EXHIBIT NO. ___(WJE-3)
DOCKET NO. UE-06___/UG-06___
2006 PSE GENERAL RATE CASE
WITNESS: W. JAMES ELSEA

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____**

SECOND EXHIBIT (NONCONFIDENTIAL) TO THE PREFILED DIRECT TESTIMONY OF W. JAMES ELSEA ON BEHALF OF PUGET SOUND ENERGY, INC.

FEBRUARY 15, 2006

V. NATURAL GAS PRICE FORECASTS

Long-term energy resource planning requires a number of key assumptions. One of the most important assumptions, for both gas and electric resource planning, is associated with long-term natural gas prices.

The ability to accurately forecast long-term gas prices is influenced by two different types of uncertainty: uncertainty related to long-term changes in the industry, and uncertainty related to short-term gas price variability. Contributing to long-term uncertainty are long-term demand and supply issues, including growth in gas demand for generation fuel; changes in LNG import infrastructure; and pipelines to bring Alaskan and other frontier supplies to market. Short-term gas price variability also affects the long-term predictability of gas prices. Even if long-term supply and demand outcomes are exactly as projected, and their effects on gas prices are also accurately predicted, actual gas prices in future months will still reflect variability due to short-term conditions. Examples of short-term supply and demand factors that can significantly affect prices include actual weather conditions in various demand and supply areas, expected short-term future weather conditions, and storage inventory balances. In other words, even with accurate long-term projection, the actual price of natural gas in the future will be influenced by impending short-term market fundamentals.

Although gas price assumptions are important for long-term resource planning, both long- and short-term uncertainties make accurate natural gas price forecasting nearly impossible. This means analysis must take these uncertainties into consideration. This section of the Least Cost Plan explains how PSE addresses uncertainty associated with forecast gas prices, describes the gas price forecasts PSE uses for analysis, provides a range of gas price forecasts available from the Department of Energy's Energy Information Administration, and illustrates the range of gas prices PSE is using in its uncertainty analysis.

A. Addressing Gas Price Uncertainty

Both long- and short-term uncertainties, as described above, have important implications for long-term resource planning. Different methods can be used to analyze these uncertainties.

Long-Term: Scenarios — The Company's electric and gas resource planning analyses use two methods to analyze the impacts of gas price uncertainty on long-term resource planning.

First, PSE uses scenario analysis. Scenario analysis is helpful because it takes into consideration the potential for entirely different gas market conditions in the future. That is, scenarios are used to define different potential gas price paths into the future. PSE's use of the Cambridge Economic Research Associates (CERA) scenario for gas prices provides a reasonable and robust range of potential market conditions. The levelized difference between the CERA gas price scenarios is approximately 27 percent of the low price scenario. This range of potential prices is considerably wider than the 9 percent range in estimated AECO prices based on the Energy Information Administration's (EIA's) 2005 Annual Energy Outlook scenarios shown in Exhibit V-2 (below).

Short-Term: Monte Carlo Analysis — As described above, scenario analysis is helpful in examining the impacts of possible alternative price paths into the future. However, Monte Carlo analysis, by modeling uncertainty as a probability distribution, is helpful for analyzing the effect that short-term market conditions can have on a particular long-term price path. Exhibit V-3 illustrates the approximate range of uncertainty from PSE's gas resource planning analysis using Vector Gas (Details of the Monte Carlo analysis are presented in Appendix H.). The spread between the 5th and 95th percentiles shown is approximately $6.37, or 240 percent of the 5th percentile price.

B. Gas Price Forecasts Used by PSE

PSE, like many utilities, uses forward market prices for a period of time into the future, then switches over to a long-term fundamental gas price forecast. The Company uses forward market quotes for the first two years of the planning horizon, then relies on long-term fundamental forecasts for periods beyond the first two years. Markets for the first two years are reasonably liquid, and provide reasonable forward price expectations. Also, this two-year time frame lines up with PSE's short-term energy management period, thus information out two years is collected, analyzed regularly, and used for managing the portfolio.

In relying on forward market prices, the Company does not use a single point estimate of forward prices on a given day. During the Company's recent General Rate Case, both PSE and Washington Utilities and Transportation Commission (WUTC) staff performed detailed analysis to identify a reasonable method for using forward price information to project gas prices. Consistent with the results of the General Rate Case, PSE is using a three month average of

forward prices collected during December 2004 as the basis for its gas prices for 2005-06. The same short-term prices are used in each scenario.

For the long-term period (2007 and beyond), PSE is using a set of fundamental gas price forecasts for its scenario analysis. A "fundamental gas price forecast" means the Company is using gas prices that result from a comprehensive analysis of supply and demand balances at regional, North American, and international (pertaining to Canadian markets and international LNG) levels. Gas prices in the Pacific Northwest are affected by regional changes in supply and demand. Changes in demand and natural gas infrastructure across North America also affect the region's gas prices, particularly in the long run. For example, additional LNG imports in the Gulf of Mexico could increase the supply of gas to Chicago, decreasing the demand for Alberta and Rockies gas to flow east out of AECO and Southwestern Wyoming. Similarly, changes in Eastern U.S. coal prices could affect the demand for gas generation fuel in that region, the demand implications of which would likewise ripple through the Midwest, into the Rockies, and to AECO. A comprehensive long-term gas price model requires analysis of each element of supply and each element of demand, including an analysis of the supply and demand of gas substitute fuels (such as coal), an analysis of how the supply and demand issues are related across the entire North American continent given changing energy infrastructure, and consideration of changing global LNG infrastructure.

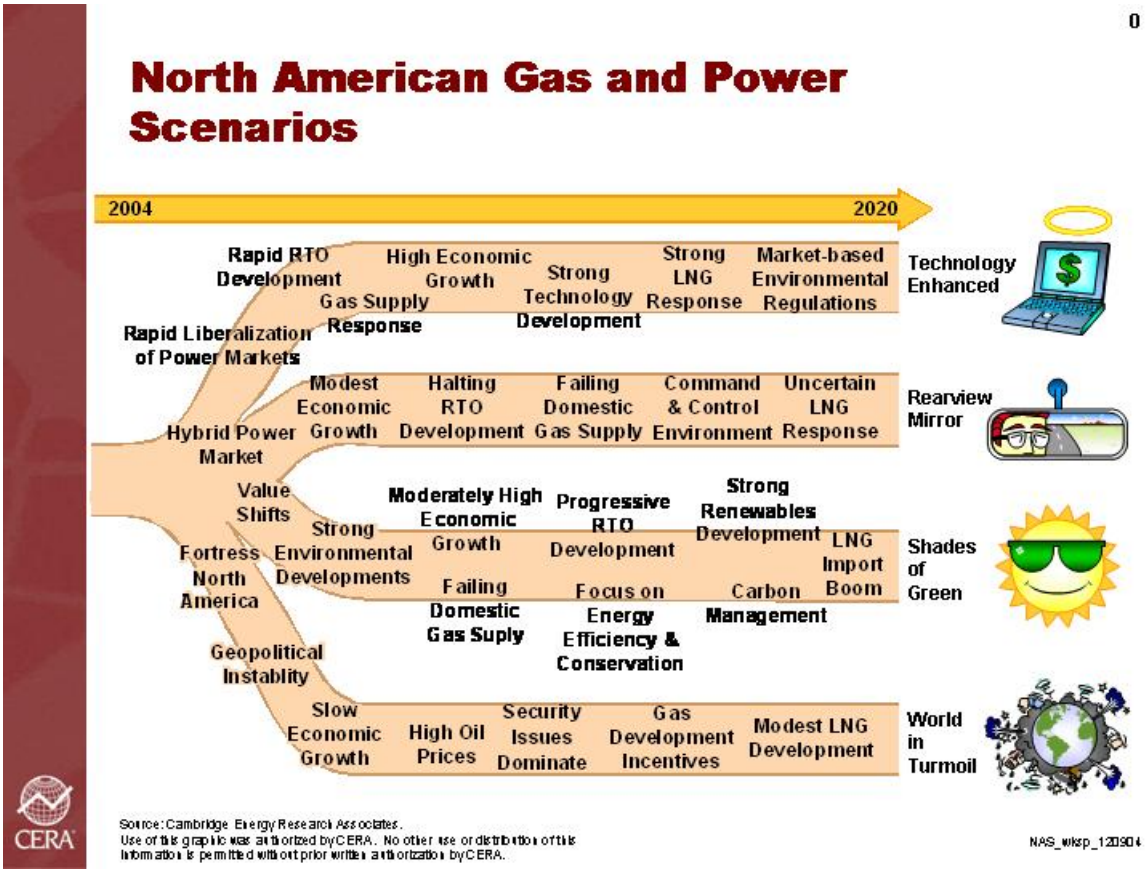
PSE does not maintain a large staff of energy economists and engineers to perform this comprehensive analysis. There are many international consulting firms, each staffed with economists and engineers, whose sole focus is to gather data and forecast both short- and long-run energy prices. Purchasing long-term price forecasts from these firms allows PSE to obtain the results of their expertise at a fraction of what it would cost to develop and maintain a long-term fundamental price forecasting model internally. Additionally, there are publicly available long-term gas price forecasts that are published annually, such as the Energy Information Adminstration's Annual Energy Outlook. The trade-off for this efficiency is that PSE is not entitled to review the proprietary details of how each forecast is calculated.

Although the Company cannot review proprietary details of gas price forecasts, PSE does supplement such price forecasts with additional analysis of its own. For example, PSE performs two different kinds of uncertainty analysis—scenarios and Monte Carlo analysis. Thus, while PSE performs resource analysis that assumes forecast prices will follow the Company's

expectations, the Company also performs analysis of the implications of gas prices that do *not* do as the Company expects. These uncertainty analyses are supplemented with PSE's review of different long-term gas price forecasts, a comparison of important assumptions, a comparison of results, and the application of judgment by experienced PSE analysts and senior management. In short, PSE's use of externally generated long-term gas price forecasts and the manner in which those forecasts are reviewed and used combine the best of internal analysis with external analysis to derive gas price forecasts.

After reviewing a number of long-term gas price forecasts, PSE chose to use long-term fundamental gas price forecasts from Cambridge Economic Research Associates (CERA). Two years ago, PSE participated in a published multi-client- study titled "New Realities, New Risks: North American Power and Gas Scenarios through 2020," which is updated by CERA annually and funded by clients. The study includes a comprehensive set of fundamental gas price forecasts based on different but plausible worldwide circumstances. The strength of the CERA scenarios study is that expertise from CERA's natural gas consulting section, the coal consulting section, electricity consulting section, world LNG consulting section, and world petroleum consulting section were brought together to provide a consistent set of assumptions for each of four different scenarios. Additionally, CERA's study provides monthly gas price forecasts for each of the pricing points needed for PSE's electric and gas resource planning analysis. Monthly shaping or non-fundamental analysis to create basis differentials to other price points is unnecessary. Overall, the CERA study provides a reasonable set of widely divergent potential outcomes well suited for PSE's scenario analysis. Exhibit V-1 briefly summarizes the concepts underlying each scenario from the CERA study.

Exhibit V-1



PSE's resource planning analysis uses three of the four CERA scenarios. For the gas Base Case and power Business as Usual case, PSE is using the CERA Rearview Mirror forecast. Shades of Green and World in Turmoil are higher and lower price forecasts, and are used consistently in PSE's planning scenarios. For an explanation of how the specific gas price forecast was used in the context of each scenario, please refer to the sections of this Least Cost Plan that describe the electric and gas planning scenarios.

C. Gas Prices

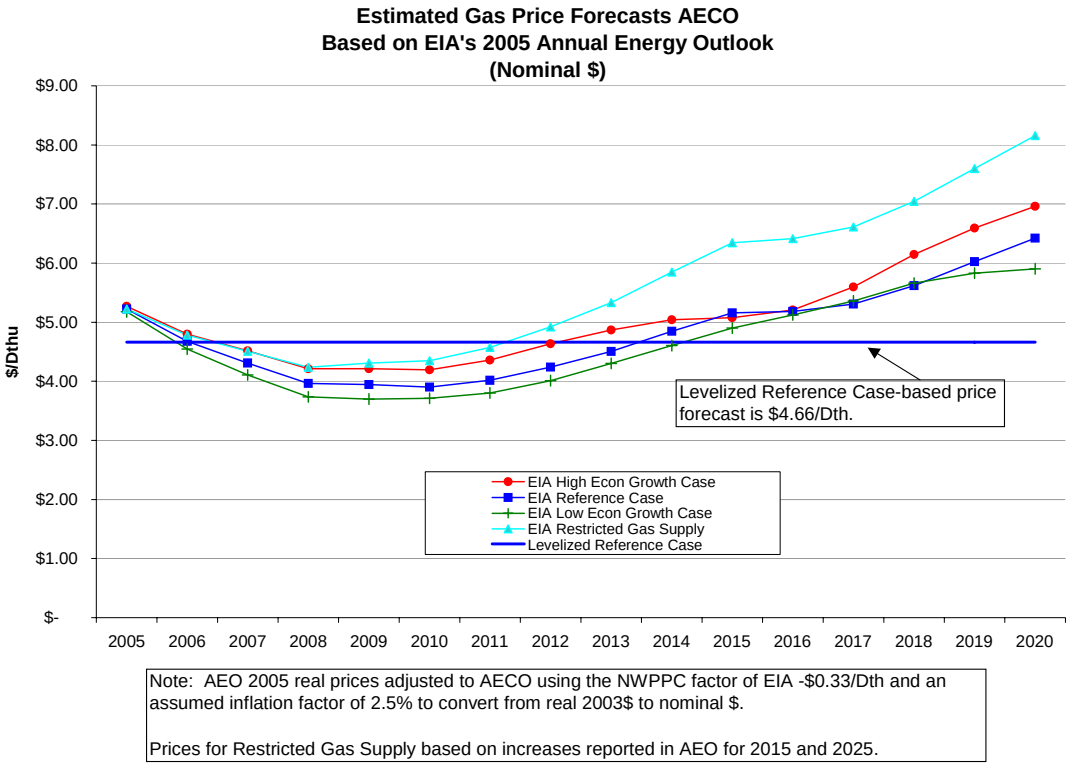
PSE believes that the CERA gas price forecasts are reasonable, and that they offer advantages not found in publicly-available gas price forecasts. However, by using a proprietary gas price forecast, the Company is precluded from disclosing the forecast to the public. Failure to protect the intellectual property rights of proprietary forecasts would undermine the economic basis of the forecasting industry. PSE weighed the disadvantages and inconvenience of withholding the proprietary long-term gas price forecast used in its long-term planning with the consequences of

using a forecast that the Company considers less reasonable. It is not practical for PSE to use a long-term gas price forecast for least cost planning efforts if that same forecast is not used to make resource acquisition decisions. Such an exercise would render the long-term planning process useless to the Company. However, a brief discussion and presentation of publicly-available gas prices published by the EIA in its 2005 Annual Energy Outlook is provided here (see Exhibit V-2). While these gas price scenarios are not used in PSE's analysis, they are generally representative of PSE's long-term gas price expectations, and may be informative.

North American gas supply and demand is essentially at equilibrium. Robust demand growth, primarily in electric generation, declines in the growth rate of new supplies, and continued drop-off in production of existing supplies have eliminated the overall surplus that kept prices low for nearly a decade. While overall supplies are adequate, current market prices rise and fall to ration supply regionally. Long-term gas prices in this Least Cost Plan analysis are about 44 percent higher than those reflected in the Company's April 2003 Least Cost Plan, and 29 percent higher than the August 2003 Least Cost Plan Update. The higher forecast prices reflect the economics needed to continue to ration capacity, while providing the necessary incentive to increase the rate of new supply development.

In general, gas prices are expected to remain relatively high. However, the long-term fundamental price path is expected to begin falling off as increased LNG imports affect gas prices. EIA's report shows LNG imports in 2005 at .75 BCF per day (3.3 percent of supply), and growing to 2.5 BCF per day by 2010 (nearly 10 percent of total supply). Prices are then expected to rise again, as demand growth increases, until about 2015, when Alaska Frontier, Alaskan gas and additional LNG supplies stabilize prices for a few years. After that, prices will continue to climb.

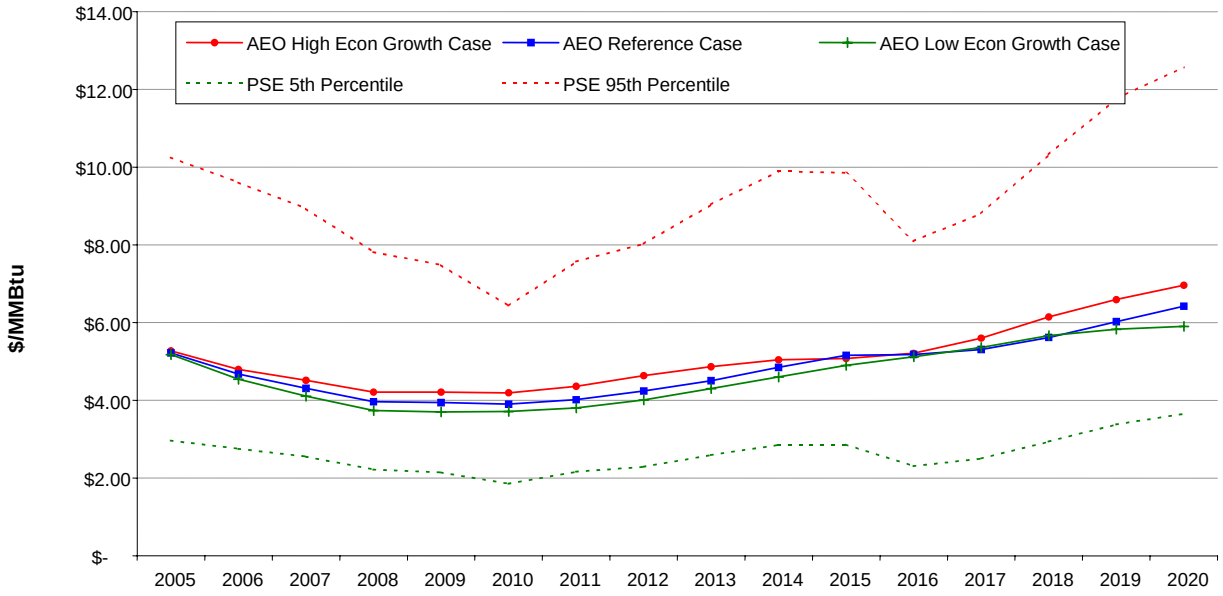
Exhibit V-2
AECO Gas Price Forecast Based on EIA 2005 Annual Energy Outlook



Note: AEO 2005 real prices adjusted to AECO using the NWPPC factor of EIA -$0.33/Dth and an assumed inflation factor of 2.5% to convert from real 2003$ to nominal $.

Prices for Restricted Gas Supply based on increases reported in AEO for 2015 and 2025.

Exhibit V-3
Gas Price Forecasts AECO (Nominal $)



Note: AEO 2005 real prices adjusted to AECO using the NWPPC factor of EIA -$0.33. MMBtu and an assumed inflation factor of 2.5% to convert from real 2003$ to nominal $.

Note: The PSE 5th and 95th percentiles do not represent CERA scenarios. These represent the range of variability around PSE's long-term expected price forecast based on Monte Carlo analysis using Vector Gas.

Exhibit V-4
EIA Long-Term Gas Price Forecast Scenarios

Estimated Nominal AECO Prices

	AEO High Econ Growth Case	AEO High Oil Price Case	AEO Reference Case	AEO Low Oil Price Case	AEO Low Econ Growth Case
2005	$ 5.27	$ 5.22	$ 5.22	$ 5.22	$ 5.18
2006	$ 4.80	$ 4.67	$ 4.67	$ 4.68	$ 4.55
2007	$ 4.52	$ 4.33	$ 4.31	$ 4.30	$ 4.11
2008	$ 4.21	$ 3.98	$ 3.96	$ 3.93	$ 3.74
2009	$ 4.21	$ 3.95	$ 3.94	$ 3.89	$ 3.70
2010	$ 4.19	$ 3.94	$ 3.90	$ 3.87	$ 3.71
2011	$ 4.36	$ 4.08	$ 4.02	$ 3.99	$ 3.80
2012	$ 4.64	$ 4.29	$ 4.24	$ 4.20	$ 4.01
2013	$ 4.87	$ 4.56	$ 4.50	$ 4.42	$ 4.30
2014	$ 5.04	$ 4.87	$ 4.85	$ 4.74	$ 4.60
2015	$ 5.08	$ 5.14	$ 5.16	$ 5.02	$ 4.90
2016	$ 5.21	$ 5.28	$ 5.18	$ 5.30	$ 5.12
2017	$ 5.60	$ 5.29	$ 5.31	$ 5.49	$ 5.36
2018	$ 6.14	$ 5.51	$ 5.62	$ 5.52	$ 5.66
2019	$ 6.59	$ 5.89	$ 6.02	$ 5.78	$ 5.83
2020	$ 6.96	$ 6.46	$ 6.42	$ 6.10	$ 5.90

Exhibit V-5
EIA Gas Supply Table—Reference Case

	Production		Imports				
	Dry Gas Production 1/	Supp Natural Gas 2/	Canada	Mexico	Liquefied Natural Gas 3/	Net Imports	Total Supply
2002	18.96	0.07	3.60	-0.26	0.17	3.50	22.53
2003	19.07	0.06	3.13	-0.33	0.44	3.24	22.37
2004	18.91	0.07	2.99	-0.34	0.63	3.28	22.26
2005	19.27	0.07	3.00	-0.38	0.75	3.37	22.72
2006	19.24	0.08	2.89	-0.39	1.14	3.64	22.96
2007	19.49	0.08	2.74	-0.29	1.30	3.75	23.31
2008	19.90	0.08	2.56	-0.18	1.76	4.13	24.11
2009	20.44	0.08	2.47	-0.08	1.80	4.20	24.72
2010	20.42	0.08	2.57	-0.14	2.50	4.94	25.44
2011	20.91	0.08	2.69	-0.20	2.67	5.16	26.14
2012	21.17	0.08	2.73	-0.22	2.99	5.50	26.75
2013	21.07	0.08	2.75	-0.25	3.55	6.05	27.20
2014	21.16	0.08	2.83	-0.27	3.82	6.38	27.61
2015	20.77	0.08	2.98	-0.29	4.33	7.02	27.86
2016	20.85	0.08	2.97	-0.32	4.78	7.43	28.35
2017	21.63	0.08	2.81	-0.34	4.78	7.26	28.96
2018	22.06	0.08	2.82	-0.36	4.79	7.25	29.38
2019	22.05	0.08	2.76	-0.38	5.16	7.54	29.66
2020	21.89	0.08	2.69	-0.35	5.54	7.89	29.85
2021	21.77	0.08	2.77	-0.31	5.65	8.11	29.96
2022	21.54	0.08	2.80	-0.26	5.94	8.48	30.10
2023	21.41	0.08	2.70	-0.28	6.27	8.69	30.17
2024	21.69	0.08	2.64	-0.30	6.37	8.71	30.47
2025	21.83	0.08	2.55	-0.25	6.37	8.66	30.56
2025	0.6%	0.7%	-0.9%	-1.2%	12.9%		1.4%

1/ Marketed production (wet) minus extraction losses.

2/ Synthetic natural gas, propane air, coke oven gas, refinery gas, biomass gas, commingled and distributed air injected for Btu stabilization, and manufactured gas with natural gas.

3/ Includes any natural gas regasified in the Bahamas and transported via pipeline to Florida.