2 in.
5	>= 45 mph	>= 60 mph	>= 48 in.	>= 1 in.

Confidence Level	
Low	< 30% chance
Medium	>= 30% to < 60% chance
High	>= 60% chance

Definition of WET snow(T>=30F)

EEI Value	Wet Snow
EEI 1	<5"
EEI 2	>5"
EEI 3	>6"
EEI 4	>12"
EEI 5	>18"

Date: January 17, 2017

Time: 6:00 AM EST

Forecaster: K Koval

Zones	SEACOAST	CAPITAL	FITCHBURG	PORTLAND
Event Starting in 30hrs	SNOW	SNOW	SNOW/ICE	SNOW
Event Begin Time	7PM Tue	6PM Tue	6PM Tue	7PM Tue
Event End Time	6PM Wed	6PM Wed	6PM Wed	6PM Wed
Tstrm Wind Gusts				
Ltng				
Storm Mvmt Dir				
Rain Amount				
Snow Amount	1-6"(SEE TEXT)	4-7"	2-5"	4-7"
Snow Character	WET	WET	WET	WET
Ice Amount			0.02-0.05"	
Sustained Wind				
Wind Gust				
Temp. Extremes	41/29	41/15	44/31	39/22

UNITIL SERVICE AREA 48 HOUR OUTLOOK:

CAPITAL: Snow expected to develop at 8pm tonight. Expect a snow/sleet mix from about 5-10am Fri, then all snow from 10am-1pm Fri. A brief period of freezing rain is possible between 5-10am Fri, but ice accretions are expected to remain below hazard levels. Ice accretions: Trace-0.03". Wet snow accumulations are expected to exceed EEI-2 levels. See table for details. Winds are expected to be strong later this evening into Friday, but are not expected to exceed 35 mph. Dry and hazard-free conditions are expected Friday evening/night.

Confidence: High confidence that at least EEI-2 wet snow occurs this evening into Friday. Chances for EEI-2/3 snowfall: 80%/60%. Confidence is high that ice accretions and wind gusts will remain below EEI-2 levels on Friday. Confidence is high in hazard-free conditions Friday evening/night.

FITCHBURG: Expect snow from 8pm tonight to 2am Fri, a snow/sleet mix from 2-5am Fri then snow from 5am-1pm Fri. Wet snow accumulations are expected to exceed EEI-2 levels through 5am Fri, see table for accumulation. The snow from 10am-1pm Fri should be an additional inch or less. Light freezing rain could occur from 2-5am Fri, but ice accretions are expected to remain below hazard levels. Ice accretions: Trace-0.02". Winds are expected to be strong later this evening into Friday, but are not expected to exceed 35 mph. Dry and hazard-free conditions are expected Friday evening/night.

Confidence: High confidence that at least EEI-2 wet snow occurs. Chance for EEI-2/EEI-3 snow: 80%/60%. Confidence is high that ice accretions and wind gusts will remain below EEI-2 levels on Friday. Confidence is high in hazard-free conditions Friday evening/night.

SEACOAST: Snow will start around 10pm tonight, mixing with sleet after 3am, then changing to rain by 7am Fri. Rain continues Fri morning, but could mix with light snow at times, with dry conditions by 12pm. Wet snow accumulations are expected to exceed EEI-2 levels through 7am, see table for accumulation. The additional snow Fri morning should be an inch or less. Light freezing rain could occur between 3-7am Fri, but ice accretions are expected to remain below hazard levels. Ice accretions: Trace-0.02". Winds are expected to be strong early Friday morning, with peak gusts to 40 mph possible between 2am-9am Friday. Dry and hazard-free conditions are expected Friday evening/night.

Confidence: High confidence that at least EEI-2 wet snow occurs. Chance for EEI-2/EEI-3 snow: 80%/30%. Confidence is high that ice accretions will remain below EEI-2 levels on Friday. Confidence is high that gusts will exceed EEI-2 levels near coastal locations. Chance for EEI-2 gusts: 60%. Confidence is high in hazard-free conditions Friday evening/night.

PORTLAND: Snow will start around 12am tonight, mixing with sleet and rain at times Fri morning near the coast, then changing back to all snow from 10am-2pm Fri. Wet snow accumulations are expected to exceed EEI-2 levels, see table above for accumulation. Highest amounts will occur near Lewiston. A period of freezing rain is possible from about 4-8am Fri, but ice accretions are expected to remain below hazard levels. Ice accretions: Trace-0.02". See table for details. Winds are expected to be strong later this evening into Friday, with peak gusts to 40 mph possible between 2am-9am Friday. Dry and hazard-free conditions are expected Friday evening/night.

Confidence: High confidence that at least EEI-2 wet snow occurs. Chance of EEI-2/EEI-3 snow: 80%/60%. Confidence is high that ice accretions will remain below EEI-2 levels on Friday. Confidence is high that gusts will exceed EEI-2 levels near coastal locations. Chance for EEI-2 gusts: 60%. Confidence is high in hazard-free conditions Friday evening/night.

UNITIL SERVICE AREA 3-5 DAY OUTLOOK: Dry and hazard-free conditions are expected Saturday through Sunday. Snow looks to return Sunday night and exit Monday morning. Snow may mix with rain across Fitchburg and Seacoast for a period Sunday night. Snowfall: Less than 1/2". Dry and hazard-free conditions are expected Monday afternoon through Monday night.

Confidence: Confidence is high that no hazards will occur Saturday through Monday night.

NORTHEAST U.S. REGIONAL SUMMARY:

Today's Weather Highlights:

- A storm system pushes in across the region late day and more so into the overnight.
- Snow and sleet is expected to be widespread across much of the region this evening.
- Things transition across southeast New York and southern New England to some rain and a little freezing rain potential late night.

- Winds will increase tonight from Long Island to the Cape/Islands.
- Up to 6 inches of snow/sleet and up to 0.15 inches of ice is all possible by daybreak Friday.
- Temperatures: 5-15 degrees below normal over all areas.

Today's Forecast Confidence: Medium – High

Most areas should verify well across the region today.

Tomorrow's Weather Highlights

- Low pressure will push off the New England Coast by midday and exit the region.
- Gusty winds are expected, especially near the New England coasts.
- Some wintry mix is possible across western and northern New England with rain in the south; mostly snow across New York and northern New England.
- Things end mostly as snow showers through the afternoon in New England with additional snow showers coming across upstate New York and northern New England late day/evening; flurries linger overnight.
- A few inches of new snow are expected in New England and northern New York with minimal icing expected.
- Temperatures: 4-8 degrees below normal.

Tomorrow's Forecast Confidence: Medium

Lots of cloud covers north and east areas could allow for a few spots to run cooler but any breaks, especially in the Hudson Valley to southern New England could run a few degrees warmer on Friday.

3-5 DAY EXTENDED OUTLOOK

Saturday:

- Lake effect is expected across New York and a few light snow showers will be possible into western/northern New England with a weak disturbance moving through.
- Accumulations are expected to be minimal.
- Temperatures: A bit below normal around Long Island and South Shore but much of the region will be 5-12 degrees below normal.

Sunday:

- A weak frontal boundary and disturbance will cross over the northeast bringing light snow showers with a little rain/snow mix for southern New England being possible, mainly late Sunday and into Sunday night.
- Snowfall should mostly remain under an inch or two.
- Temperatures: 5-15 degrees below normal.

Monday:

- Breezy but no hazard winds with some rain/snow southern New England and snow showers northern areas through the day.
- Temperatures: 5-12 degrees below normal.