Public Service Company of New Hampshire
Docket No. DE 10-261

Technical Session TS-02

Dated: 06/22/2011
Q-TECH-007
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Witness: **Richard L. Levitan**
Request from: **New Hampshire Public Utilities Commission Staff**

Question:
Re-run the Levitan Newington CUO Study model with the following data input changes:

a) Apply a premium to the Dracut natural gas price of 80 cents in Jan-Feb and 84 cents in all other months.
b) Include the revision to the start up costs to reflect adjustment made by Levitan in 2010 Backcast analysis.
c) Change the natural gas/ #6 residual oil parity ratio to reflect oil being 4.0 times higher than natural gas in 2011 and narrowing down on a linear basis to 3.5 times higher than natural gas in 2020. Also adjust #2 fuel oil parity ratio to reflect oil being 5.0 times higher than natural gas in 2011 and narrowing down on a linear basis to 4.5 times higher than natural gas in 2020.
d) Add warming fuel as a separate line item in the financial result when reporting the final results.

Response:
Implementation details of the data input changes in the requested model run are as follows:

a) As in the CUO Study run, the Dracut premium inputs are in 2010 dollars and escalated at 2.4% annually over the 2011 to 2020 period.

b) As in the 2010 Backcast run with higher start costs, no energy generation or revenue was credited for dispatch while ramping from the 20 MW online load to the 60 MW stable minimum operating load.

c) RFO prices don't vary by month and 2FO prices have very little seasonal shape, so the requested oil to gas price ratios were applied to annual average natural gas prices at Dracut. The RFO oil to gas price ratios were applied to both 1% S RFO, used through 2017, and 0.5% S RFO, used from 2018 to 2020.

d) Annual warming fuel of 72.9 BBtu of 2FO, per the calculation reported in TS-02, Q-TECH-006(b), was multiplied by the annual average 2FO prices for the respective scenarios and years. Warming fuel is fired in the auxiliary boilers. Almost all modeled emission allowance costs are for CO2 allowances, which are only required for the main boiler, so no additional emission allowance costs were calculated.

Expected value revenue requirements results are presented in Attachment 1, in the same basic format as Exhibit G.12, with the addition of "Warming" and "Operation" sub items under "Fuel and Fuel Related O&M" expenses. The PV of net revenue requirements is still a negative number, indicating that continued operation of Newington Station is expected to produce customer benefits.

Operational performance results are presented in Attachment 2, in the same basic format as Exhibit G.17 of the CUO Study, with additional row items under the "With Warming Fuel" heading in each of the three panels (for expected value, median, and P25 results). Warming fuel is modeled as a constant 72.9 BBtu, regardless of how much the plant ran during the winter. The warming cost is the 72.9 BBtu times the price of the 2FO for the scenario (or all scenarios for the expected value panel). The warming fuel cost is added as an after-the-fact adjustment to the financial results reported by the model.

A complication resulting from insufficient time to include the warming fuel costs within the dispatch model is that the percentile-based results in the P50 and P25 panels are reported on the basis of energy net revenue without warming cost. This means that because the warming costs were added outside the model, the bottom line net revenue results, with warming costs, do not represent the indicated percentile levels. For example, in 2011, the P50 net revenue with warming cost included is smaller (more negative) than the P25 result. If the percentile results were ranked with the warming fuel costs included, the P50 and P25 cases would vary slightly. Also, the year-to-year fluctuations in the net revenue results with warming cost are larger than if that measure had been used for the percentile ranking since the (e.g.) P25 scenario, without inclusion of warming costs in the net revenue ranking, may in one year have high 2FO prices, but the P25 scenario for the next year may have low 2FO prices, resulting in overly wide warming cost fluctuation.

Attachment 1

Expected Values of Incremental Revenue Requirements
Case: Higher Start Cost and Warming Fuel Cost; PUC Staff Requested Natural Gas Premiums and Oil Prices

	Present Value EOY	Calendar Year 2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Expenses ($000)											
Non-Fuel O&M with Indirects											
Other than Emission Allowances	$57,236	$7,498	$7,706	$7,920	$8,139	$8,366	$8,600	$8,841	$9,089	$9,343	$9,605
Emission Allowances	$1,415	$179	$170	$181	$212	$225	$207	$212	$243	$244	$248
Total O&M Expense	$58,651	$7,677	$7,876	$8,101	$8,351	$8,591	$8,807	$9,053	$9,331	$9,587	$9,853
Fuel and Fuel Related O&M	$98,035	$10,981	$11,772	$12,875	$14,954	$15,926	$15,019	$15,476	$16,923	$16,709	$16,756
Warming		$1,885	$2,133	$2,263	$2,332	$2,389	$2,431	$2,450	$2,457	$2,455	$2,463
Operation		$9,096	$9,639	$10,612	$12,622	$13,537	$12,589	$13,025	$14,466	$14,253	$14,293
Property Tax	$9,057	$958	$1,034	$1,117	$1,206	$1,303	$1,407	$1,520	$1,641	$1,773	$1,914
Depreciation Expense	$2,879	$50	$106	$168	$240	$323	$423	$548	$715	$965	$1,465
Total Expenses	**$168,621**	**$19,666**	**$20,789**	**$22,261**	**$24,751**	**$26,142**	**$25,656**	**$26,596**	**$28,610**	**$29,033**	**$29,988**
Rate Base ($000)											
Incremental Gross Plant Value		$500	$1,000	$1,500	$2,000	$2,500	$3,000	$3,500	$4,000	$4,500	$5,000
Incremental Accum. Depreciation		$50	$156	$324	$563	$886	$1,309	$1,857	$2,571	$3,536	$5,000
Net Plant Value		$450	$844	$1,176	$1,437	$1,614	$1,691	$1,643	$1,429	$964	($0)
Working Capital		$925	$925	$925	$925	$925	$925	$925	$925	$925	$925
Accumulated Deferred Taxes		$12	$32	$64	$112	$181	$279	$417	$613	$898	$1,372
Fuel Inventory (year end)		$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
NOx, SO2, CO2 Allowance Inventory		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Material & Supply Inventory		$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500
Total Rate Base		$13,887	$14,301	$14,665	$14,973	$15,219	$15,395	$15,485	$15,466	$15,287	$14,796
Average Return on Rate Base		*11.09%*	*11.09%*	*11.09%*	*11.09%*	*11.09%*	*11.09%*	*11.09%*	*11.09%*	*11.09%*	*11.09%*
Return on Rate Base ($000)	**$11,271**	**$1,540**	**$1,586**	**$1,626**	**$1,660**	**$1,688**	**$1,707**	**$1,717**	**$1,715**	**$1,695**	**$1,641**
Expenses Plus Return on Rate Base	**$179,892**	**$21,206**	**$22,374**	**$23,887**	**$26,411**	**$27,830**	**$27,363**	**$28,313**	**$30,325**	**$30,728**	**$31,628**
Revenues ($000)											
Energy	$104,104	$11,549	$12,088	$13,431	$15,958	$17,116	$15,813	$16,483	$18,216	$18,172	$18,114
Capacity	$111,205	$17,250	$13,343	$12,121	$12,779	$13,791	$14,903	$16,420	$17,830	$22,106	$29,026
Ancillary	$1,367	$200	$200	$200	$200	$200	$200	$200	$200	$200	$200
10 MW Unitil Entitlement	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Revenue	**$216,676**	**$28,999**	**$25,631**	**$25,752**	**$28,937**	**$31,107**	**$30,916**	**$33,103**	**$36,246**	**$40,477**	**$47,340**
NET REVENUE REQUIREMENT	**($36,785)**	**($7,793)**	**($3,257)**	**($1,864)**	**($2,526)**	**($3,277)**	**($3,553)**	**($4,789)**	**($5,921)**	**($9,749)**	**($15,712)**

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Attachment 2

Operational Performance at Selected Annual Energy Net Revenue Probability Levels
Case: Higher Start Cost and Warming Fuel Cost; PUC Staff Requested Natural Gas Premiums and Oil Prices

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Expected Value										
DAM Dispatch Hours	451	429	445	508	525	470	471	526	514	506
RT Dispatch Hours	19	17	17	22	23	21	22	23	25	26
Generation (GWh)	137.0	130.0	134.7	154.3	159.9	143.1	143.5	160.2	157.2	155.6
Number of Starts	22	22	22	25	24	22	22	23	23	23
2FO Consumption (BBtu)	13	13	13	15	15	14	14	15	15	14
RFO Consumption (BBtu)	3	3	2	2	3	4	4	5	9	19
Gas Consumption (BBtu)	1,544	1,468	1,521	1,743	1,805	1,616	1,619	1,806	1,768	1,740
CO2 Emitted (1000 ton)	92	87	90	103	107	96	96	107	105	105
SO2 Emitted (ton)	15	14	15	17	17	16	16	16	17	19
NOx Emitted (ton)	92	87	91	104	107	96	97	108	106	105
Capacity Factor (%)	3.9%	3.7%	3.8%	4.4%	4.6%	4.1%	4.1%	4.6%	4.5%	4.4%
Service Factor (%)	5.4%	5.1%	5.3%	6.0%	6.3%	5.6%	5.6%	6.3%	6.2%	6.1%
Energy Revenue ($1000)	11,549	12,088	13,431	15,958	17,116	15,813	16,483	18,216	18,172	18,114
Energy Cost ($1000)	9,276	9,809	10,793	12,834	13,762	12,795	13,237	14,708	14,498	14,541
Net Revenue ($1000)	2,273	2,279	2,638	3,124	3,354	3,018	3,245	3,508	3,674	3,573
With Warming Fuel										
2FO Consumption for Warming Use (BBtu)	73	73	73	73	73	73	73	73	73	73
Warming Cost ($1000)	1,885	2,133	2,263	2,332	2,389	2,431	2,450	2,457	2,455	2,463
Energy Cost with Warming Fuel ($1000)	11,160	11,943	13,056	15,166	16,150	15,226	15,688	17,166	16,953	17,004
Net Revenue with Warming Fuel ($1000)	389	146	375	792	965	587	795	1,050	1,219	1,110
P50 (Median)										
DAM Dispatch Hours	287	328	328	756	595	389	537	469	604	545
RT Dispatch Hours	5	13	5	48	21	16	6	29	31	36
Generation (GWh)	85	97	97	234	183	116	158	144	186	166
Number of Starts	12	22	21	39	19	25	23	20	25	34
2FO Consumption (BBtu)	9	14	11	23	13	15	15	13	14	19
RFO Consumption (BBtu)	0	0	0	0	3	14	0	0	1	0
Gas Consumption (BBtu)	972	1,113	1,099	2,629	2,018	1,318	1,785	1,626	2,091	1,875
CO2 Emitted (1000 ton)	58	66	65	156	119	80	106	96	124	111
SO2 Emitted (ton)	6	13	13	27	12	22	16	13	15	20
NOx Emitted (ton)	58	66	65	156	121	80	106	96	124	111
Capacity Factor (%)	2.4%	2.8%	2.8%	6.7%	5.2%	3.3%	4.5%	4.1%	5.3%	4.7%
Service Factor (%)	3.3%	3.9%	3.8%	9.2%	7.0%	4.6%	6.2%	5.7%	7.2%	6.6%
Energy Revenue ($1000)	8,817	10,148	13,959	19,980	14,369	13,263	14,220	11,801	15,383	23,460
Energy Cost ($1000)	6,718	8,208	11,804	17,172	11,544	10,731	11,735	8,800	12,535	20,466
Net Revenue ($1000)	2,099	1,940	2,155	2,808	2,825	2,531	2,485	3,001	2,848	2,994
With Warming Fuel										
2FO Consumption for Warming Use (BBtu)	73	73	73	73	73	73	73	73	73	73
Warming Cost ($1000)	2,306	2,207	3,479	2,500	1,228	2,223	1,092	1,754	1,397	3,736
Energy Cost with Warming Fuel ($1000)	9,023	10,415	15,283	19,672	12,772	12,954	12,826	10,554	13,932	24,202
Net Revenue with Warming Fuel ($1000)	-206	-267	-1,324	308	1,597	309	1,394	1,247	1,450	-742
P25										
DAM Dispatch Hours	391	311	294	489	302	481	600	502	477	512
RT Dispatch Hours	24	15	23	34	24	16	30	30	23	40
Generation (GWh)	120.7	95.8	90.8	149.3	94.5	145.6	181.2	157.8	145.0	159.6
Number of Starts	22	21	17	22	22	14	38	14	29	20
2FO Consumption (BBtu)	14	11	11	15	13	9	21	11	18	12
RFO Consumption (BBtu)	15	12	0	0	12	0	0	4	11	0
Gas Consumption (BBtu)	1,360	1,074	1,025	1,692	1,068	1,633	2,059	1,767	1,644	1,787
CO2 Emitted (1000 ton)	82	65	61	100	65	96	122	105	98	105
SO2 Emitted (ton)	21	19	11	15	18	9	23	9	21	13
NOx Emitted (ton)	82	66	60	100	65	97	122	105	99	106
Capacity Factor (%)	3.4%	2.7%	2.6%	4.3%	2.7%	4.2%	5.2%	4.5%	4.1%	4.6%
Service Factor (%)	4.7%	3.7%	3.6%	6.0%	3.7%	5.7%	7.2%	6.1%	5.7%	6.3%
Energy Revenue ($1000)	9,037	8,501	7,881	9,767	9,429	9,965	10,329	9,643	16,023	10,242
Energy Cost ($1000)	7,695	7,247	6,439	7,903	7,801	8,210	8,912	7,721	14,167	8,460
Net Revenue ($1000)	1,343	1,253	1,443	1,864	1,627	1,755	1,417	1,921	1,856	1,782
With Warming Fuel										
2FO Consumption for Warming Use (BBtu)	73	73	73	73	73	73	73	73	73	73
Warming Cost ($1000)	1,495	2,221	1,840	1,612	2,171	1,563	1,163	1,428	1,666	1,300
Energy Cost with Warming Fuel ($1000)	9,189	9,468	8,279	9,515	9,972	9,773	10,076	9,149	15,833	9,760
Net Revenue with Warming Fuel ($1000)	-152	-967	-397	252	-544	192	253	494	190	482