

**EXHIBIT NO. ___(EMM-5)
DOCKET NO. UE-06___/UG-06___
2006 PSE GENERAL RATE CASE
WITNESS: ERIC M. MARKELL**

**BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION,**

Complainant,

v.

PUGET SOUND ENERGY, INC.,

Respondent.

**Docket No. UE-06___
Docket No. UG-06___**

**FOURTH EXHIBIT (NONCONFIDENTIAL) TO THE
PREFILED DIRECT TESTIMONY OF
ERIC M. MARKELL
ON BEHALF OF PUGET SOUND ENERGY, INC.**

FEBRUARY 15, 2006

IX. ELECTRIC RESOURCES

This chapter begins with an overview of PSE's existing mix of supply resources for meeting customer demand, including hydro, coal, wind, combustion turbines (CTs) and long-term contracts with both utilities and non-utility generators (NUGs). The next section outlines PSE's Green Power Program, beginning with a discussion of renewable energy options available to PSE customers, including green tags and new small-scale production using biomass and solar. The chapter concludes with a discussion of PSE's projected load resource balance through 2025.

A. Existing Generation Supply

PSE's generation portfolio currently consists of a mix of resources with both geographical and fuel diversification. Exhibit IX-1 is a map showing the location of PSE's primary resources. Most of the gas-fueled resources are in western Washington, while the major hydro contracts are at the Mid-C in central Washington, outside of PSE's service territory. Furthest away from the load is Colstrip in eastern Montana.

Exhibit IX-2 shows expected energy resource supply under average hydro conditions (60-year) for December 2006. Hydro, PSE's largest energy source, includes both PSE-owned projects and long-term power purchase contracts with the mid-Columbia PUDs. PSE's share of the coal-fueled Colstrip plant makes up the next largest portion. Natural gas generation resources consist of the NUG contracts, which include Tenaska, Sumas and March Point, PSE-owned Encogen, and PSE's share of the Frederickson 1 combined cycle combustion turbine. The new Hopkins Ridge wind power facility is expected to provide 2 percent of PSE's 2006 energy supply, and the Wild Horse project could provide another 3 percent in 2007 (not shown here). Various contracts comprise the remaining resources.

Exhibit IX-1 Existing PSE Resources

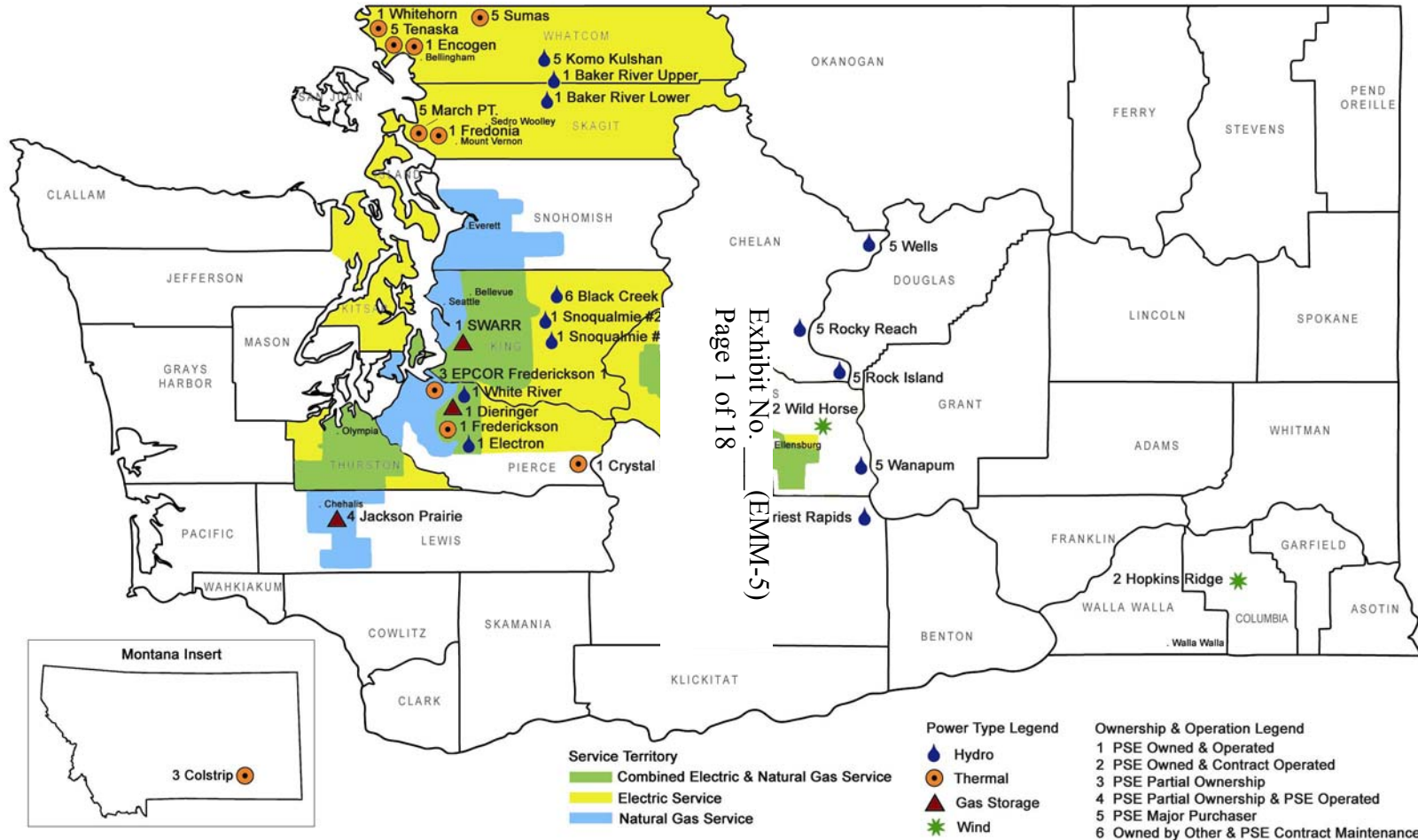
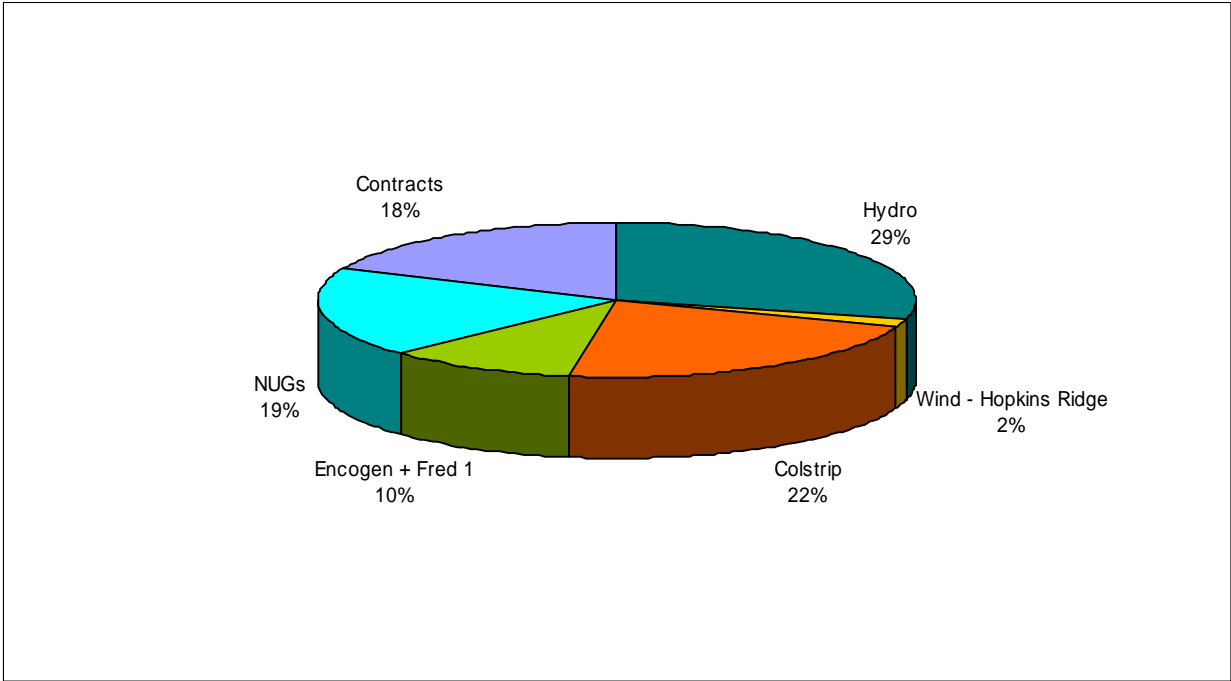


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**Exhibit IX-2: December 2006 Supply Side Resources
Average Megawatts by Source**



Hydro

Hydroelectric plants cover approximately 33 percent of PSE’s energy generation on an annual basis. Hydro resources consist of PSE-owned westside projects and long-term contracts with larger dams on the Columbia River. Other PSE hydro resources include the small dams named in the Contracts section as Qualifying Facilities. Hydro resources are very valuable as they can follow loads and are generally low-cost. High precipitation levels enable utilities to generate more power from hydro facilities. However, during low water years utilities must rely on other, more expensive sources in the market to meet load. PSE includes both the seasonality and year-to-year variation in hydro production in its Least Cost Plan analytics.

**Exhibit IX-3
PSE's Existing Hydro Resources (2006)**

PLANT	OWNER	PSE SHARE %	ENERGY (aMW)	EXPIRATION DATE
Upper Baker River	PSE	100	40	
Lower Baker River	PSE	100	44	
Snoqualmie Falls and Electron	PSE	100	48	
Total PSE-Owned			132	
Wells	Douglas Co. PUD	29.9	136	3/31/18
Rocky Reach	Chelan Co. PUD	38.9	269	11/1/11
Rock Island I & II	Chelan Co. PUD	55.0	182	6/7/12
Wanapum and Priest Rapids	Grant Co. PUD	Mixed share and contract	85	Refer to Wanapum and Priest Rapids section below
Mid-Columbia Total			672	
Total Hydro			804	

- **Baker River Hydroelectric Project**

PSE initiated the relicense process for the Baker River Hydroelectric Project in March 2000, in anticipation of the expiration of its existing license on April 30, 2006. In 2004, 23 stakeholders, including all federal and state resource agencies, three Indian tribes, Skagit County, several nongovernmental organizations and PSE reached consensus to sign a Settlement Agreement. If the agreement is approved by the Federal Energy Regulatory Commission (FERC), the Company will be authorized to generate 707,600 MWh¹ for at least 30 years. While the current annual average output at Baker is actually slightly higher (716,320 MWh) and the cost lower than proposed in the new Settlement Agreement, the project will remain a very cost-effective resource. Furthermore, all parties to the Settlement Agreement have expressed support for a 45-year license rather than the more standard 30-year license, which, if granted, would provide 15 additional years of dependable generation at a stable and favorable cost.

¹ annual average output

- **White River Project**

In January 2004, PSE stopped generating electricity at the White River Project because the environmental costs and other expenses required to license the Project would have resulted in a power cost well above available alternatives. Since production ceased, PSE has made post-retirement arrangements with third parties to cover most ongoing costs. In disposing of the Project assets, PSE is working with interested parties so that they may have the opportunity to preserve the Lake Tapps reservoir for regional recreation and municipal water supply.

- **Snoqualmie Falls Hydroelectric Project**

FERC issued a license for the Snoqualmie Falls Hydroelectric Project on June 29, 2004. The terms and conditions of the 40-year license allow the Company to maintain the Project as a reliable and cost-effective resource. Over the 40-year term of the license, the Project will generate an estimated 300,000 MWh². The license requires significant enhancements to a number of public amenities.³

- **Wanapum and Priest Rapids**

On December 28, 2001, PSE signed new contracts to secure a share of the electricity produced at the Wanapum and Priest Rapids dams. The contract includes three agreements:

- 1) The “Priest Rapids Product Sales Contract” – The terms of this contract begin November 1, 2005 for the Priest Rapids Development, and November 1, 2009 for the Wanapum Development. Contained within the contract are provisions for two products. The first is a “Surplus Product,” which provides PSE with a percentage of project power at cost. The second is a “Displacement Product,” which provides PSE with additional power resulting from Grant PUD’s purchase of Bonneville Power Administration (BPA) power. The power from both products decreases over time as Grant PUD’s loads increase.
- 2) The “Additional Products Sales Agreement” – This agreement provides PSE with a portion of the non-firm generation available to Grant PUD from the Priest Rapids Project as and when such energy is available. The availability of this energy is determined by the District. The non-firm product is available for the life of the FERC license and the

² annual average output

³ e.g., parks and recreational resources, aesthetics resources, and historic resources

amount of power will increase gradually over time as Grant PUD withdraws more power from the Project.

- 3) The “Reasonable Portion Power Sales Contract” – This contract provides PSE with a percentage of the net revenue from the FERC’s “Reasonable Portion.” This is equivalent to 30 percent of the project output, which is to be marketed by Grant PUD according to “market-based principles.”

The terms of these new agreements apply to the Priest Rapids Development beginning November 1, 2005 and to both developments beginning November 1, 2009. Until those dates, the previous agreement terms apply. After November 1, 2009, PSE will have a share of the combined Priest Rapids and Wanapum Developments instead of individual shares of each project.

Colstrip

PSE owns a 50 percent share in Colstrip 1 & 2, and a 25 percent share in Colstrip 3 & 4, a coal-fired plant located in Colstrip, Montana. The four units will be expanding their capacities by a total of 82 MW by installing higher efficiency turbine components in the years 2006-2008. PSE’s share of this increase is 28 MW. Colstrip provides important baseload energy and about 23 percent of PSE’s overall needs. PSE receives additional energy from Colstrip under a contract with NorthWestern Energy, described below. Exhibit IX-4 lists Colstrip’s capacity and planned energy output.

Exhibit IX-4: Colstrip (2006)

UNITS	PSE OWNERSHIP	NAMEPLATE CAPACITY (MW)	ENERGY (AMW)
Colstrip 1 & 2	50%	614	251
Colstrip 3 & 4	25%	1,480	299
Total Colstrip			550

Base-Load Gas-Fueled Resources

Encogen, a former NUG which PSE purchased in 1999, is a natural gas-fired cogeneration facility located in Bellingham. The plant provides steam to the adjacent Georgia Pacific Mill. Frederickson 1 is a combined cycle plant operated by EPCOR, of which PSE owns 49.85 percent. The energy listed in Exhibit IX-5 represents the energy available for planning

purposes. Actual output may be lower if market purchases displace production for economic reasons.

Exhibit IX-5: Combined Cycle (2006)

UNITS	PSE OWNERSHIP	NAMEPLATE CAPACITY (MW)	ENERGY (AMW)
Encogen	100%	169	161
Frederickson	49.85%	249.3	117
Total Gas CCs			278

Combustion Turbines

PSE operates four simple-cycle gas turbine facilities. These plants provide important capacity although they typically operate during only a few months each year. As discussed extensively in Appendix E of the April 2003 Least Cost Plan, these resources cannot be used for baseload energy. While the lease for the Whitehorn units originally expired in 2004, it has been extended to 2009. Fredonia 3 & 4 were installed in 2001 with financing arranged as a long-term lease expiring in 2011. Exhibit IX-6 provides additional detail on PSE's CTs.

Exhibit IX-6: PSE's Combustion Turbines

NAME	PLANT CAPACITY (MW)
Fredonia 1 & 2	202
Fredonia 3 & 4	118
Whitehorn 2 & 3	134
Frederickson	141
Total	595

Wind Energy

PSE signed letters of intent with two wind resource developers in 2004. The first project, Hopkins Ridge, was developed by RES Inc. The site is located in Columbia County and will be PSE's first ownership of utility-scale renewable energy. The plant is scheduled to be online in late 2005 or early 2006. The second facility, Wild Horse, is located in Kittitas County, near Ellensburg and PSE's service territory. The plant could be online by the beginning of 2007. Further information on the RFP process was provided at the LCPAG meetings and in Appendix E.

Exhibit IX-7: Wind Resources

UNITS	PSE OWNERSHIP	NAMEPLATE CAPACITY (MW)	ENERGY (aMW)
Hopkins Ridge	100%	149	52
Wild Horse	100%	239	81
Total Wind			133

Non-Utility Generators – NUGs

The NUG supply consists of cogeneration plants that PSE contracted with in the early 1990s. The plants use natural gas, and supply steam to industrial “hosts” that use the steam energy in their production processes. All three of the plants are located in Skagit and Whatcom counties, in the northern part of PSE’s service territory. Exhibit IX-8 lists PSE’s NUG contracts.

Exhibit IX-8: PSE NUG Contracts (2006)

NAME	CONTRACT EXPIRATION	ENERGY (aMW)⁴
March Point I	12/31/2011	80
March Point II	12/31/2011	65
Tenaska	12/31/2011	224
Sumas	04/16/2013	133
Total		502

- **March Point Phase I & II (Gas-fired Cogeneration)** – On June 29, 1989, PSE executed a long-term contract (through December 31, 2011) to purchase the full output of March Point Phase I, beginning October 11, 1991, from the March Point Cogeneration Company (March Point). March Point owns and operates the facility. On December 27, 1996, PSE executed a second contract (having a term co-extensive with the first contract) to purchase output of a second facility known as March Point Phase II. Both plants are located at the Texaco refinery in Anacortes.
- **Tenaska Cogeneration (Gas-fired Cogeneration)** – On March 20, 1991, PSE executed a long-term contract to purchase the output, beginning in April 1994, from Tenaska Washington Partners, L.P., which owns and operates the project near Ferndale. In December 1997 and January 1998, PSE bought out the project’s existing long-term gas supply contracts, which contained fixed and escalating gas prices that were well above

⁴ Energy (aMW) is expected annual average capability adjusted for forced outage rates and scheduled maintenance.

current and projected future market prices for natural gas. PSE became the principal natural gas supplier to the project, and power purchase prices under the Tenaska contract were revised to reflect market-based prices for the natural gas supply.

- **Sumas Energy Cogeneration (Gas-fired Cogeneration)** – On February 24, 1989, PSE executed a long-term contract to purchase from Sumas Cogeneration Company, L.P., which owns and operates the project located in Sumas, Wa.

Other Long-Term Contracts

The next portion of PSE's portfolio consists of long-term contracts that range in capacity from a few megawatts to three hundred megawatts. The group consists of a mix of contracts with independent producers and contracts with other utilities. The fuel sources include hydro, gas, waste products, and system purchases without designated supply resources. Most of the contracts will expire by 2011. Long-term contracts with independent producers provide approximately 39 aMW, and long-term utility contracts will contribute approximately 189 aMW in 2006. PSE's energy trading group procures short-term contracts (less than one year), which are not included as long-term resources. Exhibit IX-9 lists PSE's long-term contracts with independent producers, and Exhibit IX-10 lists PSE's long-term contracts with other utilities.

**Exhibit IX-9
PSE Long-Term Contracts with Independent Producers**

CONTRACT	TYPE	EXPIRATION	CAPACITY (MW)	ENERGY (AMW)
Port Townsend Paper	Hydro-QF	12/31/2008	0.4	< 1
Hutchison Creek	Hydro-QF	*	0.9	< 1
Puyallup Energy Recovery Co.(PERC)	Biomass-QF	4/18/2009	2.8	1
Spokane Municipal Solid Waste	Biomass-QF	11/15/2011	22.9	16
North Wasco	Hydro-QF	12/31/2012	5	4
Kingdom Energy-Sygitowicz	Hydro-QF	2/2/2014	0.4	< 1
Weeks Falls	Hydro	12/1/2022	4.6	1
Koma Kulshan	Hydro	3/1/2037	14	5
Twin Falls	Hydro	3/8/2025	20	8
Nooksack Hydro	Hydro	11/30/2013	3	3
Total				39

* Contract re-negotiation in progress.

**Exhibit IX-10
PSE Long-Term Contracts with other Utilities**

CONTRACT	TYPE	EXPIRATION	CAPACITY (MW)	ENERGY (AMW)
Powerex/Pt.Roberts	Hydro	9/30/2007	8	2
Baker Replacement	Hydro	10/1/2006	7	1
PG&E Seasonal Exchange-PSE	Thermal	Ongoing*	300	0
Conservation Credit - SnoPUD	Hydro	2/28/2010	12	11
Northwestern Energy Company	Colstrip	12/29/2010	97	80
BPA- WNP-3 Exchange	Various	6/30/2017	82	47
Canadian EA	Hydro	12/31/2025	-60	-37
Arizona Public Service	Coal	12/31/2006	85	85
Total				189

*May be terminated with issuance of 5-year notice.

- **BPA Baker Replacement.** PSE and the U.S. Army Corps of Engineers signed a letter of intent to enter into a 20-year agreement which calls for PSE to provide flood control for the Skagit River Valley by reducing the level of the reservoir behind the Upper Baker hydro

project between October 15 and March 1. During periods of high precipitation and run-off, the water can be stored in the Upper Baker reservoir and released in a controlled manner to reduce downstream flooding. In return for providing flood control, PSE receives power from BPA during the months of November through February to compensate for the lower generating capability caused by the reduced head at the plant.

- ***BPA Snohomish Conservation Contract*** (Term from March 1, 1990, to February 28, 2010). This agreement, the Conservation Transfer Agreement, is a system-delivery, not a unit-specific, purchased power contract. Snohomish PUD, together with Mason and Lewis County PUDs, installed conservation measures in their service areas. PSE receives an equivalent amount of power saved over the expected 20-year life of the measures. Under the contract, BPA delivered the power to PSE through the year 2001. PSE then continues to receive the power from Snohomish County PUD for the remaining life of the conservation measures.
- ***BPA – WNP-3 Bonneville Exchange Power (BEP)*** (Term from January 1, 1987, to June 30, 2017). This is a system-delivery, not a unit-specific, purchased power contract. PSE and the BPA entered into an agreement settling PSE's claims resulting from BPA's action in halting construction on nuclear project WNP-3, in which PSE had a 5 percent interest. Under the settlement agreement, for a period of 30.5 years beginning January 1, 1987, PSE receives a certain amount of power from BPA, as determined by a formula and depending on the equivalent annual availability factors of several surrogate nuclear plants similar in design to WNP-3.
- ***Canadian Entitlement Return.*** Pursuant to the treaty between the United States and Canada, one-half of the firm power benefits produced by additional storage capability on the Columbia River in Canada accrue to Canada. PSE's benefits and obligations from this storage are based upon its participation percentage in the Columbia River projects. In 1997, PSE entered into agreements with the Mid-Columbia PUDs which specify PSE's share of the obligation to return one-half of the firm power benefits to Canada beginning in 1998 and continuing until the expiration of the PUD contracts or 2024, whichever occurs first. Note that the energy listed in the table is negative since this represents power PSE provides.

- **NorthWestern Energy (formerly the Montana Power Company) 20-Year Contract** (Term from October 1, 1989, to December 29, 2010.) This is a unit-specific purchased power contract tied to Colstrip Unit 4. The contract specifies capacity payments for each year, subject to reductions if specific performance is not achieved.
- **Pacific Gas & Electric Company Seasonal Exchange.** This is a system-delivery, not a unit-specific, purchased power contract. Under this agreement, 300 MW of capacity, together with 413,000 MWh of energy, is exchanged every calendar year on a one-for-one basis. PSE provides power to Pacific Gas & Electric (PG&E) during the months of June through September, and PG&E provides power to PSE during the months of November through February (PSE is a winter-peaking utility, while PG&E is a summer-peaking utility.).
- **Powerex 5-Year Purchase for Point Roberts** (Currently extended to September 30, 2007) Powerex delivers electric power to serve the retail customers of PSE within the boundaries of Point Roberts, Washington. The Point Roberts load, which is physically isolated from PSE's transmission system, connects to British Columbia Hydro's electric facilities. PSE pays a fixed price for the energy during the term of the contract.

B. Green Power and Community Program

Green Power Program

Beginning in January 2001, Washington state law required the 16 largest of the state's electric utilities to provide customers with the opportunity to voluntarily purchase their retail electricity from qualified renewable energy resources; i.e., green power. PSE currently supplies the green power option for its customers primarily by purchasing renewable energy credits, called green tags, from the Bonneville Environmental Foundation (BEF), a nonprofit environmental organization located in Portland. Customers can purchase green power in 100 kWh blocks for \$2 per block with a two-block minimum and the option to purchase multiple blocks.

The Company has recently broadened its efforts in relation to customer-focused renewable energy by setting goals for customer participation in the Green Power Program. In 2004, the Company added 4,619 new customers to the Green Power Program for a total of 14,074. Of these, 13,794 are residential and 280 are business customers. PSE's green power customers purchased just over 46,110 megawatt hours of green power in 2004.

PSE's Green Power Program efforts and outreach have received both local and national recognition. The Department of Energy, the Environmental Protection Agency and the Center for Resource Solutions presented PSE with the Beacon Award, and the Green Power Program was a contributing factor to PSE's receipt of NWECA's Eagle Award.

Community and Small Scale Renewables Program

PSE has initiated several processes to encourage development of small-scale renewable generation projects. These included implementation of a residential solar rebate program, increasing limits under our net-metering tariff, and an additional agreement with BEF to assist in the screening and development of projects utilizing a portion of PSE's conservation and renewable discount credits from the BPA.

Several proposed small-scale renewable projects were discussed and reviewed in 2004. PSE became directly involved with three projects that were constructed or partially constructed in PSE's service area in 2004. Two are solar "demonstration" projects, and one is an animal waste-to-energy project.

The first solar project is a 10-kilowatt system that was installed at the Puget Sound Electrician Joint Apprenticeship Training Center (PSEJATC) in Renton. The new solar electric system will allow PSEJATC to expand its program and improve curriculum by offering hands-on solar installation training. PSEJATC is committed to expanding the system by 5 kilowatts each year as part of its training program. The project also will substantially increase the number of electricians qualified to design and install solar power systems, relieving a critical bottleneck to regional expansion of this technology. PSE funded 50 percent of this project using conservation and renewable discount (C&RD) credit dollars.

The second solar project, located at the Washington State Legislative Building in Olympia, was installed in conjunction with the \$118 million Legislative Building rehabilitation project. The 18.6-kilowatt system is only the second such project involving a state capital building in the United States and it is the largest. This project demonstrates solar system installation compatibility with historic preservation standards for this type of building. PSE made a monetary contribution using a portion of the Company's C&RD credits, and provided content for the project's informational kiosk. Other partners were BP Solar and Chelan County PUD.

The third small-scale renewable construction was the Vanderhaak dairy animal waste-to-energy project (anaerobic digester) in Lynden, Washington. This project is the first of its kind in the state. Anaerobic digesters have been called a "solution that leads to more solutions" for many of the environmental and economic problems facing the dairy industry today. Anaerobic digesters convert waste materials, such as dairy manure, into renewable energy and other value-added products. In addition, anaerobic digestion of dairy manure reduces odor problems, improves water quality and reduces methane emissions (a potent greenhouse gas linked to global climate change). This 350-kilowatt project uses dairy manure from approximately 1,500 cows and is anticipated to generate enough energy to serve 180 homes.

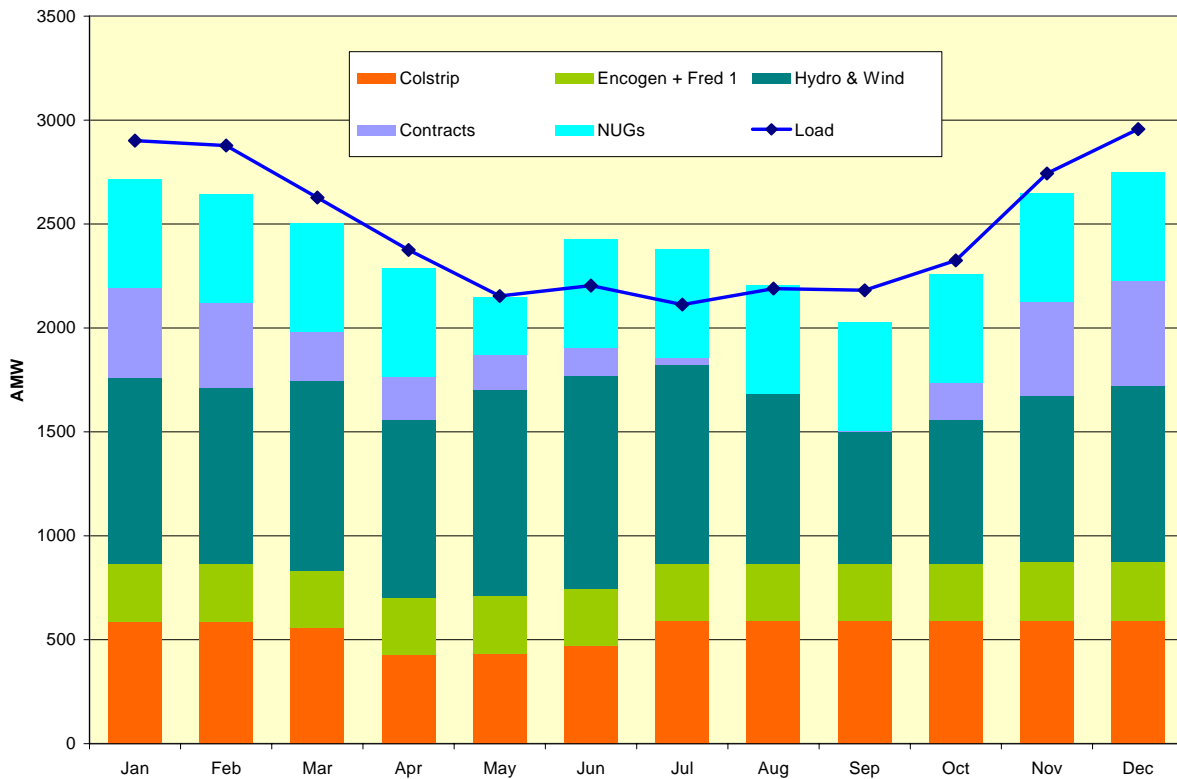
Also in 2004, PSE implemented a Solar Rebate Program, which provides residential electric customers up to \$650 per installed kilowatt of Photovoltaic (PV) solar system installed. In 2004 this program provided rebates to 15 customers totaling over \$16,000.

Finally, PSE increased the maximum project size allowable under its net-metering tariff, Schedule 150, from 25 to 50-kilowatts. As of December 2004, there were 47 customer generators connected to PSE's system under Schedule 150, for a total of 115.62 kW. Of the total, 44 are solar photovoltaic installations and 3 are micro hydro. Twenty of the 44 solar customer generators were connected in 2004.

C. Load Resource Balance

Load resource balance shows the level of demand for power from PSE's customers, and the supply of available resources required to meet that demand. In this plan, PSE continues to use the standard developed in the previous Least Cost Plan, that of meeting energy needs for all months and planning for a peak load on a 16 degree day. Energy need is defined as the difference between the average monthly load and the average monthly expected or available energy. PSE's energy resources include both owned and contracted resources aggregated as Contracts, NUGs, Colstrip, Hydro & Wind, and Encogen & Fred 1. PSE's resources are currently shaped to provide more energy in the winter and less in the summer to better match the shape of the load. Nevertheless, as illustrated in Exhibit IX-11, the load shape is more varied than the resource shape. This results in a summer surplus and a winter shortage.

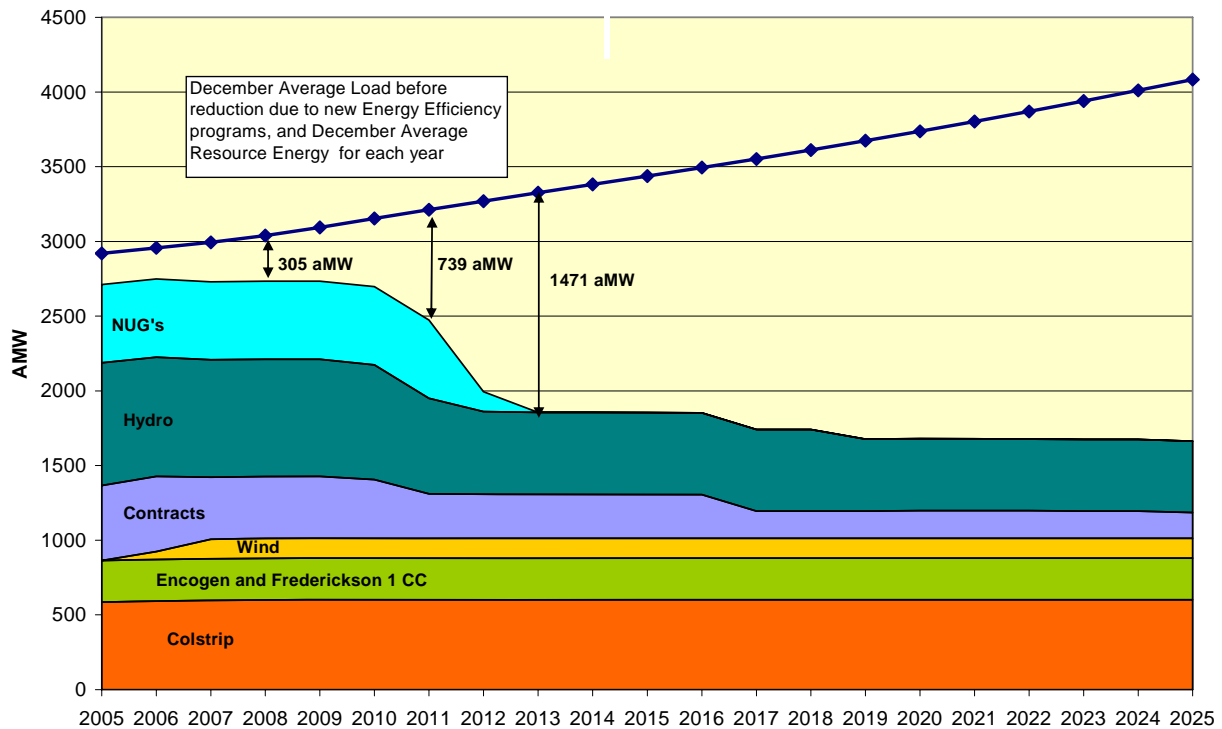
**Exhibit IX-11
 2006 Monthly Average Energy Load Resource Balance**



Because the summer surplus offsets the winter shortage, PSE’s annual average need is small in 2006. However, the summer surplus cannot realistically be stored for winter use. Meeting the need for all months is equivalent to meeting the need for the worst month, typically December of each year. Over time, the load-resource imbalance increases as the load grows and contracts expire.

Exhibit IX-12 shows the load resource balance from year-to-year based on the December average for each year. The gap between the load line and the stack of available resources portrays the “need” for new resources. As the chart clearly illustrates, the need comes from a combination of increasing load and contract terminations over time. The need is 305 aMW in 2008, increasing to 739 aMW in 2011, and 1,471 aMW in 2013. During this period, the load increases approximately 60 aMW per year without new energy efficiency programs.

**Exhibit IX-12: 2006-2025 Annual Load Resource Balance
 Level B2 Standard, December Each Year**



Energy from Resources

Assumptions about the availability of energy from PSE’s portfolio play an important role in the load-resource balance equation. Colstrip provides baseload energy with a known maintenance period. Hydro power assumes a 60-year average output from the Northwest Power Pool and is shaped to provide maximum peak energy. PSE’s contract with the Chelan Public Utility District is set to expire in 2012. For modeling purposes only, PSE assumes that the contract with Chelan is extended, but at only one-half of the last year’s contract portion of the resource. For the NUG contracts, generation technology has advanced, making these resources relatively inefficient compared to the market. Therefore, the Company has made no assumption about renewals upon their termination in 2011 and 2012. Prior to contract expiration they are modeled at their baseload capability and a 5 percent forced outage rate. Encogen and Frederickson 1, PSE’s owned gas-fueled combined cycle plants, are modeled with their baseload capability and a 5 percent forced outage rate. The Company’s simple cycle peakers are not included for energy, but are included in peak capacity planning. Lastly, most contracts have specific expiration dates with the exception of the PG&E Exchange, which continues year-to-year and

has a 5-year notice of termination. Some of the larger contracts terminating in the study period include APS in 2006, Montana Power in 2011, and WNP-3 BPA Exchange in 2017.

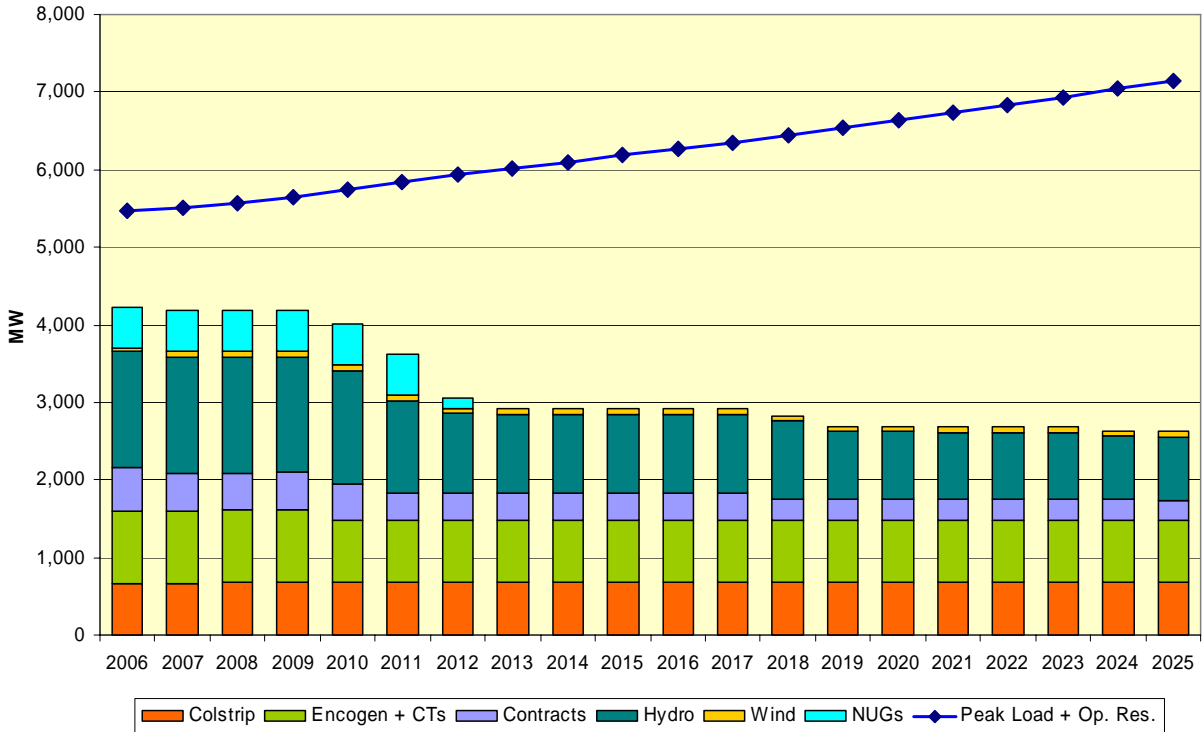
Peak Capacity Needs

The peak planning standard focuses on the highest demand hour of the year to compare load (in megawatts) to available resources. As with energy demand, peak load grows each year as the number of customers in PSE's service territory increases. PSE is winter peaking with peaks driven by temperature-dependent loads such as heating. The peak load forecast, therefore, includes both a forecast of the customer base, and an estimate of how much power would be used at a temperature of 16 degrees.

Resources are constrained by regional operating reserve requirements (from the Western Electricity Coordinating Council) of the greater of the largest single contingency or 7 percent for thermal units plus 5 percent for hydro units. Half of the reserve requirement must be provided as spinning (instantaneously available) reserves with the balance being carried as supplemental reserves. The reserve requirement in effect raises the peak resource requirement to take into account possible forced outages.

Resources available to meet peak capacity include hydro, contracts, NUGs, Colstrip, and PSE's gas-fueled turbines, including the simple cycle peaking units (These units are listed in section A.). Exhibit IX-13 illustrates the long-term gap between firm resources and peak demand. For peak modeling purposes new resources are assumed to need a 7 percent operating reserve, which is added into the peak load forecast.

**Exhibit IX-13
 Peak Demand-Resource Balance**



Currently the region is long for winter peak capacity, (according to both the Northwest Power and Conservation Council and the Pacific Northwest Utilities Conference Committee) and PSE relies on its short-term Power Supply Operations to meet customer needs on an expected peak basis. In planning for winter peak needs, PSE uses a balanced approach including fixed and index-priced contracts for seasonal firm power; call options that cover the months of November, December, January and February; and leaving part of the possible load for market purchases.