2008 Capacity/Energy Planning

Background

PSNH retains load serving responsibility for customers who have not selected a competitive supplier. PSNH's monthly peak load for 2008 ranged from 1,066 MW to 1,621 MW, on-peak monthly energy ranged from 299 to 438 GWH, and off-peak monthly energy ranged from 270 to 350 GWH. The market supplied 31 percent to 63 percent of PSNH's monthly on-peak energy requirements and 15 percent to 54 percent of PSNH's monthly off-peak energy requirements in 2008. For the year, the market supplied 44 percent of PSNH's on-peak energy requirements and 29 percent of its off-peak energy requirements.

In 2008 and at summer ratings, PSNH owned approximately 528 MW of coal units at two stations, 419 MW of oil plants in two units, 65 MW of hydro plants from nine stations, 43 MW of wood fired generation in a single unit, and 83 MW of combustion turbine plants in five units. PSNH also purchases 20 MW of nuclear capability from a single unit, 42 MW from various PURPA-mandated purchases, and 10 MW from IPP buyout replacement contracts. The PSNH portfolio totals approximately 1,210 MW of summer capability (1,277 MW winter). In addition, PSNH receives monthly capacity credits from the Hydro Quebec interconnection. PSNH must meet its share of the Independent System Operator – New England (ISO-NE) monthly capacity requirement which ranged from 2,164 MW to 2,366 MW. The difference between PSNH resources and the ISO-NE monthly requirement must be made up by supplemental purchases. The market represented approximately 38 percent to 43 percent of PSNH monthly capacity requirements in 2008 and varied from 826 MW to 1,013 MW.

Load requirements remained unpredictable in 2008. On January 1, approximately 50 MW of PSNH large customers were taking market supply or performing self supply. This load equivalent value rose in the month March to 75 MW. From June 1 through the end of September, large customers taking market supply or performing self supply dropped to approximately 25 MW. From the end of September through December, self supply customers rose to 125 MW. For 2008, the energy related to customer migration totaled 321 GWH compared to the PSNH forecast of 254 GWH.

During 2008, the NU system employed 16 FTEs (full-time equivalents and up from 14 in 2007) in the Wholesale Marketing Department with 4.75 FTEs allocated to PSNH and unchanged from 2007. The remaining 11.25 FTEs are allocated to the other two NU subsidiaries that do not have load-serving responsibilities. By function, 1.75 of the 2.00 Bidding and Scheduling FTEs, 2.00 of the 4.00 Resources Planning/Analysis FTEs, 0.50 of the 2.00 Energy and Capacity Purchasing FTE, none of the 3.00 Standard Offer and Default Service Procurement FTEs, none of the 3.00 Contract Administration FTEs, 0.25 of the 1.00 Administrative Support FTE, and 0.25 of the 1.00 Management FTE are allocated to PSNH. Since June 2003, PSNH has had on site full time capacity/energy planning personnel in New Hampshire dedicated to New Hampshire power supply. From an organizational viewpoint, the New Hampshire position reports to a Connecticut manager. The New Hampshire power supply person has accepted another position but is currently filling in until PSNH can fill the position. PSNH states that the new individual may be based in New Hampshire or may be based in Connecticut based on the preference of the individual.

To meet its load responsibility, PSNH requires supplemental on-peak and off-peak (defined by ISO-NE as weekends, holidays, and weekday hours 1-7 and hour 24) purchases that change hourly and vary from 0 MW to 400 MW on peak to 0 MW to 600 MW off-peak as Newington is not economic off peak (plus reserves for capacity purchases) depending on the day of the week and month. Liberty considers these requirements to be "fixed," as PSNH's requirement is based on no contingencies occurring but does include planned unit maintenance. These requirements are increased if any of the above generation is unavailable when needed to serve load or if loads are higher than planned due to variation in the weather or customer migration. Likewise, these requirements are reduced when loads are less than planned due to variation in the weather or customer migration. Liberty considers this portion of the energy supply to be "variable."

In general, PSNH supplemented its own generation with monthly, weekly, and daily bilateral purchases to meet the "fixed" portion of its supplemental on-peak requirements and used the ISO-NE spot market combined with daily bi-lateral purchases to meet the "variable" portion of its supplemental requirements. The table below shows how PSNH on-peak and off-peak energy requirements have been supplied by its own resources and the bilateral and ISO-NE spot markets. Of note is the increasing reliance on market energy generally due to load growth through time. Actual weather and major unit outages that do not occur every year can also alter these percentages.

Percent Supply of PSNH Energy Requirements from PSNH and Market Sources

	PSNH Owned Generation (Percent)		**Bilateral and Spot Energy (Percent)**	
	On-Peak	**Off-Peak**	**On-Peak**	**Off-Peak**
2004	83	90	17	10
2005	74	85	26	15
2006	67	80	33	20
2007	66	80	34	20
2008	56	71	44	29

The following table shows how PSNH units and the markets supplied PSNH energy requirements for 2008.

Percent of PSNH 2008 On-Peak and Off-Peak Energy Requirements Supplied by PSNH and the Markets

	On-Peak (Percent)	Off-Peak (Percent)
Merrimack and Schiller	41	54
Hydro	5	6
Vermont Yankee	2	2
IPP's	6	7
Buyout Contracts	1	1
Newington and Wyman	2	1
Combustion Turbines	0	0
Bilateral Purchases	38	19
ISO-NE Spot Purchases	6	10

The following table depicts PSNH's historical market purchases and their source by percent.

Historical PSNH Supplemental Purchases and Source

	Sup. Purchases (GWH)	LT Bilateral (%)	ST Bilateral (%)	ISO-NE Spot (%)
On-Peak				
2004	900	52	22	26
2005	1,424	83	4	13
2006	1,815	85	10	5
2007	1,642	78	9	13
2008	2,046	81	7	12
Off-Peak				
2004	431	0	33	67
2005	847	79	3	18
2006	1,106	79	6	15
2007	945	73	5	22
2008	1,210	64	5	31

2008 Energy Market

In the first quarter of 2008, price volatility dominated the marketplace. Gas varied in price from \$8 to \$18 per MMBTU or 8 cents to 18 cents per kWh assuming a 10,000 BTU/kWh heat rate (Newington), and #6 oil remained stable at approximately \$11.00 per MMBTU or 11.0 cents per kWh assuming a 10,000 BTU/kWh heat rate. These prices produced an on-peak bilateral energy market in New England that varied from 7 cents to 14 cents per kWh during the same time period.

Stability returned to the market in the second quarter of 2008 but with increasing costs. During that period, gas rose from \$8 per MMBTU to \$14 per MMBTU or 8 cents to 14 cents per kWh assuming a 10,000 BTU/kWh heat rate, and #6 oil rose from \$11 to \$17 per MMBTU or 11 cents to 17 cents per kWh assuming a 10,000 BTU/kWh heat rate. These prices produced an on-peak bilateral energy market in New England that generally varied from 9 cents to 21 cents per kWh during the same time period.

In the third quarter of 2008, market volatility subsided and prices fell. Gas dropped to approximately $8 per MMBTU or 8 cents per kWh assuming a 10,000 BTU/kWh heat rate, and #6 oil dropped to $8 per MMBTU or 8 cents per kWh assuming a 10,000 BTU/kWh heat rate. These prices produced an on-peak bilateral energy market in New England that generally dropped from 18 cents to 8 cents per kWh during the same time period.

In the fourth quarter of 2008, gas price was stable at $8 per MMBTU or 8 cents per kWh assuming a 10,000 BTU/kWh heat rate until December when it spiked to $13 per MMBTU (13 cents per kWh), and #6 oil dropped from $13 to $6 per MMBTU or 13 cents to 6 cents per kWh assuming a 10,000 BTU/kWh heat rate. These prices produced an on-peak bilateral energy market in New England that generally varied from 6 cents to 8 cents per kWh.

In 2008, PSNH relied on the market for a significant portion of its energy requirements. Loads generally were lower than forecast and up to 125 MW of large customers met their needs from the market or self supply, resulting in a reduced supplemental purchase requirement. Although market prices were high during much of the year, market prices were lower than PSNH costs during most of the fourth quarter. PSNH continues to be susceptible to both market price volatility and to fluctuations in the supplemental purchase volume created by changing economic conditions and the degree to which customers migrate to and from competitive supply options. Market price volatility would be expected to increase as ISO-NE loads and sources come more into balance in 2009 and beyond.

PSNH Supply Approach

Historically, PSNH has altered its approach to supply procurement each year as it has gained market experience. In the summer of 2005, PSNH continued to cover its position and purchased blocks of bilateral power for 2006 to bring stability to pricing and to limit potential under recoveries in every month rather than just the peak months and months of unit outages as was done for 2004. PSNH also supplemented its bilateral purchased for July and August in June 2006. In addition, PSNH did more hedging in 2006 for both on-peak and off-peak load periods to better reflect the forced outage rates of the coal units. In 2007, PSNH intended to establish a fixed annual energy service rate that is subject to minimal under-recovery or over-recovery. PSNH established its monthly purchase targets in the first quarter of the year and made a series of purchases of bi-lateral energy through November to cover these targets. In addition, PSNH purchased short term bilateral energy to cover forced outages and the high load periods. All other energy was either procured from its own units or from the spot market. In 2008, PSNH followed the same purchase pattern that it used in 2007 in order to minimize risks associated with market fluctuations.

In 2005, PSNH purchased 500 MW of its 2006 capacity requirement via an annual contract. The capacity market was scheduled to switch over to the new Forward Capacity Market (FCM) in October 2006, however, the switch over did not take place until December 2006. Uncertainty regarding the start date of the new FCM rules virtually precluded further capacity contracts after June 1, 2006. When the FCM transition period rules took effect in December 2006, each load serving entity was responsible for meeting its percentage of the total NEPOOL qualified capacity resources. NEPOOL qualified capacity resources are reduced by their individual forced outage rates (unforced capacity). The seasonal capability of PSNH units is also discounted for their forced outage rate to meet its percentage of the NEPOOL supply obligation.

The FCM took effect in December 2006 and was in full effect for 2007 and beyond. Under those rules, PSNH is billed at the transition capacity rate of $3.05 per kW-month through May 2008 and $3.75 per KW-month from June through December for its 6.00 to 6.37 percent share of the 34,586 to 38,212 MW of qualified unforced monthly capacity in ISO-NE or 2,164 to 2,366 MW per month less the value of its own resources. The ISO-NE transition rates produced a bill for $93.0 million for capacity and PSNH unit capacity produced a $55.2 million credit leaving PSNH with a $37.8 million capacity cost for 2008.

PSNH conducts biweekly phone calls with generating station, fuels, operations, and bidding/scheduling personnel. Plant personnel keep capacity/energy planning informed of impending developments at the plants. PSNH views Newington as the key unit on its system as all other owned units are hydro, coal, wood, or long-term resources that are almost always economic or must take contracts. The net monthly on-peak energy requirements of PSNH were 110 to 213 GWH and their monthly off-peak energy requirements were 46 to 151 GWH. The incremental energy needs from the market are determined by the actual weather that occurred, not the forecasted average weather in the energy forecast and actual unit operation.

PSNH covered major outages and known shortfalls by executing a series of monthly bilateral forward purchases from April 2007 through November 2007 for the January 2008 through December 2008 period. Monthly blocks of power were bought that closely matched the forecasted energy requirement. Additional monthly purchased were made throughout 2008 to address exposure and the reduced utilization of Newington.

Purchases were based on monthly analysis where PSNH modeled hourly forecasts by month including a hydro schedule, hourly load forecast, IPP forecast, and its own resources. PSNH modeled its own resources as follows. Combustion turbines and Wyman #4 were not modeled as they have extremely low capacity factors and the market price tends to mimic their cost when they do run. Coal units have planned outages specifically modeled and are derated to their annual forced outage rate for the periods in which it runs. PSNH also discretely models the short planned reliability outages. Newington costs were modeled as the projected market cost of oil corrected for SOX and NOX calculations and at a full load dispatch rate. If the cost of Newington was lower than the blocks of power to be purchased, Newington was run as loaded for that block. The remainder of the energy requirements was supplied by the spot market.

Financial Transmission Rights (FTRs) are needed on-peak to protect against congestion pricing in the pool. In essence, one trades a known price for a potentially high variable congestion price. These rights are limited by actual system capability, function much like a hedge, and bring certainty to the price of generation with regard to congestion. FTRs are purchased between the major PSNH stations (Seabrook, Vt. Yankee, Mass. Hub, Merrimack, Newington (For the months it is expected to run), and Schiller known as the source locations) and the New Hampshire load zone (sink location). In 2008, PSNH purchased 7,818 MW-months of on-peak FTRs and 5,385 MW-months of off-peak FTRs. The table below shows PSNH's historical FTR purchases, their value regarding avoided congestion costs, and their cost to PSNH customers.

PSNH Historical FTR Costs and Savings

Year	Auction Cost (Thousands)	Avoided Congestion Costs (Thousands)	Net Cost (Thousands)
2003	414	488	74
2004	1,341	1,417	76
2005	777	896	119
2006	301	133	(168)
2007	973	1,133	160
2008	827	237	590

PSNH bilaterally purchased 1,795 GWH of on-peak energy and 831 GWH of off-peak energy. PSNH also spot purchased 252 GWH of on-peak energy and 380 GWH of off-peak energy. PSNH made two types of sales into the New England market. It sold 2.1 GWH of on-peak energy and 19 GWH of off-peak energy from surplus generation from owned units that netted \$22 thousand above cost. PSNH also sold unneeded bilateral energy on the spot market because loads failed to materialize as or when expected. PSNH resold 167 GWH of on-peak bilateral energy at a price of \$87 per MWH and 125 GWH of off-peak bilateral energy at a price of \$63 per MWH. These sales resulted in a gain on on-peak energy sales of \$437 thousand and a loss on the sale of off-peak energy of \$215 for a total net gain of \$222 thousand.

To provide certainty of cost and to limit potential under recoveries, PSNH purchased most of its bilateral energy via fixed price contracts. PSNH purchased its 2008 energy in the months after the run up in the price of fuel. In addition to market fluctuations, PSNH had approximately 25 to 125 MW of its largest customer sign contracts with retail suppliers representing 321 GWH annually or 11 to 50 GWH per month.). Customer migration can swing annual supplemental purchases significantly, especially in the lower load months.

Projected Unit Capacity Factors

The table below shows the historical capacity factors and the projected capacity factors used for the 2007/2008 period.

Actual and Projected Annual Capacity Factors for PSNH Major Units
(Annual Generation/Winter Rating/8760)

	Actual Capacity Factor - Percent								Forecasted Percent
	2001	**2002 (1)**	**2003 (2)**	**2004**	**2005**	**2006**	**2007**	**2008**	**2008**
Merrimack-1	81.6	74.7	93.3 (3)	86.8	90.6 (3)	80.6	95.7	79.8	74.9
Merrimack-2	72.7	75.7	73.9	80.3	79.1	84.1	82.9	72.8	71.9
Schiller-4	66.5	65.4	73.9	73.7	76.5	71.1	84.2	78.5	72.9
Schiller-5	59.3	68.2	73.5	74.0 (4)	72.4 (4)	42.0(5)	76.7	79.8	80.4
Schiller-6	62.8	71.6	75.1	76.6	81.4	77.6	74.6	80.7	75.3
Newington	12.6	19.0	55.9	50.3	33.5	8.0	9.3	3.3	4.9

(1) - Seabrook not in PSNH mix for November and December.
(2) - First full year Seabrook not in PSNH mix.
(3) - No unit overhaul in this year.
(4) - Very minor outage this year due to wood conversion.
(5) - Coal to wood boiler conversion project.

PSNH based the 2008 projected capacity factors by explicitly modeling planned annual maintenance and consultation with plant personnel. Short term planned reliability outages were also discretely modeled and are not included in the overall annualized forced outage factor. The table clearly shows that PSNH base load units performed better than forecasted.

Evaluation

Liberty reviewed the capacity/energy planning testimony filed by PSNH, conducted an on site interview with knowledgeable personnel responsible for the capacity/energy planning function at PSNH, submitted follow-up data requests, and reviewed detailed backup information of the summary results supplied by PSNH. Liberty concluded that the PSNH filing is an accurate representation of the process that took place in 2008 and that PSNH made sound management decisions with regard to capacity and energy purchases in its market environment. Liberty also concluded that the capacity factor projections used in its purchase projections were reasonable.