

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

**Public Service Company of New Hampshire  
Reconciliation of Energy Service and Stranded Costs for  
Calendar Year 2015**

**DIRECT TESTIMONY OF  
ELIZABETH H. TILLOTSON**

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**I. Introduction**

**Q. Please state your name, position, employer and address.**

A. My name is Elizabeth H. Tillotson. I am the Manager – Regulatory and Environmental for the Generation Division of Public Service Company of New Hampshire, d/b/a Eversource Energy (“Eversource”). My business address is 780 North Commercial Street, P.O. Box 330, Manchester, New Hampshire 03105.

**Q. Please provide a brief summary of your background.**

A. I received a Bachelor of Science in Mechanical Engineering from the University of New Hampshire. I began working for Public Service Company of New Hampshire in 1980. My duties have included Results Engineer – Merrimack Station, Senior Engineer on Staff including serving as the Division’s weld engineer, Project Engineer – Merrimack Station’s Supplemental Precipitator, Production Manager – Merrimack Station and Station Services Manager at Merrimack Station responsible for the installation of the Merrimack Unit 2 supplemental precipitator and the Merrimack 1 SCR. In February 2002, I assumed the responsibilities of Technical Business Manager - PSNH Generation. In 2014, I became the Manager – Regulatory and Environmental for the Generation Division.

1 **Q. Have you ever testified before this Commission?**

2 A. Yes. I have provided testimony in previous Commission proceedings including  
3 energy service and reconciliation dockets. I also testified before the commission  
4 during the Schiller Conversion proceeding, Docket No. DE 03-166.

5 **Q. Please describe your responsibilities as Manager – Regulatory and**  
6 **Environmental, Generation.**

7 A. In my present position, as Manager – Regulatory and Environmental for  
8 Generation, I am responsible for the support of environmental and regulatory  
9 compliance, as well as supporting legislative activities for PSNH's generating  
10 stations. Eversource maintains a diversified fuel portfolio including gas, oil and  
11 coal-fired units as well as hydro and renewable biomass with a total generation  
12 capacity of approximately 1150 MW.

13 **Q. What is the purpose of your testimony in this proceeding?**

14 A. The purpose of my testimony is to provide information on all outages that took  
15 place at Eversource's fossil-fired, hydroelectric and biomass units and at NextEra  
16 Energy Resources, LLC's (formerly FPL Energy) Wyman Station, Unit No. 4 in  
17 which Eversource is a minority owner. This information will be for the period  
18 January 1, 2015 through December 31, 2015. I shall also provide information on  
19 unit equivalent availability achieved by Eversource's steam generating units,  
20 consistent with reporting provided in previous years. Unit availability including  
21 planned outages will be calculated consistent with past submittals, as well as  
22 similar calculations, without the influence of planned outages.

23 **II. Generating Unit Operation**

24 **Q. Please provide an overview of the performance of Eversource's generating**  
25 **units in 2015.**

26 A. Eversource's generating units produced 1,702,966 megawatt-hours (MWH) during  
27 2015. The fleet's availability during the 30 highest-priced days when customers'  
28 exposure to high market prices was the greatest was 94.2%. Eversource focused on

1 safe, compliant, reliable, and cost-effective operations and management of the  
2 generating fleet to provide benefit to customers; as well as the successful  
3 management planned outages and forced outages during 2015. These efforts  
4 resulted in the generating stations achieving an aggregate equivalent availability of  
5 77.2% in 2015.

6 Merrimack Unit 1 and Unit 2 provided high availability in the winter months of  
7 January, February and March with equivalent availability factors of 99.2% on Unit  
8 1 and 94.0% of Unit 2. The annual equivalent availability factors (“EAF”) were  
9 79.5% and 71.6%, respectively. These availabilities are reduced due to outage  
10 planning which considers overtime costs and replacement power costs, often  
11 resulting in a longer outage window (lower EAF), but lower overall costs to  
12 customers. The Flue Gas Desulfurization system (“scrubber”) completed its fourth  
13 full calendar year of successful operation with overall good performance.  
14 Merrimack Station also operates four electrostatic precipitators and two selective  
15 catalytic reduction systems to significantly reduce flue gas emissions.

16 At Schiller Station, December 1, 2015 marked the ninth anniversary of the Northern  
17 Wood Power biomass unit (Unit 5). In 2015, Unit 5 produced 314,157 MWH, an  
18 83.9% capacity factor; and it has generated over 2,880,000 MWH during its 9 years  
19 of operation. During the year Unit 5 burned about 491,000 tons of wood and  
20 completed a run of 105 consecutive days, the 6th longest run in its history. Units 4  
21 and 6 generated about 160,000 MWH with equivalent availability factors of 97.9%  
22 and 84.9%, respectively.

23 Eversource’s hydroelectric facilities consist of 9 hydro facilities with a total of 20  
24 units. These units have a total installed capacity of 70.6 MW and successfully  
25 produced 320,056 MWH in 2015. The annual generation was 8% below the long  
26 term average due to below average precipitation. The hydro fleet produces the  
27 company’s lowest cost power while using a renewable, reusable, emission-free  
28 energy source.

1 Newington Station burned a similar amount of oil in 2015 as it did in 2014, again  
2 significantly greater than in prior years 2011 through 2013. Use of #6 fuel oil  
3 accounted for almost 80% of total station generation in 2015. The unit utilized its  
4 fuel diversity, blending oil and natural gas to support the system grid and maximize  
5 its value to customers. Newington Station participated in the ISO-NE Winter  
6 Reliability Programs for the 2014/2015 period and the 2015/2016 period through  
7 the provision of oil inventory service. This resulted in a benefit to customers of  
8 approximately \$4 million in the 14/15 program period and about \$2 million in the  
9 15/16 program period. Eversource managed this program to maximize customer  
10 benefit while maintaining unit availability and reliability. Newington Station  
11 completed the year with a 76.8% equivalent availability.

12 **Q. Please provide a summary of how Eversource's generating units continue to**  
13 **operate well, with high reliability and high availability, recognizing the**  
14 **changing market conditions, the capacity demands and the on-going**  
15 **discussion of divestiture.**

16 A. Quality operations and maintenance ensures the generating equipment is prepared  
17 to provide high reliability in an efficient and timely fashion to provide value to  
18 customers and benefit to the ISO-NE grid.

19 Eversource's Generation team continues to focus on key items important to long-  
20 term operational success: the day-in and day-out operation and maintenance of the  
21 units; the corrective and preventative maintenance conducted during forced  
22 outages; pre-planning and execution of scheduled and planned maintenance  
23 outages; and the use of a long-term maintenance outage and capital expenditure  
24 planning process. While plans to accomplish these goals have been revised to  
25 accommodate the changing market and unit operations, the goals still remain high  
26 reliability and high availability at the lowest possible cost.

27 Long-term maintenance plans prioritize reliable plant operations and are founded  
28 on operations, equipment history, on-going condition assessment, and industry  
29 experience. The generating stations maintain a long-standing preventative  
30 maintenance program to best execute quality maintenance and the operation of the

1 units. With changes in market forces and market conditions due to economic  
2 changes in the country and the world, as well as the continuing evolution of gas  
3 markets, Generation has made changes to the management of its fleet with  
4 adjustments to expenses and staffing consistent with reduced capacity factor  
5 operations. Generation continues to rely on an experienced management team and  
6 a well-trained, skilled work force utilizing sound practices derived from experience  
7 within our facilities, as well as working with suppliers, contractors, experts, and  
8 other generating plant peers in the industry.

9 The 2015 capital and O&M expenses reflected a number of planned major  
10 maintenance activities including turbine work on Merrimack Unit 1 and Schiller  
11 Unit 6, boiler work on Merrimack Unit 2 and generator work on Newington; as  
12 well as routine, cyclic work and some previously deferred outage work. Generation  
13 operating budgets continued to emphasize a proper balance between spending what  
14 is necessary in the most critical areas, while being sensitive to the overall cost of  
15 production. Generation reviews maintenance projects to determine how they can be  
16 most effectively executed and how capital investments can be best applied to  
17 achieve a high level of plant performance.

18 **Q. Please discuss how Generation has been addressing the stringent North**  
19 **American Electric Reliability Corporation (NERC) standards as regulated by**  
20 **the Northeast Power Coordinating Council (NPCC)**

21 A. Eversource as a whole, and the Eversource New Hampshire operations including  
22 Generation, is regulated by the NPCC and undergoes stringent audits of NERC  
23 standards and requirements at least every three years. During year 2016, such an  
24 audit will occur for NH including the Generation Owner (GO) and Generation  
25 Operator (GOP) functions.

26 In preparation for these audits, the entire NH organization works to fulfill and  
27 document compliance with the NERC standards and requirements. As a result of  
28 the history of compliance, and documentation to support that compliance  
29 demonstrated by Eversource in 2015 and before, the NPCC Internal Controls  
30 Evaluation Team has recommended a reduction of 73% from the original 2016

1 targeted audit scope of NERC's Compliance Monitoring and Enforcement Program  
2 for Eversource NH as a whole. Additionally, NPCC gave Eversource NH the  
3 highest internal control rating for the remaining audit standards. NPCC has  
4 identified that the remaining standards are required to be audited either because  
5 they are new or because of their criticality to the Bulk Electric System (BES).

### 6 III. Unit Outages and Availabilities

7 **Q. Please provide a list of all unplanned outages that took place during the period**  
8 **January 1, 2015 through December 31, 2015 for Eversource's fossil, hydro,**  
9 **and biomass units and for NextEra's Wyman Station Unit No. 4.**

10 A. Attachment EHT-1 lists these outages. This listing is similar to the information  
11 submitted in the past, as a reporting requirement for the fossil hydro "outage  
12 information" resulting from discussion with the Staff in Docket No. DR 91-011.

13 **Q. Is there additional reporting with respect to outages?**

14 A. Yes. Eversource provides outage reports for all forced and maintenance outages in  
15 excess of two days at either Newington Station or at the two units at Merrimack  
16 Station, and in excess of four days at the three units at Schiller Station or at Wyman  
17 Unit 4. These Outage Reports are included as Attachment EHT-2.

18 **Q. Please provide a chronological listing of the forced and maintenance outages**  
19 **for which Outage Reports are provided in the testimony.**

20 A. The following table provides the chronological listing along with the start and end  
21 dates and times, the duration, and the causes of these forced and maintenance  
22 outages. The outages listed do include short term maintenance outages coordinated  
23 with wholesale marketing and scheduled with ISO-NE.

1    **FORCED & MAINTENANCE OUTAGE LIST**

NH Generation Steam Units Forced & Maintenance Outage List							
Report No.		Outage Start Date Time		Outage End Date Time		Duration Days	Reason
OR-1	MK2	03/05	2330	03/11	0128	5.0	Cyclone Tube Leaks and Penthouse Repairs
OR-2	MK2	04/27	0001	05/19	2330	23.0	Maintenance Outage - Penthouse Repairs / FGD Inspection
OR-3	MK1	06/06	1250	06/08	2139	2.4	Maintenance/ Post Outage- Turbine Testing and Balancing
OR-4	MK1	06/15	0700	06/22	1417	7.3	Maintenance Outage - Throttle Valve Flange Leak
OR-5	SR5	08/06	1355	08/13	0209	6.5	Economizer Tube Leak
OR-6	SR5	09/05	1540	09/10	0530	4.6	In-Bed Tube Leak
OR-7	MK1	09/23	0700	09/25	1235	2.2	Maintenance Outage - FGD DCS Control System Upgrade
OR-8	SR5	11/03	1012	11/09	2345	6.6	Reliability Maintenance Outage

2    **Q.     Please discuss the longer outage durations provided in the table.**

3    A.     Eversource monitors customer load and the energy market and seeks to provide low  
4           cost energy to Eversource's customers. With that, during periods of low electrical  
5           demand and low power market prices, the outage duration is adjusted to use less  
6           overtime. While this practice may extend the duration of the outage, the total  
7           outage expense is minimized, by avoiding the associated overtime costs.

8    **Q.     Please provide a brief summary of each of the Outage Reports discussed**  
9           **above.**

10   A.     A summary of the Outage Reports follows:

11        2015-OR-01

12           This Merrimack Unit 2 outage was 5.0 days long and began on March 5. After 66  
13           days of operation, the unit was removed from service to repair a number of cyclone  
14           water tube leaks. A boiler inspection was performed and found tube leaks in

1 cyclones 2C, 2G, and 2F. The tube leaks were repaired with pad welding. New  
2 studs and refractory were installed in the cyclones. There were also repairs made to  
3 a mechanical attachment on elevation 345'. A series of these mechanical  
4 attachments, called buckstays, are arranged around the furnace to provide the  
5 support system to hold the boiler walls in place. Metal plates that are part of the  
6 attachment had failed allowing the walls to move out of position; and as a result the  
7 penthouse seal was leaking. Staging was installed, lagging and insulation removed,  
8 and rigging installed to move the walls back into place. An interim repair was  
9 made by re-welding the support ties and repairing the mechanical attachment. The  
10 insulation and lagging was re-installed. Additional jobs from the outage backlog  
11 were also completed.

#### 12 2015-OR-02

13 This Merrimack Unit 2 outage was 23.0 days long and began on April 27. This  
14 outage was taken during a low cost, low demand energy period to complete repairs  
15 on the boiler wall support system. Material had been ordered and a Babcock &  
16 Wilcox (B&W) service representative was scheduled on site to oversee the repairs.  
17 Also a complete inspection of the FGD scrubber vessel and internals was completed  
18 to coincide with the boiler wall repairs. A boiler inspection was performed. Boiler  
19 casing leaks were identified and weld repaired; and insulation and lagging re-  
20 installed. Tube leaks in cyclones 2B, 2C, 2F and 2G were repaired with pad  
21 welding. To reduce overtime costs, this maintenance work to support improved  
22 reliability during subsequent higher priced operating periods was completed on  
23 straight time. Additional jobs from the outage backlog were also completed.

#### 24 2015-OR-03

25 This Merrimack Unit 1 outage began on Saturday, June 6 and lasted through  
26 Monday June 8. This outage was one, among others, that addressed turbine testing  
27 and balancing adjustments at the end of the planned outage. This outage exceeded  
28 48 hours, not due to a long critical path, but rather due to delaying some of the final  
29 work to Monday to avoid premium costs associated with weekend work. The  
30 energy market load and prices indicated that Merrimack Station would not be  
31 dispatched; and thus the lower cost option for customers was to complete the work



1 on Monday. On Monday, a small leak was fixed on a leak-off check valve bonnet  
2 on a turbine throttle valve; and Siemens made final balancing adjustments to the  
3 HP/IP turbine to complete the outage activities. The unit was made available and  
4 put into reserve status.

#### 5 2015-OR-04

6 This Merrimack Unit 1 maintenance outage was 7.3 days long and began on June  
7 15. The unit was removed from service to repair a flange leak on the turbine 'E'  
8 throttle valve. This leak was identified when the unit ran on Wednesday, June 10.  
9 After a short run on June 10, the unit remained off-line in reserve status. To  
10 address the leaking flange a maintenance outage was scheduled with ISO-NE. This  
11 scheduled outage ensured that the flange leak was corrected during a low cost  
12 period and prior to typical higher summer demands. The unit remained in reserve  
13 status allowing the unit to be sufficiently cool and materials were ordered in  
14 preparation for the outage scheduled for Monday morning. Three flange studs were  
15 replaced and the valve reassembled. At the end of the outage the unit returned to  
16 reserve status. Other corrective and preventative maintenance jobs were completed.

#### 17 2015-OR-05

18 This Schiller Unit 5 outage was 6.5 days long and began on August 6. The unit was  
19 removed from service to repair a tube leak in the economizer section of the boiler.  
20 A boiler inspection was completed and tube thicknesses measured. An additional  
21 leak in the economizer area was identified. Both economizer tube leaks were  
22 repaired with dutchmen. The inspection also identified necessary repairs in the in-  
23 bed tube area of the boiler. Two dutchmen were installed; and pad welding on six  
24 tubes was completed. Additional jobs from the outage backlog were also  
25 completed.

#### 26 2015-OR-06

27 This Schiller Unit 5 outage was 4.6 days long and began on September 5. The unit  
28 was removed from service to repair tube leaks in the fluidized bed area of the  
29 boiler. A boiler inspection was performed and found two tube leaks. The first tube  
30 failure caused the damage to the second tube. The initial failed tube section and the

1 associated damaged tube sections were removed. Dutchmen were installed to  
2 complete the repairs. Other jobs were completed for corrective and preventative  
3 maintenance.

4 2015-OR-07

5 This Merrimack Unit 1 outage was 2.2 days long and began on September 23. With  
6 power prices and demand low, Unit 1 was removed from service to coincide with  
7 the on-going Unit 2 planned outage to allow an upgrade to the FGD scrubber  
8 control system. While much of the work was completed without taking Unit 1 out  
9 of service, because the scrubber is a pollution control device tied to both Unit 1 and  
10 Unit 2, a short outage was necessary with both units offline. During the outage new  
11 software was installed and the control system reprogrammed. When this control  
12 system work was completed Unit 1 was returned to a reserve status.

13 2015-OR-8

14 This Schiller Unit 5 outage began on November 3 to perform planned maintenance  
15 during a scheduled high yard outage which was necessary to complete a capacitor  
16 bank tie-in. The Unit 5 outage was 6.6 days. Priority work for the outage included  
17 the cleaning and inspection of the six boiler cyclone separators and the replacement  
18 of the wood yard bucket conveyor. Additional jobs were completed for corrective  
19 and preventative maintenance to support reliability during the upcoming winter  
20 period.

21 **Q. Were scheduled Planned Outages performed at any of Eversource's fossil and**  
22 **hydro units during the period January 1, 2015 through December 31, 2015?**

23 A. Yes. Attachment EHT-1 contains a list of unit outages including planned  
24 maintenance outages for each of Eversource's fossil, biomass, hydro, and  
25 combustion turbine units, as well as the Wyman 4 unit. EHT-3 also summarizes  
26 the planned maintenance periods for the fossil units.

- 1   **Q.    Please provide a list of scheduled Planned Outages at Eversource’s fossil units**  
2   **during January 1, 2015 through December 31, 2015.**  
3   **A.    The planned maintenance outages & their durations were:**

<b>Unit</b>	<b>Planned Outages</b>
Schiller Unit 5	3/28 – 4/18
Newington Unit 1	3/30 – 4/10
Merrimack Unit 1	4/03 – 6/04
Schiller Unit 6	9/07 – 10/23
Newington Unit 1	9/12 – 11/21
Merrimack Unit 2	9/14 – 11/27

- 4       The outages listed in the table above were scheduled to complete routine  
5       maintenance to support improved reliability during subsequent higher priced  
6       operating periods.

- 7   **Q.    Are these scheduled outages usually included as part of the Reconciliation of**  
8   **Energy Service and Stranded Costs docket review?**

- 9   **A.    Yes. A review of the scheduled outages has traditionally been completed by the**  
10       Commission’s Staff utilizing an outside consultant. The outside consultant has  
11       performed on-site interviews and a review process of the planned outages.

- 12   **Q.    Are there any other requirements associated with this filing to be discussed?**

- 13   **A.    Yes. The company is required to report for a 3 year period on one remaining**  
14       recommendation associated with past SCRC filings. That recommendation is the  
15       continuation of hazard tree assessment within our rights of way, and the trimming  
16       or removal of those trees which pose a threat to equipment. The company  
17       committed to continue this work and to provide information regarding the work  
18       performed in reconciliation dockets for years 2014, 2015 and 2016. At the end of  
19       that time the distribution and transmission systems will have completed their on-

1 going 5-year vegetation management cycles. Please see Appendix A for a summary  
2 of the 2015 tree removal and costs.

3 **Q. Does this conclude your testimony?**

4 A. Yes, it does.