EXHIBIT NO. ___(AS-1HCT)
DOCKET NO. UE-13____
2013 PSE PCORC
WITNESS: ALIZA SEELIG

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, Complainant, v. PUGET SOUND ENERGY, INC., Respondent.	Docket No. UE-13_____

PREFILED DIRECT TESTIMONY (HIGHLY CONFIDENTIAL) OF ALIZA SEELIG ON BEHALF OF PUGET SOUND ENERGY, INC.

REDACTED
VERSION

APRIL 25, 2013

D. Base + CO_2 Scenario

Q. Please generally describe the Base + CO_2 scenario.

A. The Base + CO_2 scenario tests portfolio decisions in a world with moderate CO_2 costs. Specifically, the Base + CO_2 scenario models power and gas prices that reflect higher CO_2 costs than the Base Case.

E. Base with New Gas Price Scenario

Q. Please generally describe the Base with New Gas Price scenario.

A. The Base with New Gas Price scenario is the same as the Base Case scenario but updates natural gas prices from April 2012. PSE slowed the RFP process to incorporate this lower gas price into the decision process.

V. KEY ASSUMPTIONS

Q. What key input assumptions does PSE include in the quantitative analysis?

A. The range of forecasts evaluated by PSE in the quantitative analysis reflects estimates and assumptions for the following key areas: (i) power prices; (ii) natural gas prices; (iii) demand forecasts; (iv) generic resources; and (v) CO_2 costs. Please see Exhibit No. ___(AS-3) and Exhibit No. ___(MM-3HC) at 23 for a table of the scenario assumptions.

A. Power Prices

Q. What projected power prices did PSE use in conducting quantitative analyses for the 2011 RFP?

A. PSE developed projected power prices for each of the five scenarios discussed above. Please see Exhibit No. ___(AS-4) and Exhibit No. ___(MM-3HC) at 98 and 99 for the power prices used by PSE for each of the scenarios.

Q. Were the projected power prices used by PSE in the 2011 RFP higher or lower than the projected power prices used by PSE in the 2011 IRP?

A. The projected power prices used by PSE in the 2011 RFP were lower than the projected power prices used by PSE in the 2011 IRP. Please see Exhibit No. ___(AS-5) and Exhibit No. ___(MM-3HC) at 100 for a comparison of the 2011 RFP levelized power prices to the 2011 IRP levelized power prices. PSE based the 2011 IRP projected power prices on the October 2010 release of gas prices, and the general trend in gas prices is declining. Due to the high correlation between power and gas prices, a downward trend of natural gas prices causes downward pressure on the power prices.

Q. Does PSE expect that power prices will remain stable?

A. No, not necessarily. Power prices tend to be volatile and are not as stable as shown in forecasts. Please see Exhibit No. ___(AS-6) and Exhibit No. ___(MM-3HC) at 101 for a comparison of historical Mid-C power prices (2000-2011)

compared to the forecasts starting with the 2005 Least Cost Plan to the current 2011 RFP. PSE runs a range of scenarios along with stochastic simulations to capture the uncertainty inherent in the volatile and unpredictable nature of power prices.

The stochastic modeling process allows PSE to understand the risks to portfolio revenue requirement associated with individual portfolios by creating 250 Monte Carlo draws simulating Mid-C power price, Sumas gas price, PSE load, hydropower and wind generation. The AURORA Dispatch Model simulated PSE's portfolio dispatch, and market purchases and sales based on the 250 draws. The simulations took into account PSE's F2012 Load forecast, the 2011 RFP Phase II range of power and gas prices, and the historical variability of natural gas prices, power prices, hydro generation, and wind generation.

Please see Exhibit No. ___(AS-7) and Exhibit No. ___(MM-3HC) at 103 for the annual Mid-C power price distribution for the 2011 RFP. Please see Exhibit No. ___(AS-8) and Exhibit No. ___(MM-3HC) at 104 for a comparison of the simulated annual price distributions to historical price distributions between 2000 and 2010.

B. Natural Gas Prices

Q. What projected natural gas prices did PSE use in conducting quantitative analyses for the 2011 RFP?

A. For resource planning and acquisition analyses, PSE used a combination of a three-month average of the forward price marks for natural gas and the Wood Mackenzie Long-Term View forecasts for natural gas. The forward price marks are typically available for about five years ahead (through 2015 as of July 2010 and through 2016 in April 2012). The Wood Mackenzie Long-Term View is a twenty-year forecast. The inputs used in the forecasts are:

(i) **2011 IRP Base:** Forward marks as of July 30, 2010, and the Wood Mackenzie Long-Term View forecast published in April 2010.

(ii) **2011 RFP Phase I Base:** Forward marks as of April 12, 2011, and the Wood Mackenzie Long-Term View forecast published in April 2011.

(iii) **2011 RFP Phase II Base:** Forward marks as of November 7, 2011, and the Wood Mackenzie Long-Term View forecast published in October 2011.

(iv) **2011 RFP Phase II with New Gas:** Forward marks as of April 19, 2012, and the Wood Mackenzie Long-Term View forecast published in April 2012.

Q. Were the projected natural gas prices used by PSE in the 2011 RFP higher or lower than the projected natural gas prices used by PSE in the 2011 IRP?

A. Projected natural gas prices have declined since PSE developed the projected natural gas prices for the 2011 IRP in July 2010. For example, the levelized

projected natural gas price of $8.08/MMBtu from the 2011 IRP has declined to a levelized projected natural gas price of $5.43/MMBtu from the 2011 RFP Phase II. Please see Exhibit No. ___(AS-9C) and Exhibit No. ___(MM-3HC) at 85 and 86 for the natural gas prices for the Sumas Hub used by PSE for each of the scenarios.

Q. What is generally causing the trend in declining natural gas prices?

A. In general, the declining natural gas prices are due to the continued and increasingly efficient development of shale gas resources and stagnant growth in demand. As gas producers have gained more experience in drilling and developing shale gas resources, the cost of production has declined. This is especially noticeable in the short-term prices. The relatively slow economic recovery in the U.S. and uncertainty in world-wide growth prospects have also tended to reduce prices. Specifically for Sumas, slowing demand for Western Canadian Sedimentary Basin gas in eastern markets due to penetration of Marcellus and Utica shale gas into eastern Canada and northeast U.S. markets, along with delays in Alberta Oil Sands demand, has created a relative surplus of supply in western Canada.

Additionally, over the shorter term, the relatively warm 2011-12 winter in North America reduced gas demand, which tended to reduce prices during the heating season. Consequently, the diversion of surplus gas to storage has tended to reduce prices for the summer and coming winter.

Q. Did PSE develop high and low projected natural gas price forecasts?

A. Yes. PSE developed high and low natural gas price forecasts using the base, high and low price forecasts from the 2011 IRP. Starting with the 2011 IRP forecasts, PSE calculated the respective percentage differences between the base forecast and the high and low price forecasts on a monthly basis. PSE based these monthly percentages on rolling eight-year average prices. PSE used the rolling average prices to smooth out the price effects of the proposed Alaska Gas Pipeline. PSE then multiplied these percentages by the 2011 RFP screening Base Case price forecast to get the low and the high price forecasts. Please see Exhibit No. ___(AS-10C) and Exhibit No. ___(MM-3HC) at 87 for a comparison of 2011 RFP natural gas price scenarios compared to the 2011 IRP natural gas price scenario. Please see Exhibit No. ___(AS-11HC) and Exhibit No. ___(MM-3HC) at 88 for a comparison of historical Sumas natural gas prices (2000-2011) compared to the forecasts starting with the 2005 Least Cost Plan to the current 2011 RFP.

As discussed above, the stochastic modeling process allows PSE to understand the risks to portfolio revenue requirement associated with individual portfolios by creating 250 Monte Carlo draws simulating Mid-C power price, Sumas gas price, PSE load, hydropower and wind generation.

Please see Exhibit No. ___(AS-12C) and Exhibit No. ___(MM-3HC) at 102 for the annual Sumas natural gas price distribution for the 2011 RFP. Please see

Exhibit No. ___(AS-13) and Exhibit No. ___(MM-3HC) at 103 for a comparison of the Sumas simulated monthly price distributions to historical price distributions between 2000 and 2010.

C. Demand Forecasts

Q. Please describe the demand forecast that PSE developed for the 2011 RFP.

A. The demand forecast PSE developed for the 2011 RFP is an estimate of energy sales, customer counts, and peak demand over a 20-year period. Significant inputs include information about regional and national economic growth, demographic changes, weather, prices, seasonality, and other customer usage and behavior factors. PSE also includes known large load additions or removal.

PSE used two different demand forecasts for portfolio analysis in the 2011 RFP:

(i) **F2011 Base load forecast** – PSE relied upon the F2011 Base load forecast for Phase I of the 2011 RFP and included such load forecast in the Screening Model.

(ii) **F2012 Base, Low, and High load forecasts** – PSE relied upon F2012 Base, Low, and High load forecasts for 2011 Phase II of the 2011 RFP. PSE delayed the RFP process in order to incorporate the F2012 load forecast in its final recommendations.

Q. Please describe the various F2012 load forecasts developed by PSE.

A. PSE based the F2012 Base load forecast on the February 2012 Moody's Analytics U.S. Macroeconomic Forecast (the "February 2012 Outlook") and developed the

F2012 High and Low load forecasts to develop distributions of load for risk analysis.

The February 2012 Outlook showed a delayed, but continued, recovery with real gross domestic product growth reaching near four percent by 2014. The unemployment rate also declined every year in the near-term, in lockstep with increasing total employment, which started to grow at a healthy pace by 2014. With manufacturing gaining strength and businesses beginning to hire more, there are some positive signs for an impending economic recovery. Risks to the economic outlook still exist. Economic problems in Europe, foreclosures preventing price stabilization in the U.S. housing market, job cuts by local governments, along with uncertain government action over the extension of programs such as payroll tax cuts and unemployment insurance programs, were all downside risks to the outlook at the time.

Q. How does the F2012 Base load forecast compare with the F2011 Load Forecast and the 2011 IRP Alternate Cyclical Low scenario?

A. The current regional economic forecast suggests worse results than the economic forecast underlying the F2011 Load Forecast but performs better than the economic forecast underlying the 2011 IRP Alternate Cyclical Low scenario. In most areas of the economy, the F2012 Base load forecast falls between the F2011 and the IRP Alternate Cyclical Low scenario, with housing recovery trending closer to the IRP Alternate Cyclical Low scenario through 2012. Housing

recovery does come closer to the F2011 forecast levels through 2016 before slowing to near the Alternate Cyclical Low for the remainder of the forecast. Additionally, the F2012 load forecast reflects the loss of Jefferson County loads in April 2013.

Please see Exhibit No. ___(AS-14) and Exhibit No. ___(MM-3HC) at 91 for a comparison of how the load forecasts have changed since the F2010 load forecast used in the 2011 IRP.

Q. Did PSE also rely on a regional load forecast?

A. Yes. PSE used a forecast of regional load to develop power prices. In particular, PSE used the Northwest Power and Conservation Council's regional forecast from the Sixth Power Plan. Please see Exhibit No. ___(AS-15) and Exhibit No. ___(MM-3HC) at 92 for a depiction of the Northwest Power and Conservation Council's regional forecast, as well as high and low variations.

D. Generic Resources

Q. What assumptions did PSE make with respect to generic resources?

A. The generic resource assumptions used by PSE in Phase I of the 2011 RFP were the same as those assumptions used in the 2011 IRP, with the costs updated to 2012 dollars. Please see Exhibit No. ___(AS-16) and Exhibit No. ___(MM-3HC) at 104 for the generic resource assumptions for Phase I of the 2011 RFP.

EXHIBIT NO. ___(AS-3)
DOCKET NO. UE-13____
2013 PSE PCORC
WITNESS: ALIZA SEELIG

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, Complainant, v. PUGET SOUND ENERGY, INC., Respondent.	Docket No. UE-13____

SECOND EXHIBIT (NONCONFIDENTIAL) TO THE PREFILED DIRECT TESTIMONY OF ALIZA SEELIG ON BEHALF OF PUGET SOUND ENERGY, INC.

APRIL 25, 2013

Optimization Model Scenario Assumptions

Scenario	PSE Demand	Gas Price	AURORA Electric Price	Generic Resource Costs	Emissions Price
Base	Base	Base	Base	Base	None
Base + CO_2	Base	Base	Base + CO_2	Base	EPA APA Analysis
Base w/ New Gas[(1)]	Base	Base + New Gas	Base + New Gas	Base	None
High Prices	Base	High	High	Base	None
Low Growth	Low Structural[(2)]	Low	Low	Base	None
SENSITIVITY Low Price w/ Base Load	Base	Low	Low	Base	None

Notes:
(1) "Base w/ New Gas": New Wood Mackenzie gas prices as of late April 2012.
(2) Lower regional population growth.

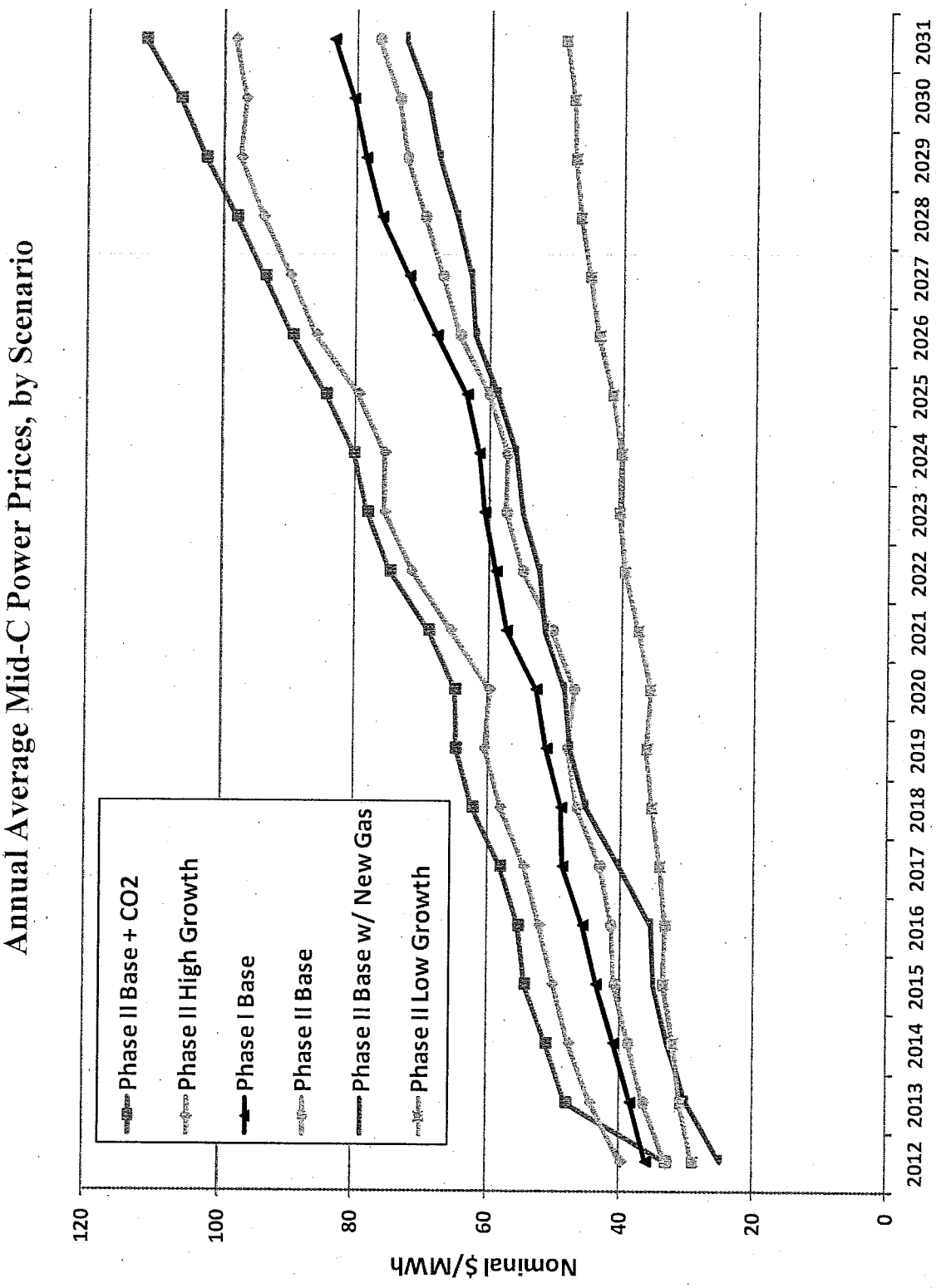
EXHIBIT NO. ___(AS-4)
DOCKET NO. UE-13____
2013 PSE PCORC
WITNESS: ALIZA SEELIG

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, Complainant, v. PUGET SOUND ENERGY, INC., Respondent.	Docket No. UE-13____

THIRD EXHIBIT (NONCONFIDENTIAL) TO THE PREFILED DIRECT TESTIMONY OF ALIZA SEELIG ON BEHALF OF PUGET SOUND ENERGY, INC.

APRIL 25, 2013


Annual Average Mid-C Power Prices, by Scenario
Phase II Base + CO2
Phase II High Growth
Phase I Base
Phase II Base
Phase II Base w/ New Gas
Phase II Low Growth
Nominal $/MWh
120
100
80
60
40
20
0
2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031

2011 RFP Mid-C Power Price Forecasts

	2011 RFP Annual Average Mid-C Power Price (Nominal $/MWh)					
	Phase I Base	Phase II Base	Base w New Gas	Low Growth	High Price	Base + CO2
2012	36.01	33.04	24.83	28.98	39.75	33.04
2013	38.43	36.50	30.00	30.94	44.31	47.98
2014	40.90	38.78	32.82	32.08	47.59	50.96
2015	43.49	40.81	35.08	33.59	50.05	54.22
2016	45.55	41.40	35.48	33.30	52.09	55.24
2017	48.68	43.09	40.30	34.16	54.43	57.93
2018	48.95	46.52	45.16	35.38	58.03	62.12
2019	51.17	48.04	47.58	36.18	60.42	64.62
2020	52.77	47.12	48.58	35.72	59.74	64.78
2021	57.24	50.33	51.38	37.56	65.41	68.73
2022	58.79	54.82	52.38	39.70	71.39	74.57
2023	60.60	57.36	54.93	40.55	75.46	78.01
2024	61.42	57.25	55.97	40.29	75.45	80.14
2025	63.28	59.94	58.64	41.58	79.46	84.36
2026	67.79	64.33	61.93	43.57	85.77	89.36
2027	71.96	66.91	62.74	44.96	89.74	93.58
2028	76.07	69.58	64.83	46.47	93.93	98.01
2029	78.56	72.38	67.46	47.18	97.40	102.69
2030	80.45	73.56	69.25	47.49	96.70	106.46
2031	83.41	76.56	72.60	48.76	98.26	111.61
20-yr Levelized	**52.29**	**48.41**	**44.64**	**36.43**	**61.80**	**64.98**

EXHIBIT NO. ___(AS-5)
DOCKET NO. UE-13____
2013 PSE PCORC
WITNESS: ALIZA SEELIG

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, Complainant, v. PUGET SOUND ENERGY, INC., Respondent.	Docket No. UE-13____

FOURTH EXHIBIT (NONCONFIDENTIAL) TO THE PREFILED DIRECT TESTIMONY OF ALIZA SEELIG ON BEHALF OF PUGET SOUND ENERGY, INC.

APRIL 25, 2013

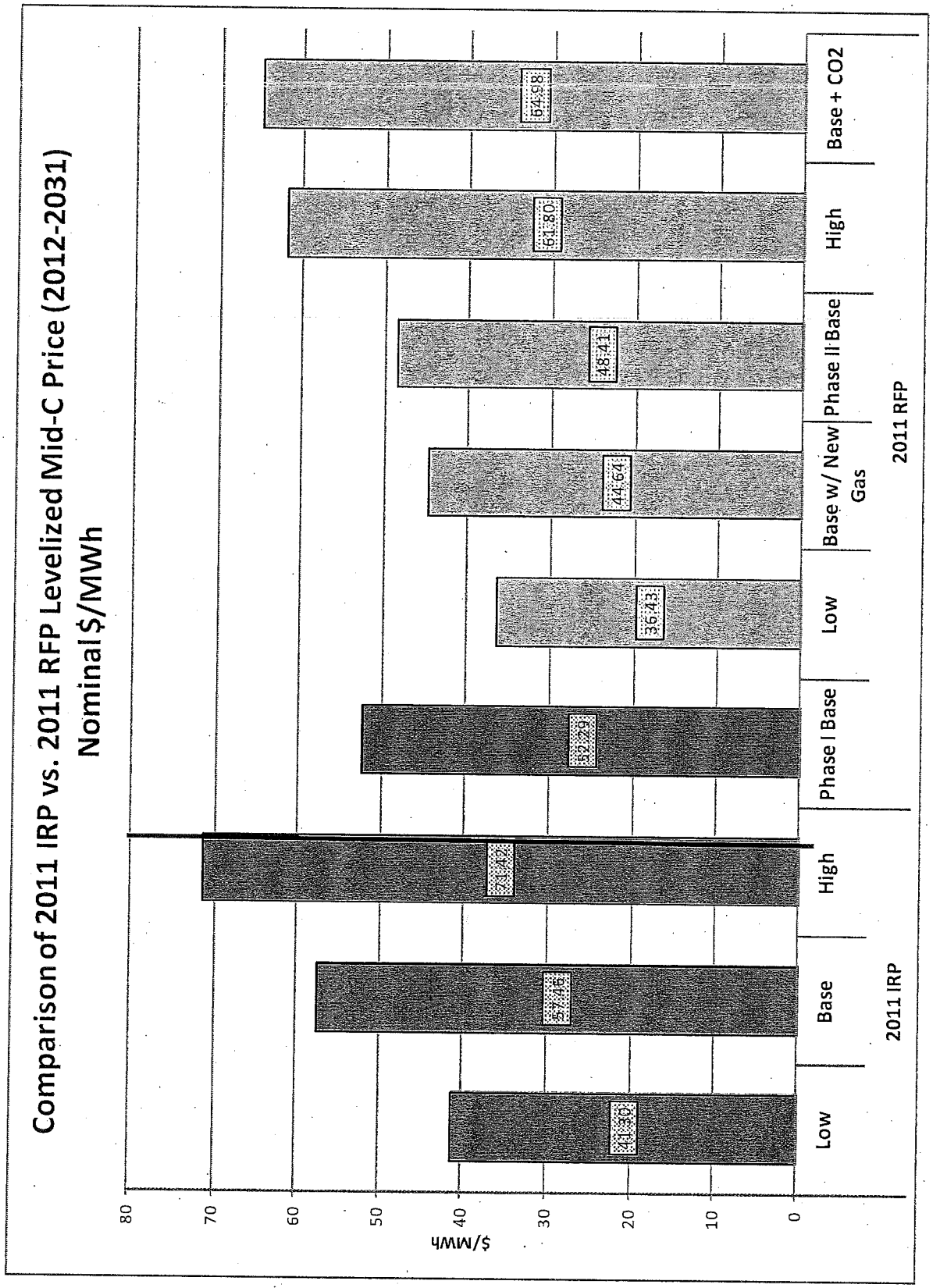

Comparison of 2011 IRP vs. 2011 RFP Levelized Mid-C Price (2012-2031)
Nominal $/MWh
$/MWh
0
10
20
30
40
50
60
70
80
31.30
57.16
71.42
32.29
36.43
44.64
48.41
61.80
64.98
Low
Base
High
Phase I Base
Low
Base w/ New Gas
Phase II Base
High
Base + CO2
2011 IRP
2011 RFP

EXHIBIT NO. ___(AS-6)
DOCKET NO. UE-13____
2013 PSE PCORC
WITNESS: ALIZA SEELIG

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY, INC.,** **Respondent.**	**Docket No. UE-13____**

FIFTH EXHIBIT (NONCONFIDENTIAL) TO THE PREFILED DIRECT TESTIMONY OF ALIZA SEELIG ON BEHALF OF PUGET SOUND ENERGY, INC.

APRIL 25, 2013

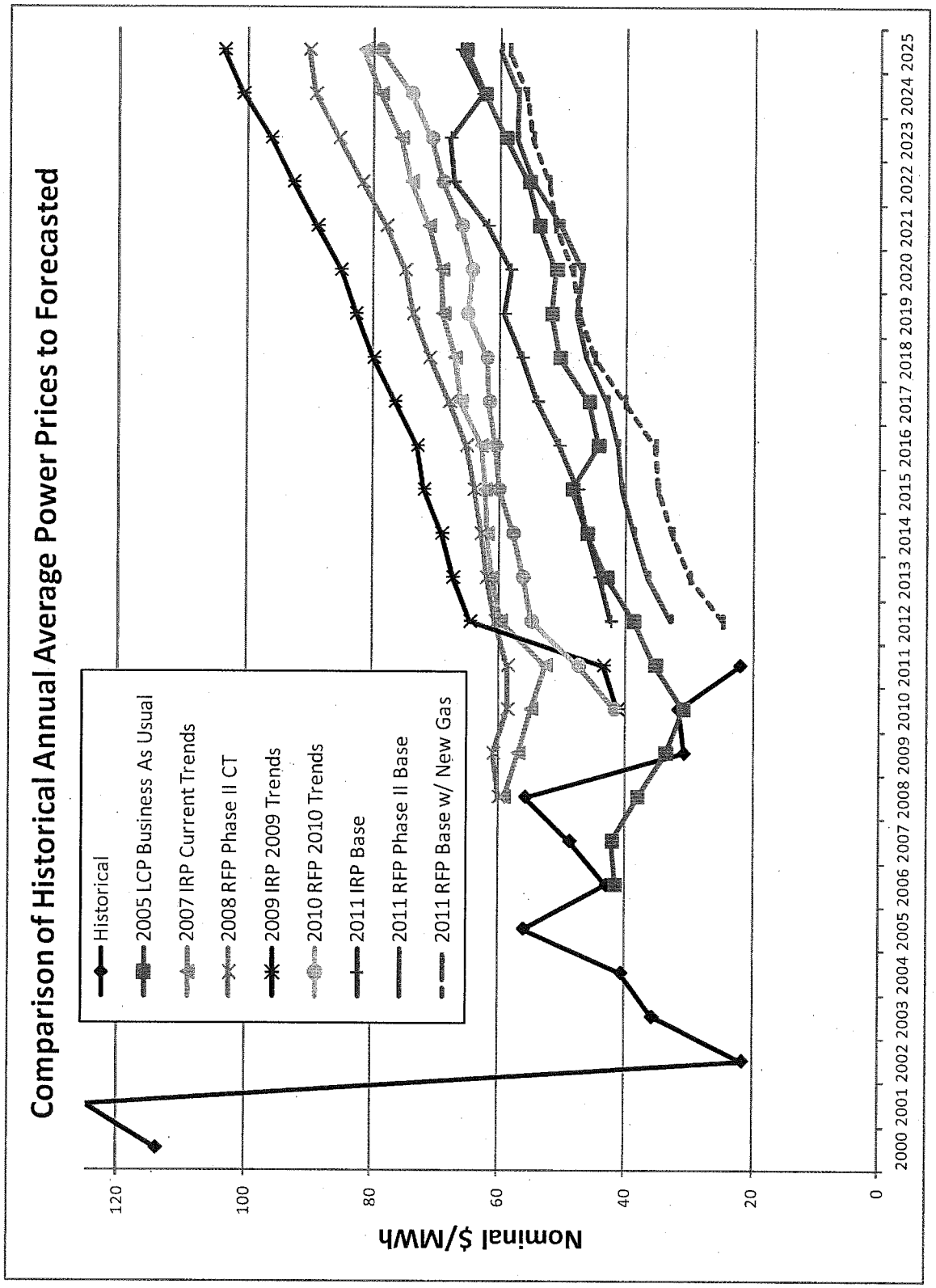

Comparison of Historical Annual Average Power Prices to Forecasted
Historical
2005 LCP Business As Usual
2007 IRP Current Trends
2008 RFP Phase II CT
2009 IRP 2009 Trends
2010 RFP 2010 Trends
2011 IRP Base
2011 RFP Phase II Base
2011 RFP Base w/ New Gas
Nominal $/MWh
120
100
80
60
40
20
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

EXHIBIT NO. ___(AS-14)
DOCKET NO. UE-13____
2013 PSE PCORC
WITNESS: ALIZA SEELIG

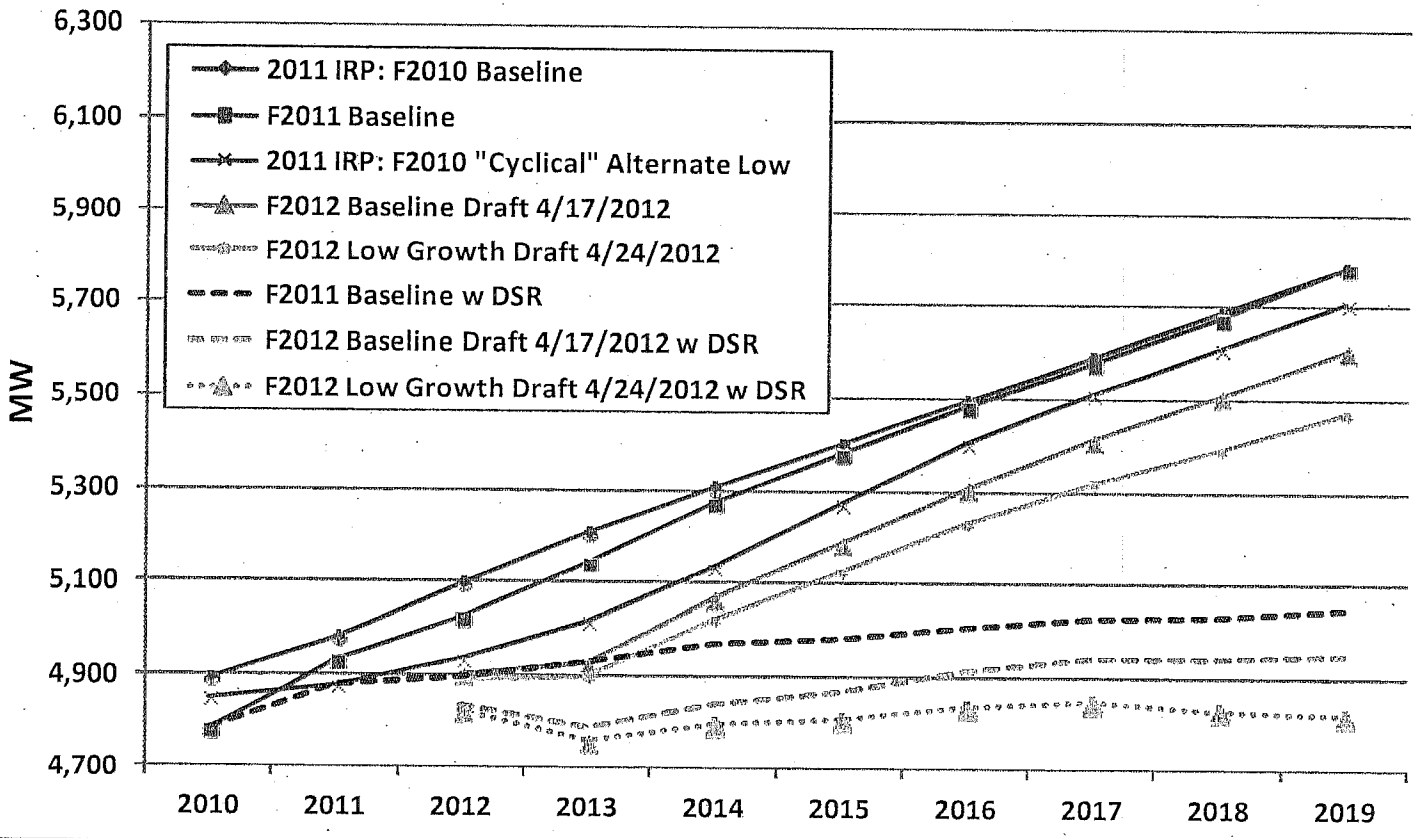
BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, Complainant, v. PUGET SOUND ENERGY, INC., Respondent.	Docket No. UE-13____

THIRTEENTH EXHIBIT (NONCONFIDENTIAL) TO THE PREFILED DIRECT TESTIMONY OF ALIZA SEELIG ON BEHALF OF PUGET SOUND ENERGY, INC.

APRIL 25, 2013

Comparison of PSE Load Forecast (2011 IRP to Current (F2012))



WUTC comments 2011 IRP acknowledgement letter: *"Due to the prolonged recession in the current economic cycle, we find the 2010-2016 period of the scenario [Low Cyclical forecast] plausible, and urge the Company to give adequate weight to this forecast as it acquires additional resources during this period of time."*

Note: F2012 baseline reflects loss of Jefferson County April 2013