

**THE STATE OF NEW HAMPSHIRE
BEFORE THE
PUBLIC UTILITIES COMMISSION**

Unitil Energy Systems, Inc.

**RELIABILITY PROGRAM
AND
VEGETATION MANAGEMENT PROGRAM
ANNUAL REPORT – FISCAL YEAR 2021**

1. Introduction

Pursuant to the Settlement Agreement approved by the New Hampshire Public Utilities Commission (“Commission”) in Docket No. DE 10-055¹, Unitil Energy Systems, Inc. (“UES” or “Company”) is submitting the results of the Reliability Enhancement Plan (“REP”) and Vegetation Management Plan (“VMP”) for Fiscal Year 2021 (“FY 2021”), report the period, January 1, 2021 – December 31, 2021.

The Settlement Agreement provides that Unitil will provide an annual report to the Commission, Staff and OCA showing actual REP and VMP activities and costs for the previous calendar year, and its planned activities and costs for the current calendar year. Actual and planned REP and VMP costs shown in the report will be reconciled along with the revenue requirements associated with the actual and planned capital additions and expenses. Please note that the Company previously filed in this docket its *planned* VMP activities for fiscal year 2022 on November 15, 2021, pursuant to Order 26,388 in DE 20-098. Accordingly, the instant filing contains the reconciliation of expenditures during fiscal year 2021. This report includes the following information:

- (A) A description of Unitil’s VMP;
- (B) A comparison of FY2021 actual to budgeted spending on O&M activities related to the VMP
- (C) Detail on the O&M spending related to the FY2021 VMP estimated expenditures and work to be completed;
- (D) A summary of the Vegetation Management Storm Resiliency Program results;
- (E) A summary of the O&M spending related to REP Enhanced Tree Trimming.

¹ Order 25,214 dated April 26, 2011

2. Vegetation Management Plan

The VMP is based upon the recommended program provided in the report of Unitil's consultant Environmental Consultants, Inc. ("ECI")², modified to incorporate a 5-year prune cycle with 10-foot side and 15-foot top prune zones.

2.1. Plan Description

Unitil's VMP is comprised of five components; 1) circuit pruning; 2) hazard tree mitigation; 3) mid-cycle review; 4) forestry reliability assessment; and 5) storm resiliency work. This program is designed to support favorable reliability performance, reduce damage to lines and equipment, and provide a measure of public safety. The main benefits and risks addressed by these programs are reliability, regulatory, efficiency, safety and customer satisfaction.

2.1.1. Circuit Pruning

Vegetation maintenance pruning is done on a cyclical schedule by circuit. The optimal cycle length was calculated by balancing five important aspects: 1) clearance to be created at time of pruning; 2) growth rates of predominant species; 3) risk to system performance; 4) aesthetics / public acceptance of pruning; and 5) cost to implement. For New Hampshire, this optimal cycle length was calculated as 5 years for all lines.

2.1.2. Hazard Tree Mitigation

The Hazard Tree Mitigation program ("HTM") consolidates tree removal activities into a formalized program with risk tree assessment. This program is aimed at developing a more resistant electrical system that is more resilient under the impacts of typical wind, rain and snow events. The intention is to accomplish this through minimizing the incidence and resulting damage of large tree and limb failures from above and alongside the conductors through removal of biologically unhealthy or structurally unstable trees and limbs.

HTM circuits are identified and prioritized through reliability assessment risk ranking, identification as a worst performing circuit, field problem identification, and time since last worked. Once circuits are identified they are scheduled in two ways: 1) while the circuit is undergoing cycle pruning; or 2) scheduled independently of cycle pruning. In New Hampshire, HTM circuit selection corresponds closely with cycle pruning, as both pruning and HTM are on a 5 year cycle.

²A copy of the ECI reliability report, originally provided in response to data request Staff 1-29 (Confidential), was made part of the record in DE 10-055, UES's 2010 base rate case, as a Confidential Exhibit, accompanied by a public redacted version, during the hearing before the Commission.

In order to produce the greatest reliability impact quickly and cost effectively, HTM circuit hazard tree assessment and removal is focused primarily on the three phase only, with most emphasis on the portion of the circuit from the substation to the first protection device. In circuits that have undergone storm resiliency work, the HTM focus also includes single phase circuitry.

2.1.3. Mid-Cycle Review

The mid-cycle review program targets circuits for inspection and pruning based on time since last circuit pruning and forecasted next circuit pruning. The aim of this program is to address the fastest growing tree species that will grow into the conductors prior to the next cyclic pruning, potentially causing reliability, restoration and safety issues. Circuit selection is based on number of years since last prune and field assessment.

2.1.4. Forestry Reliability Assessment

The Forestry Reliability Assessment program targets circuits for inspection, pruning, and hazard tree removal based on recent historic reliability performance. The goal of this program is to allow reactive flexibility to address immediate reliability issues not addressed by the scheduled maintenance programs. Using recent historic interruption data, poor performing circuits are selected for analysis of tree related interruptions. Circuits or portions of circuits showing a high number of tree related events per mile, customers interrupted per event, and/or customer minutes interrupted per event are selected for field assessment. After field assessment, suitable circuits are scheduled and a forestry work prescription is written for selected circuits or areas.

2.1.5. Storm Resiliency Work

The SRP targets critical sections of circuits for tree exposure reduction by removing all overhanging vegetation or pruning “ground to sky”, as well as performing intensive hazard tree review and removal along these critical sections and the remaining three phase of the circuit. The goal of this program is to reduce tree related incidents and resulting customers interrupted along these portions in minor and major weather events. In turn, the aim is to reduce the overall cost of storm preparation and response, and improve restoration.

2.2. 2021 Actual Expenditures and Work Completed

Table 1 depicts the 2021 VMP expenditures by activity in relation to the anticipated budget expenditures. As the program progressed in 2021 there were some deviations in the anticipated expenditures. In the VMP spending, the cycle pruning work was not completed by year end due to contractor workforce issues. \$532,693 of work in awarded contract was not fully completed by year end and is carried over into 2022. Traffic control (Police/Flagger) for that work was also correspondingly low due to this work delay. Other deviations include the Hazard Tree Mitigation work activity cost \$60,470 higher than estimated. Mid-cycle was \$94,526 under the estimate, as three circuits were backed out due to no pressing concerns and being scheduled for SRP in 2022. The work cost for the SRP was slightly below the anticipated level, but all planned work was complete. As shown in the table below, total spending for all VMP and SRP components was below the budget by \$672,253, with the bulk of that being the \$532,693 of cycle pruning carrying over into 2022.

Table 1

2021 VMP O&M Activities		
VM Activity	2021 Cost Proposal	2021 Actual Cost
Cycle Prune	\$ 1,746,507	\$ 1,238,981*
Hazard Tree Mitigation	\$ 840,000	\$ 900,470**
Forestry Reliability Work	\$ 25,603	\$ 28,937
Mid-Cycle Review	\$ 115,360	\$ 20,833
Police / Flagger	\$ 619,515	\$ 552,501
Core Work	\$ 154,500	\$ 180,606
VMP Planning	\$ -	\$ -
Distribution Total	\$ 3,501,485	\$ 2,922,329
Sub-T	\$ 620,069	\$ 565,474
Substation Spraying	\$ 13,431	\$ 12,225
VM Staff	\$ 364,491	\$ 418,049
Program Total	\$ 4,499,476	\$ 3,918,077
Storm Resiliency Program	\$ 1,465,690	\$ 1,374,836
Grand Total	\$ 5,965,166	\$ 5,292,913

*\$532,693 awarded contract not finished and carried over to 2022

**\$132,747 awarded HT not finished and carried over (see Table 3)

The following tables detail the 2021 VMP work completed by activity. Table 2 details the cycle pruning work. A total of 158.6 miles of cycle pruning was completed in 2021.

Table 2

2021 VMP Completed Cycle Pruning Details					
District	Feeder	Overhead Miles	Scheduled Miles	Completed Miles	
Capital	C4W3	18.6	18.6	18.6	
Capital	C13X4	1.7	1.7	1.7	
Capital	C37X1	6.7	6.7	6.7	
Capital	C16H1	3.2	1.1	1.1	
Capital	C16H3	4.5	2.7	2.7	
Capital	C16X4	6.6	2.8	2.8	
Capital	C16X5	0.5	0.5	0.5	
Capital	C16X6	0.1	0.1	0.1	
Capital	C375X1	0.1	0.1	0.1	
Capital	C15H3	1.3	1.3	1.3	
Capital	C35X1	0.4	0.4	0.4	
Capital	C35X2	0.03	0.03	0.03	
Capital	C35X3	0.03	0.03	0.03	
Capital	C35X4	0.04	0.04	0.04	
Capital	C374X1	0.5	0.5	0.5	
Capital	C6X3	14.9	14.9	14.9	
Capital	C21W1P	1.8	1.8	1.8	
Capital	C2H1	3.2	3.2	3.2	
Capital	C2H2	8.7	8.7	8.7	
Capital	C2H4	1.8	1.8	1.8	
Capital	C34X1	0.2	0.2	0.2	
Capital	C34X2	0.4	0.4	0.4	
Capital	C34X3	0.04	0.04	0.04	
Capital	C18W2	33.7	33.7	0*	
Seacoast	E19X3	37.9	37.9	37.9	
Seacoast	E43X1	30.7	30.7	0*	
Seacoast	E51X1	29.5	29.5	29.5	
Seacoast	E3W4	5.6	5.6	5.6	
Seacoast	E7W1	7.4	7.4	7.4	
Seacoast	E59X1	15.4	15.4	15.4	
Total			223	158.6	

* Awarded but not completed

Table 3 details the hazard tree mitigation work. A total of 77.8 miles of line across 14 circuits were mitigated for hazard tree risk. Unitil had estimated approximately 2,242 hazard tree removals in the budget. The actual results indicate 1,938 total hazard trees were removed on these circuits and various other circuits as found through the course of work over the year. Consistent with the trend from 2020, the

increase in average cost of tree removal is due to increased contractor costs for labor and increased unit prices for hazard tree removal.

Table 3

2021 VMP Completed Hazard Tree Mitigation Details					
District	Feeder	Overhead Miles	Scheduled Miles	Completed Miles	# of Removals
Capital	C13W2	18.1	5.0	5.0	18
Capital	C13W3	83.4	18.1	18.1	591
Capital	C18W2	33.7	3.4	0.1	14*
Capital	C4W3	18.6	7.5	7.5	91
Capital	C6X3	14.9	4.4	0.5	1*
Capital	C37X1	6.7	1.2	1.2	16
Capital	C22W3	40.2	0	5.3	176
Capital	Various				297
Seacoast	E13W2	29.1	10.7	10.7	94
Seacoast	E58X1	31.2	12.9	12.9	138
Seacoast	E27X1	19.9	7.1	1.0	27
Seacoast	E19X3	39.1	15.5	15.5	87
Seacoast	E43X1	29.9	7.2	0.5	12*
Seacoast	E59X1	15.7	7.4	0.5	13*
Seacoast	E51X1	30.1	10.3	10.3	172
Seacoast	Various				196
Total			107.4	77.8	1,938

*Hazard tree planning completed, but some tree removal carrying over into 2022

Tables 4 and 5 detail the forestry reliability work and mid-cycle work respectively. A total of 12.2 miles of line underwent forestry reliability work and 25.3 miles of line were completed for mid-cycle work.

Table 4

2021 VMP Completed Reliability Analysis Details				
District	Feeder	Overhead Miles	Scheduled Miles	Completed Miles
Capital	C8X3	106.0	1.2	1.2
Capital	C8X5	9.5	0	0.5
Capital	C13W1	33.9	0	3.5
Capital	C4W4	14.2	0	1.8
Seacoast	E13W1	18.8	2.5	2.5
Seacoast	E11X1	11.9	0	1.2
Seacoast	E21W2	21.7	0	1.5
Total			3.7	12.2

Table 5

2021 VMP Completed Mid-Cycle Review Details				
District	Feeder	Overhead Miles	Scheduled Miles	Completed Miles
Capital	C13W2	18.1	5.0	5.0
Capital	C24H1	1.9	0.7	0.7
Capital	C24H2	1.9	1.5	1.5
Capital	C33X4	2.0	0.1	0.1
Capital	C34X4	0.2	0.2	0.2
Seacoast	E13X3	3.9	2.5	2.5
Seacoast	E56X2	2.5	2.1	2.1
Seacoast	E58X1	31.2	12.9	12.9
Seacoast	E5X3	9.0	5.2	-
Seacoast	E15X1	9.6	6.1	6.1
Seacoast	E17W1	9.9	4.1	-
Seacoast	E17W2	4.6	1.8	-
Seacoast	E2H1	2.3	1.4	1.4
Total			36.4	25.3

Table 6 details the sub-transmission right-of-way clearing work. A total of 18.3 linear miles of right-of-way floor were cleared.

Table 6

2021 Sub Transmission Clearing Details			
District	Feeder	Scheduled Miles	Completed Miles
Capital	2020 LVF	0*	-
Capital	33	3.2	3.2
Capital	33	4.8	4.8
Seacoast	2020 LVF	0*	-
Seacoast	3341/3352	3.2	3.2
Seacoast	3347	2.1	2.1
Seacoast	3351/3362	4.3	4.3
Seacoast	E51X1 ROW	0.6	0.6
Total		18.3	18.3

* included only LVF herbicide treatment carried-over from 2020

The sub-transmission right-of-way that was cleared in both Capital and Seacoast in 2019 was scheduled to undergo the integrated vegetation management (IVM) program's low-volume foliar herbicide application work in 2020. Due to COVID-19 pandemic workforce labor restrictions there were no qualified herbicide applicators available to perform the work in the application window. These acres were unable to be managed with IVM chemical control and were carried over from 2020 and completed last year, in the spring of 2021.

3. 2021 Vegetation Management Storm Resiliency Program Results

In 2021, Unitil continued the SRP, targeting the resiliency efforts in communities in the Seacoast area. This program, now through its tenth year, has been very successful. Unitil is experiencing less damage during storm events resulting in a quicker restoration and the ability to send line and tree crews to our neighboring utilities to assist with their restoration. As in previous program years, the 2021 circuits were selected through analysis of tree related reliability performance. The 2021 circuits are shown below in Table 7. In 2021, 37.6 miles of critical three phase line were work-planned for hazard tree removals and ground-to-sky pruning. A total of 1,702 hazard trees were removed along these portions of line.

Table 7

2021 Storm Program Work Details			
Circuit	Scheduled Miles	Completed Miles	# of Removals
E2X3	13.7	7.2	172
E21W1	29.8	8.7	684
E2X2	19.7	12.9	173
E11X2	11.9	6.6	347
E20H1	4.5	2.2	150
E8X3	0.0	4.5	176
Total	37.6	37.6	1,702

Due to the varying nature of storm resiliency work and traffic control, as well as the lack of workforce availability, the Company expects costs may continue to experience minor variances, with final annual costs being slightly above or below the estimated budget. Even with yearly fluctuations, the average cost for the SRP program has remained close to the original estimate.

4. Reliability O&M Expenditures

The Company had allocated \$300,000 to Reliability O&M expenditures for enhanced tree trimming in 2021. The Enhanced Tree Trimming funding is intended to target “problem” areas identified through engineering analysis.

4.1. Enhanced Tree Trimming

Each year, the Company completes reliability analysis on the distribution and sub-transmission system. The reliability analysis identifies areas of the system which have experienced an abnormal or

increasing amount of tree related outages in the previous year. Distribution Engineering provides the Manager of Forestry Operations a prioritized list of recommended sub-transmission lines and/or distribution circuits which would benefit the most from enhanced tree trimming.

In 2021, Distribution Engineering recommended hazard tree removal on the Sub-Transmission lines emanating from the system supply substations as well as continuing thorough inspection of the trees along the sub-transmission lines that experienced a tree related outages in the UES Seacoast area. In total, \$208,494 was spent on Enhanced Tree Trimming and 295 hazard tree removals were completed along with sideline clearing on selected portions.

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