EXHIBIT NO. ___(AS-4HCT)
DOCKET NOS. UE-111048/UG-111049
2011 PSE GENERAL RATE CASE
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-111048** **Docket No. UG-111049**

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

REDACTED VERSION

JANUARY 17, 2012

PUGET SOUND ENERGY, INC.

PREFILED REBUTTAL TESTIMONY (HIGHLY CONFIDENTIAL) OF ALIZA SEELIG

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PUGET SOUND ENERGY, INC.

PREFILED REBUTTAL TESTIMONY (HIGHLY CONFIDENTIAL) OF ALIZA SEELIG

I. INTRODUCTION

Q. Are you the same Aliza Seelig who provided in this proceeding prefiled direct testimony, Exhibit No. ___(AS-1HCT), on June 13, 2012, on behalf of Puget Sound Energy, Inc. ("PSE")?

A. Yes.

Q. What is the purpose of your prefiled rebuttal testimony?

A. This rebuttal testimony responds to the direct testimony of Scott Norwood, Exhibit No. SN-1HCT, witness for the Public Counsel section of the Washington State Attorney General's Office ("Public Counsel") and the Industrial Customers of Northwest Utilities ("ICNU"), with respect to the quantitative analysis supporting PSE's decision to construct Phase 1 of the Lower Snake River Wind Project ("LSR Phase 1"). Specifically, this rebuttal testimony demonstrates the following:

- PSE thoroughly and rigorously analyzed and considered the need for the cost-effectiveness of LSR Phase 1.
- Mr. Norwood's recommended LSR Phase 1 disallowance is largely based on criticisms of preliminary analyses performed in the 2009 Integrated Resource Plan ("IRP") and prior to the 2010 Request for Proposals (the "2010

RFP"). However, PSE's decision to construct LSR Phase 1 was ultimately based on the definitive analysis performed in the 2010 RFP.

- Although there were errors in PSE's 2009 and 2010 Business as Usual ("BAU") scenarios, the revised analyses did not change the resource selections or conclusions.

- PSE had a demonstrated need for renewable resources in 2016 because PSE had contractual obligations to sell the majority of the 2011-2015 renewable energy credits ("RECs").

- The 2010 RFP demonstrated that it was cost-effective to acquire LSR Phase 1 in advance of the renewable portfolio standard ("RPS") target requirements even when considering an extension of the production tax credits ("PTCs") to 2020.

- PSE used updated assumptions of CO_2 price and scenarios with CO_2 prices of zero in the 2010 RFP.

- PSE appropriately included end effects in its evaluation of resource alternatives.

- PSE's evaluation included REC purchases as an alternative to wind and biomass alternatives

As discussed below and in my prefiled direct testimony, the overwhelming majority of results from the 2010 RFP analyses projected that PSE's decision to construct LSR Phase 1 to meet its 2016 RPS need was cost-justified.

Additionally, this prefiled rebuttal testimony discusses the recent federal legislation to eliminate normalization requirements for the Section 1603 Treasury Grant which would only serve to improve the quantitative evaluations of LSR Phase which would only serve to improve the quantitative evaluations of LSR

Phase 1 presented in this rebuttal testimony and the prefiled direct testimonies of Mr. Roger Garratt and Ms. Aliza Seelig.

II. LSR PHASE 1 IS COST EFFECTIVE

Q. How do you respond to Mr. Norwood's assessment that the early addition of LSR Phase 1 was not cost-justified?

A. Mr. Norwood's analysis relies on an incomplete assessment of the long-term benefits and costs of acquiring LSR Phase 1. Mr. Norwood's analysis focuses on the short-term costs of LSR Phase 1 and fails to consider all benefits and costs of LSR Phase 1 in a complete portfolio analysis or over the life of the project. By focusing on the short-term costs, Mr. Norwood attempts to make PSE's decision to construct LSR Phase 1 appear to be a bad decision for customers.

Q. Has PSE made an assessment of the full benefits and costs of LSR Phase 1 in a complete portfolio analysis?

A. Yes. My prefiled direct testimony and workpapers presented extensive analyses that demonstrate the costs and benefits of construction of LSR Phase 1 in advance of need. In early 2010, PSE received 64 proposals containing 87 individual offers in response to the 2010 RFP. Of these, 31 proposals were for renewable resources. PSE modeled those 31 proposals through the Portfolio Screening Model and selected nine renewable proposals for further evaluation in the optimization model under five different price scenarios. In total, the workpapers

supporting my direct testimony included six DVD-ROMs containing over 1,000 files and over 8,000 megabytes of data. In addition, Exhibit No. ___(AS-3HC) provided an exhaustive summary of the processes employed by PSE to compile this voluminous data in the 2010 RFP.

PSE's optimization model compares the costs and benefits of building LSR Phase 1 in 2012 with the costs and benefits of building an alternative wind plant in 2016. In doing this analysis, PSE ran each scenario's optimization model twice: once with LSR Phase 1 with a commercial operation date in 2012 and once with a similarly sized alternative plant with a commercial operation date in 2016. For the second run of each scenario, PSE manually removed LSR Phase 1 and inserted a similarly sized alternative plant in 2016 because the optimization model originally did not choose an alternative wind plant in 2016.

Q. What were the results of this analysis?

A. Table 1 below shows that the projected net benefit to customers—for both the 2010 Trends and BAU price scenarios—of the construction of LSR Phase 1 in 2012 is approximately $190 million higher than the construction of a similarly sized alternative plant in 2016.

Table 1. LSR Phase 1 in 2012 vs. Similarly Sized Alternative Wind Plant in 2016
PV Revenue Requirement ($ in millions)

	2010 Trends	BAU (Corrected)[1]	
PV (Benefit) of Cash Grant	(227,522)	(227,522)	PSE Response PC 52
PV (Benefit) of Sales Tax Exemption	(45,737)	(45,737)	PSE Response PC 54
PV Cost / (Benefit) other Portfolio	84,827	76,252	
Net PV (Benefit)	(188,432)	(197,007)	

1- Reflects correction to market prices made to the 2010 BAU scenario

As indicated by Mr. Norwood, the average embedded cost of LSR Phase 1 in the early years is higher than market prices for power. This cost is reflected in the line labeled "PV Cost / (Benefit) Other Portfolio Costs" in Table 1 above. This cost line reflects the net balance of portfolio costs that primarily include changes in market purchases and sales, REC sales, and end effects of the portfolio.

Table 2 below presents the same analysis for each price scenario included in the 2010 RFP and is the source for the Net Present Value (PV) Benefit line in Table 1 above.

Table 2. PSM III Version 13.9.1 - Normalized Grant Benefit

	Portfolio Cost with LSR Phase 1 in 2012	Portfolio Cost with Generic Equivalent in 2016	Cost / (Benefit) of Building LSR Phase 1 Early
2010 Trends	15,234,322	15,422,754	(188,432)
BAU (Corrected Market Prices)[2]	13,009,852	13,206,859	(197,007)
Green World	19,307,673	19,600,477	(292,804)
Low Growth	11,935,049	11,867,071	67,979
Low Growth w/ Base CapEx	11,253,756	11,405,120	(151,363)
2010 Trends PTC Extended through 2020	15,129,755	15,140,753	(10,998)

1- Values shown in $000
2- Reflects correction to market prices made to the 2010 BAU scenario

As demonstrated in Table 2 above, the construction of LSR Phase 1 in 2012 is the least cost from a portfolio perspective in all but the Low Growth scenario.

III. MR. NORWOOD'S EVALUATIONS OF PSE'S ANALYSES REGARDING THE COST-EFFECTIVENESS OF EARLY WIND ADDITIONS IS FLAWED

A. PSE's Analytical Processes That Led to the Decision to Construct LSR Phase 1

Q. What conclusion does Mr. Norwood draw about PSE's analysis regarding the cost-effectiveness of adding new wind resources ahead of the RPS target requirements?

A. Mr. Norwood's testimony states that "[t]he comparative analyses of wind energy proposals received in response to PSE's 2010 RFP did not address whether adding new wind generation early was cost justified." Exhibit No. ___(SN-1CT) at page 45, lines 5-7. His testimony recommends costs adjustments for the acquisition of LSR Phase 1 based on intermediate analyses performed after the 2009 Integrated Resource Plan (the "2009 IRP") and prior to the 2010 RFP.

Q. Is this an accurate representation of PSE's 2010 RFP analysis of adding new wind generation early?

A. No. PSE's 2010 RFP evaluation included an updated analysis of the cost-effectiveness of adding early wind. In fact, the updated analysis performed during the 2010 RFP demonstrates that adding more than 600 MW of new wind

early is cost effective in four of five scenarios evaluated. Indeed, the results of the 2010 RFP analyses were consistent with analyses performed prior to the 2010 RFP, including both the 2009 IRP and the re-run of the 2009 IRP analysis.

Q. Does it make sense to make recommendations about the acquisition of LSR Phase 1 based on the re-run of the 2009 IRP analysis?

A. No. PSE evaluated and made the decision to construct LSR Phase 1 as part of its 2010 RFP renewable resources evaluation. However, Mr. Norwood appears to discount the definitive analysis performed during the 2010 RFP by focusing instead upon preliminary analyses performed during the re-run of the 2009 IRP analysis.

Q. What analyses did PSE perform leading up to the decision to construct LSR Phase 1?

A. PSE introduced the following four analyses in the Prefiled Direct Testimonies of Ms. Aliza Seelig and Mr. Roger Garratt:

1) the 2009 IRP;

2) a simple discounted cash flow ("DCF") analysis;

3) a re-run of the PSM II Model used during the 2009 IRP; and

4) the renewable resource evaluation phase of the 2010 RFP (Comparative Analysis).

Q. How did PSE use the results of each of these analyses?

A. The results of the first three analyses informed PSE's decision to include development of an LSR Phase 1 build-out as an alternative in its 2010 RFP evaluation. The results of the 2010 RFP analysis led to the decision to construct LSR Phase 1.

Q. What was the timing of each of these analyses?

A. Table 3 below provides a timeline of each of the analytic models used by PSE in the processes that resulted in the decision to construct LSR Phase 1.

Table 3. Timeline of Each of the Analytic Models Used by PSE in the Processes that Resulted in the Decision to Construct LSR Phase 1

Study	Modeling Dates
2009 IRP	**Started:** April 2008 **Completed:** July 2009 (publication of IRP)
Discounted Cash Flow	**Started:** September 2009 **Completed:** November 2009
Re-run of 2009 IRP Models	**Started:** September 2009 **Completed:** October 2009
2010 RFP Renewable Evaluation	**Started:** March 3, 2010 (RFP bids) **Completed:** June 30, 2010 (includes re-evaluations completed in April 2010 and June 2010)

Source: PSE's Response to Public Counsel Data Request No. 347

Q. Please summarize the purpose of the 2009 IRP and the conclusions drawn from this analysis.

A. PSE prepared the 2009 IRP in accordance with WAC 480-100-238. The purpose of the 2009 IRP was to assess PSE's load-resource balance over a 20-year planning horizon and to identify a generic resource plan that represents a lowest reasonable cost mix of resources to meet PSE's needs.

The 2009 IRP analysis identified a need for new capacity resources within the next three years and a lowest reasonable cost portfolio, which included early development of wind resources to take advantage of expiring federal and state tax incentives. Additionally, the 2009 IRP action plan called for PSE to continue to implement strategies of moving deeper into the development process for wind and other renewables and to remain active in exploring cost-effective opportunities for wind and other renewables as they appear during the formal RFP process. *See, e.g.,* Exhibit No. ___(RG-3) at page 258. Based on these conclusions, PSE filed the 2010 RFP.

Q. How did PSE use the DCF analysis and the re-run of the 2009 IRP analysis?

A. PSE used the DCF analysis and the re-run of the 2009 IRP analysis to compare cost-effective levels of development of the Lower Snake River Wind Project to the 2009 IRP resource plan. From the results of these models, PSE concluded that it was cost-effective to build 600 MW of wind early to take advantage of the available federal and state tax incentives. Additionally, the re-run of the 2009

IRP analysis demonstrated that it was generally better to accelerate wind development before 2016 as opposed to acquiring renewable resources just in time.

Although both analyses showed that it was cost-effective to accelerate 600 MW to capture the federal and state tax incentives, PSE did not make a recommendation to the PSE Board of Directors to construct LSR Phase 1 based on these analyses. Instead, PSE reexamined the cost-effectiveness of early wind as part of the 2010 RFP, using updated assumptions, market alternatives, and a further refined LSR Phase 1 alternative.

Q. How did the 2010 RFP inform the decision to recommend to the PSE Board of Directors the construction of LSR Phase 1?

A. The 2010 RFP, unlike the 2009 IRP, considers actual rather than theoretical projects and represents the culmination of all of PSE's analyses. The 2010 RFP includes updated assumptions, real resource alternatives, and reexamines need. It also considers whether early wind is cost-effective. The 2010 RFP concluded that LSR Phase 1 was the lowest reasonable cost and risk resource available to PSE. PSE presented the results of this analysis to the PSE Energy Management Committee ("EMC") on April 22, 2010.

Q. Did PSE continue to evaluate the recommendation to construct LSR Phase 1 after the Energy Management Committee meeting dated April 22, 2010?

A. Yes. PSE continued to evaluate the recommendation to construct LSR Phase 1 after the EMC meeting dated April 22, 2010, and prior to the recommendation to commence construction of LSR Phase 1 at the PSE Board of Directors meeting on May 5, 2011. Please see Exhibit No. ___(AS-5HC) for a copy of a summary of the results of the analyses conducted between the EMC meeting dated April 22, 2010, and the Board of Directors meeting dated May 5, 2011.

The analyses conducted between April 22, 2010, and May 5, 2011, included sensitivity analyses to examine the impact of PTC extensions to 2016 and 2020 on the decision to construct LSR Phase 1. The analyses were not completed in time for inclusion in the presentation book presented as Exhibit No. ___(RG-13HC), which was finalized for distribution to the PSE Board of Directors on April 22, 2010, but were available for discussion at the PSE Board of Directors meeting on May 5, 2010. Although PSE conducted many different analyses to understand the benefits of new wind additions, the 2010 RFP was the final evaluation on which PSE's Board of Directors based its decision to construct LSR Phase 1.

Finally, PSE again reevaluated the decision to construct LSR Phase 1 after PSE received new and revised offers of wind projects. The prices of several of these revised and unsolicited bids were lower than the projects PSE evaluated in the 2010 RFP (Exhibit No. ___(AS-1HCT) at pages 44-47). The intent of this

analysis was to confirm whether LSR Phase 1 remained the lowest reasonable cost and lowest risk renewable resource.

Q. What final conclusion did PSE draw from all of the above-described analyses?

A. PSE concluded that LSR Phase 1 was the lowest reasonable cost and risk resource available to PSE.

B. 2009 IRP Analysis and Re-Run of the 2009 IRP Analysis

1. Mr. Norwood's Discussion of the 2009 Business as Usual (BAU) Market Price Error is Overblown

Q. Did Mr. Norwood identify an error in the 2009 BAU market price scenario used in PSE's re-run of the 2009 IRP analysis?

A. Yes. In the course of responding to Public Counsel Data Request No. 345, PSE realized that Mr. Norwood had identified an error in the 2009 BAU scenario in the re-run of the 2009 IRP analysis.

Q. Please describe the error.

A. On Table 6 on page 25 of the Prefiled Direct Testimony of Aliza Seelig, Exhibit No. ___(AS-1HCT), the 2009 BAU market price scenario inadvertently reflects the costs of secondary market purchases under the assumptions used in the 2009 Trends market price scenario. The 2009 BAU market price scenario should have

reflected the costs of secondary market purchases under the assumptions used in the 2009 BAU market price scenario.

Q. Did PSE fix this error?

A. Yes. Table 4 below provides a revised version of the Table 6 on page 25 of the Prefiled Direct Testimony of Aliza Seelig, Exhibit No. ___(AS-1HCT), and reflects the costs of secondary market purchases under the assumptions used in the 2009 BAU market price scenario.

Table 4. Revised Version of the Table 6 on page 25 of the Prefiled Direct Testimony of Aliza Seelig, Exhibit No. ___(AS-1HCT), to Reflect the Costs of Secondary Market Purchases Under the Assumptions Used in the 2009 BAU Market Price Scenario

		2009 Trends Price Scenario			Revised BAU Price Scenario		
Plan No.	**Wind Build Schedule**	**NPV Portfolio Cost**	**Incremental NPV Portfolio Cost from Lowest Cost Plan**	**Rank**	**NPV Portfolio Cost**	**Incremental NPV Portfolio Cost from Lowest Cost Plan**	**Rank**
1	LSR 7-29-09 Development Plan	$19,454,371	$42,214	4	$12,599,200	$37,276	4
2	Accelerated 500 MW – then IRP	$19,453,221	$41,063	3	$12,602,568	$40,644	5
3	2009 IRP Resource Plan	$19,533,805	$121,648	7	$12,663,992	$102,068	8
4	Phase 400 MW - then IRP	$19,478,149	$65,991	5	$12,608,952	$47,028	6
5	Phase 500 MW - then IRP	$19,445,152	$32,995	2	$12,585,438	$23,514	3
6	Phase 600 MW - then IRP	$19,412,157	$0	1	$12,561,924	$0	1
7	2009 Trends	$19,479,380	$67,222	6	$12,575,914	$13,990	2
8	No Early Wind	$19,565,828	$153,670	8	$12,629,686	$67,762	7

Source: PSE's Response to Public Counsel Data Request No. 345.

Q. Did the revised BAU scenario of the re-run of the 2009 IRP analysis demonstrate that the addition of renewable energy ahead of the RPS need was cost-effective?

A. Yes. As shown in Table 4 above, the corrected BAU market price scenario continued to show that Plan No. 6, which accelerated the construction of 600 MW of renewable energy to capture the Section 1603 Treasury Grant, was the most cost-effective solution based on the need defined in the 2009 IRP. Indeed, seven of the eight build schedules presented were still more cost-effective than then No Early Wind build schedule.

2. Mr. Norwood's Evaluation of PSE's Renewable Energy Need is Flawed

Q. Is Mr. Norwood's evaluation of PSE's Renewable Energy Need accurate?

A. No. Mr. Norwood's analysis presented in Figure 4 on page 24 of Exhibit No. ___(SN-1CT) ignores that, at the time PSE's Board of Directors authorized the construction of LSR Phase 1, PSE had contractual commitments to sell most of the "surplus" RECs in the 2011–2015 period to counterparties. By failing to include PSE's REC sale obligations, Mr. Norwood has overstated the volume of RECs eligible for banking from PSE's existing resources.

Q. Was Mr. Norwood aware of the existing renewable energy sales contracts?

A. Yes. In January 2010, Mr. Norwood testified in Docket No. UE-070725, in which this Commission considered the accounting for REC sales. At that time,

Mr. Norwood recognized that PSE had estimated contract revenues "over the next six (6) years from the sale of RECs under existing contracts with California utilities and other parties." In addition, PSE provided Mr. Norwood with (i) agreements for REC sales to California utilities and (ii) projected annual volumes of REC sales in responses to data requests in this proceeding.

Q. Has PSE prepared a revision to Mr. Norwood's Figure 4 to reflect the REC sales obligations that existed as of May 5, 2010?

A. Yes. As shown in Table 5, PSE's projected renewable energy production would have been less than PSE's renewable energy needs beginning in 2016.

Table 5. PSE's Existing Renewable Resources without LSR Phase 1 vs. RPS Requirements – With REC Sales

	2009 IRP Delivered Load (GWh)	RPS Target (% of Load)	RPS Target ('000 RECs)	Annual REC Production	REC Sales	Banked RECs from Year - 1	Surplus / (Deficit)
2011	21,391	0%	0	1,322	(1,371)	0	(49)
2012	22,018	3%	661	1,326	(707)	0	(42)
2013	23,186	3%	696	1,413	(640)	0	78
2014	23,216	3%	696	1,478	(640)	78	219
2015	23,201	3%	696	1,478	(640)	219	361
2016	23,229	9%	2,091	1,482	0	361	(247)
2017	23,326	9%	2,099	1,478	0	0	(621)
2018	23,435	9%	2,109	1,478	0	0	(631)
2019	23,521	9%	2,117	1,478	0	0	(639)
2020	23,644	15%	3,547	1,482	0	0	(2,065)

Thus, Mr. Norwood is mistaken in his assertion that, without LSR Phase 1, PSE would have "approximately 4 times the amount of renewable energy required to meet its RPS target through 2015 and sufficient renewable energy to meet [PSE's]

RPS requirement until at least 2018." Exhibit No. ___(SN-1CT) at page 23, lines 9-11.

Q. Did PSE include banking provisions in its analyses?

A. PSE did not examine REC banking provisions in evaluating the timing and cost effectiveness of renewable additions in the Resource Plan to meet the minimum requirements of the RPS. As discussed above, PSE did not project significant REC surplus over the 2011-2015 period because PSE had contracted to monetize near-term surplus RECs to offset resource costs until needed for RPS compliance to provide significant benefits to customers. Therefore, PSE considered the RPS's banking provisions a hedge against wind generation uncertainty, wind curtailment policies, and load uncertainty and not as a tool to defer meeting the requirements of the state mandated RPS.

3. Mr. Norwood Incorrectly Assumes that PSE Never Considered Scenarios that Extended the Availability of PTCs After 2012

Q. Please describe Mr. Norwood's testimony with respect to PSE's assumptions regarding production tax credits ("PTCs").

A. Mr. Norwood asserts that PSE assumed "PTCs would not be available for any new wind generation projects placed in service after 2013" and that such assumption "was one of the primary factors contributing to the estimated economic benefit of adding new wind early." Exhibit No. ___(SN-1CT) at page 36, lines 4-6. Mr. Norwood further asserts, that PSE's assumption "had the

effect of creating a significant capital cost advantage for early wind generation projects, such as LSR Phase 1, when compared to wind projects that were projected to enter service after 2013." *Id.* at lines 8-10.

Mr. Norwood theorizes that PSE's assumption of PTC expiration "represents an extreme and overstated estimate of the benefits of early wind to its customers." *Id*. at page 38, lines 16-17. Mr. Norwood further theorizes that this assumption overstated the estimate of the benefits of LSR Phase 1 by approximately $228 million on a present value basis. Mr. Norwood then concludes that removal of this assumption would negate the projected economic benefit of early wind development:

> Obviously, without this very substantial assumed PTC expiration benefit, PSE's estimated economic benefit of adding new wind generation such as LSR 1 early would be entirely eliminated.

Id. at page 36, lines 13-15.

Q. Why did PSE assume, for much of its analyses, that PTCs would not be available for projects placed in service after December 31, 2012?

A. PSE assumed, for purposes of analyses, that PTCs would not be available for projects placed in service after December 31, 2012, because the legislation that provides for wind PTCs does not extend to projects placed in service after December 31, 2012. See Exhibit No. ___(SN-1CT) at page 37, lines 9-10 (acknowledging that "existing laws provided for wind PTCs to be effective for projects placed in service no later than December 31, 2012"). For purposes of

much of its analysis, PSE assumed that PTCs would expire, as provided for in statute, unless extended through legislation. To date, no legislation has extended the date applicable to wind PTCs.

Q. Did PSE evaluate the possible extension of PTCs beyond 2012?

A. Yes. PSE conducted sensitivity analyses that considered the possibility that legislation would extend PTCs through 2016 and through 2020.

Q. Please explain the sensitivity analyses conducted by PSE that evaluated the possible extension of PTCs beyond 2012.

A. PSE—in the 2010 Trends scenario—evaluated two possible extensions of the PTC (approximated the value as a Treasury Grant):

(i) to projects that came on-line as of January 1, 2016, and

(ii) to projects that came on-line as of January 1, 2020.

For this analysis, PSE used its optimization model PSM III model version 13.9.1.

Q. Were the results of these sensitivity analyses available at the time the Board of Directors made its decision to authorize construction of LSR Phase 1?

A. Yes. PSE completed these sensitivity analyses in late April 2010, just prior to the presentation to the Board of Directors on May 5, 2011. The analyses, however, were not included in the presentation book presented as Exhibit No. ___(RG-13HC) because PSE posted the book for the Board of Directors on April 22, 2010

before the analyses were complete. PSE did prepare an additional report entitled "Addendum to Exhibit M", which was available for discussion at the Board of Directors meeting of May 5, 2010. Please see Exhibit No. ___(AS-5HC) for a copy of the report entitled "Addendum to Exhibit M," which summarizes the results of these sensitivity analyses.

Q. Did PSE make the results of these sensitivity analyses available to parties to this proceeding?

A. Yes. PSE made the results of these sensitivity analyses available to all parties. PSE provided the work papers for the PSM 13.9.1 model runs on Disc 4 of the work papers supporting the Prefiled Direct Testimony of Aliza Seelig. PSE also provided an electronic copy of "Addendum to Exhibit M" in the same work papers.

Q. Did the results of these sensitivity analyses alter the recommendation to the Board of Directors that PSE commence construction of LSR Phase 1?

A. No. The results of these sensitivity analyses did not alter the recommendation to the Board of Directors that PSE commence construction of LSR Phase 1. Indeed, these results confirmed PSE's recommendation, and the optimization model selected both LSR Phase 1 *and* the [redacted], even assuming extension of the PTCs. Table 6 below presents the results of these sensitivity analyses.

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Table 6. Sensitivity Analyses
Assuming Extension of Federal Incentives

PSM III 13.9			
Proposed Wind Projects	**Trends 2010**	**Trends 2010 (ITC 2016)**	**Trends 2010 (ITC 2020)**
LSRWP Phase 1	**X**	**X**	**X**
[redacted]	**X**	**X**	**X**
[redacted]			
[redacted]	**X**		
[redacted]	**X**		
RECs from Wind Acquisition	2,062,531	1,423,402	1,423,402
Equivalent MW Wind 30% CF	785	542	542

In short, these sensitivity analyses concluded that LSR Phase 1 and the [redacted] were less costly than other alternatives and less costly than generic wind projects built just in time to meet the RPS standard (9% of load in 2016 and 15% of load in 2020).

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4. Mr. Norwood's Focus on the CO_2 Price Forecasts in the 2009 Trends Scenario in the 2009 IRP and Pre-RFP Analyses Fails to Acknowledge the Fact that PSE Updated CO_2 Price Forecasts and Reevaluated Need in the 2010 RFP

Q. Please describe Mr. Norwood's concerns regarding PSE's carbon price forecast.

A. Mr. Norwood expresses concern that "the forecast carbon prices used for PSE's 2009 Trends scenario were two to three times higher than any other carbon forecast [PSE] has used for resource planning analyses in recent years." Exhibit No. ___(SN-1HCT) at page 39, lines 20-22. Mr. Norwood continues to express concern that the "extraordinarily high level of the 2009 Trends carbon price forecast had the effect of increasing market prices used for this scenario by

approximately 50 percent ($20/MWh)." *Id*. at page 39, lines 3-5 (citing to PSE's Response to Public Counsel Data Request No. 315).

Mr. Norwood admits that PSE "used the more recent carbon price forecast based on EPA's October 2009 analysis . . ." in the 2010 RFP. Exhibit No. ___(SN-1HCT) at page 40. However, Mr. Norwood continues to focus on the CO_2 price forecasts in the 2009 Trends Scenario in the re-run of the 2009 IRP analysis.

The 2010 RFP was the *definitive* process in which PSE finalized its need assessment, confirmed the cost effectiveness of early wind and determined that LSR Phase 1 was the lowest reasonable cost resource to meet this need.

Q. Did PSE's 2009 IRP analyses consider only one set of CO_2 prices?

A. No. PSE used a range of CO_2 price estimates in the 2009 IRP to capture the uncertainty regarding legislation and such prices. This range includes estimated low, moderate, and high CO_2 prices:

- For low CO_2 prices in the 2009 IRP, PSE based prices on existing Washington law, RCW 80.70, that applies to new fossil fuel fired thermal generation built within the state. For modeling purposes, PSE made a reasonable simplification that compliance requires payment of $1.60 per ton of CO_2 to cover 20% of emissions, or $0.32 per ton. PSE applied this $0.32 per ton to CO_2 emissions for the entire WECC. For the 2009 IRP, PSE modeled low CO_2 prices in the Low Growth and 2009 BAU scenarios.

- For moderate CO_2 cost in the 2009 IRP, PSE assumed a cap and trade regulatory scheme and used the CO_2 prices from the 2008 ADAGE model published by the U.S. Environmental Protection Agency ("EPA"). PSE then used

these prices were to develop estimated prices that ranged from $37 per ton in 2012 to $130 per ton in 2029. In this environment, CO_2 prices are reflected in gas prices and power prices. PSE modeled moderate CO_2 prices in 2007 Trends, 2009 Trends, and High Growth scenarios.

- For high CO_2 prices in the 2009 IRP, PSE used a cap and trade regulatory scheme and Wood Mackenzie's "Carbon Casebook 2." PSE used these prices to develop estimated prices that ranged from $55 per ton in 2012 to $150 per ton in 2029. In this regulatory environment, CO_2 prices are reflected in gas prices and power prices. PSE modeled high CO_2 prices in Green World.

See also Exhibit No. ___(RG-3) at pages 49-50. Mr. Norwood focuses exclusively on the 2009 Trends scenario, which relied on the moderate CO_2 price forecast used within the range and fails to acknowledge either the low CO_2 price forecast used by PSE in the Low Growth and 2009 BAU scenarios or the high CO_2 price forecast used by PSE in the Green World Scenario.

Q. Were the CO_2 price forecasts used in the 2009 Trends Scenario for the 2009 IRP reasonable?

A. Yes. The CO_2 price forecasts used in the 2009 Trends Scenario for the 2009 IRP reasonably reflected the then-current political climate for carbon regulation. Emissions costs, other than the capital and operating costs of certain pollution control equipment, are not a significant energy price factor today. At the time of the development of the 2009 Trends Scenario, however, PSE was expecting new regulations for greenhouse gases by 2012. *See* Exhibit No. ___(RG-3) at page 49.

PSE's expectations regarding the likelihood of greenhouse gas regulations were reasonable for the period in question.

Various federal legislative efforts were targeting climate change issues. President Obama was elected in November 2008, and his campaign platform featured the "New Energy for America" plan that called for the implementation of a cap-and-trade program to reduce greenhouse gas emissions eighty percent by 2050. In June 2009, the U.S. House of Representatives approved the American Clean Energy and Security Act of 2009 (also known as the Waxman-Markey Bill), which would have set a cap on total emissions over the 2012-2050 period to reduce greenhouse gas emissions eighty-three percent by 2050. In May 2010, the American Power Act (also known as the Kerry-Lieberman Bill) was introduced to the U.S. Senate and which would have also set a cap on total emissions over the 2012-2050 period to reduce greenhouse gas emissions eighty-three percent by 2050. In 2009, it appeared likely that some form of greenhouse gas legislation would become law.

The momentum for greenhouse gas regulation has since dissipated. In July 2010, the U.S. Senate announced that it would not consider greenhouse gas legislation before the end of the legislative term. Against this earlier backdrop, however, PSE reasonably believed that a regional or national cap and trade system was a reasonable measure and proxy for assumptions concerning future greenhouse gas regulation.

Q. If the CO_2 price forecasts used in the 2009 IRP represented a reasonable range of such prices given the then-current political climate for carbon regulation, what is the basis for Mr. Norwood's criticisms of the use of such forecasts?

A. Mr. Norwood argues that, in conducting the re-run of the 2009 IRP analysis, PSE improperly continued to rely on the 2009 Trends scenario, which contained CO_2 price forecasts from the 2008 ADAGE model published by the EPA, when CO_2 price forecasts from the 2009 ADAGE model published by the EPA were allegedly available:

> Notwithstanding the availability of the new 2009 EPA analysis, PSE continued to use the older forecast with its higher carbon costs for its Re-run of the 2009 IRP analysis of early wind additions.

Exhibit No. ___(SN-1HCT) at page 40, lines 11-14. Mr. Norwood suggests that PSE's continued use of the 2009 Trend scenario biased the re-run of the 2009 IRP analysis in favor of early wind additions and should have instead relied on the CO_2 price forecast published by the U.S. Environmental Protection Agency in 2009:

> PSE's use of the outdated carbon forecast for the "2009 Trends" scenario resulted in the unreasonable and significant overstatement of benefits of early wind additions. As it did for the 2010 RFP process, [PSE] should have used the more recent carbon price forecast based on EPA's October 2009 analysis, as the basis for evaluating the cost effectiveness of early wind additions.

Id. at page 40, line 18, through page 41, line 2.

Q. In conducting the re-run of the 2009 IRP analysis, could PSE have relied on the CO_2 price forecast published by the EPA in 2009?

A. No. PSE could not have realistically relied on the CO_2 price forecast published by the EPA in 2009 in conducting the re-run of the 2009 IRP analysis. PSE began the re-run of the 2009 IRP analysis in September 2009 and completed the analysis in October 2009. In other words, the commencement of the re-run of the 2009 IRP analysis predated, and the conclusion of such analysis was concurrent with, the CO_2 price forecast published by the EPA in October 2009. Any suggestion that PSE could have relied on data not yet published is unreasonable.

Q. Was Mr. Norwood aware of the relationship between the period in which PSE conducted the re-run of the 2009 IRP analysis and the timing of the release of the CO_2 price forecast update by the U.S. EPA in October 2009?

A. Yes. In PSE's Response to Public Counsel Data Request No. 347, PSE informed Mr. Norwood that PSE started the re-run of the 2009 IRP analysis in September 2009 and completed such analysis in October 2009.

Q. What CO_2 prices did PSE consider in the 2010 RFP?

A. For the 2010 RFP, PSE also used a range of estimates based on low, moderate, and high CO_2 prices.

- For low CO_2 prices in the 2010 RFP, PSE again based prices on RCW 80.70. For the 2010 RFP, PSE modeled low CO_2 prices in the 2010 BAU scenario, 2010 Low Growth Scenario, and 2010 LG w/ Base Capex.

- For moderate (or base) CO_2 prices in the 2010 RFP, PSE again based prices on projections derived from the requirements of the then-pending American Clean Energy and Security Act of 2009. For the 2010 RFP, PSE modeled moderate (or base) CO_2 prices in the 2010 Trends scenario.

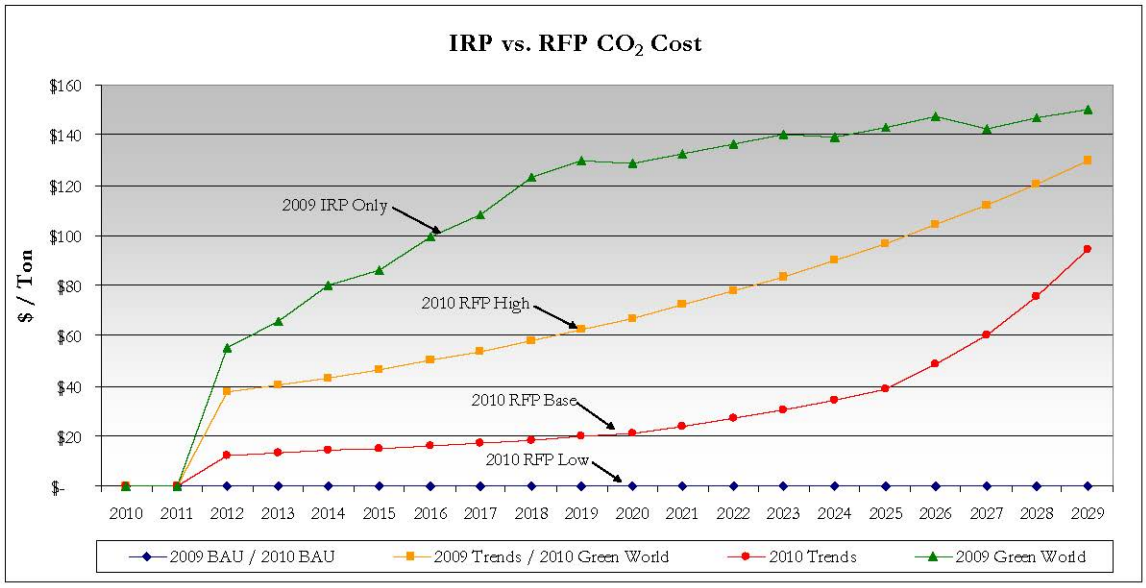
- For high CO_2 prices in the 2010 RFP, PSE used CO_2 prices from the 2008 ADAGE model published by the U.S. Environmental Protection Agency, which served as the basis of the moderate CO_2 prices in the 2009 IRP. For the 2010 RFP, PSE modeled high CO_2 prices in the 2010 Green World scenario.

- PSE did not use CO_2 prices from Wood Mackenzie's "Carbon Casebook 2," which served as the basis for the high CO_2 prices for the 2009 IRP.

See also Exhibit No. ___(AS-3HC) at page 165.

Q. Has PSE prepared a comparison of the various CO_2 prices used by PSE in each of the 2009 IRP and the 2010 RFP scenarios?

A. Yes. The following charts provide a comparison of the various CO_2 prices used by PSE in each of the 2009 IRP and the 2010 RFP scenarios:



CO_2 Forecast	Forecast Source	2010 RFP Scenario	2009 IRP Scenario
Low	RCW 80.70	2010 BAU	2009 BAU
Base	Kerry-Lieberman "American Power Act"	2010 Trends	N / A
High	EPA's analysis of cap-and-trade from the ADAGE model	2010 GW	2009 Trends
2009 IRP High	Wood Mackenzie	Not Used	2009 GW

See also Exhibit No. ___(AS-3HC) at page 165. As shown in the above graphs, the high CO_2 prices modeled in the 2010 RFP were equivalent to the moderate prices in the 2009 IRP, and the moderate CO_2 prices modeled in the 2010 RFP were between the low and moderate prices in the 2009 IRP.

Q. Does Mr. Norwood know that PSE updated its range of CO_2 price forecasts for its 2010 RFP?

A. Yes. Mr. Norwood acknowledges that PSE used the carbon price forecast issued by the EPA in 2009 for PSE's 2010 RFP, and he also acknowledges that PSE

updated such price forecasts to reflect the change in political climate with respect to greenhouse gas legislation and regulation:

> The much lower carbon price forecast used by PSE to evaluate wind energy proposals received in response to its 2010 RFP was based on a newer EPA analysis of carbon legislation published in October of 2009. PSE indicates that it used this updated carbon price forecast "because it was lower than the 2009 Integrated Resource Plan's (IRP) base carbon price forecast and more reflective of the then-current political climate for carbon regulation.

Exhibit No. ___(SN-1HCT) at page 40, lines 5-11 (quoting PSE's Response to Public Counsel Data Request No. 192). Despite these acknowledgments, Mr. Norwood fails to acknowledge that PSE's decision to construct LSR Phase 1 rests on updated need and cost analyses from the 2010 RFP. This RFP used the lower CO_2 price forecasts that Mr. Norwood states are preferable for this analysis, as well as a \$0/ton CO_2 for three scenarios. The results of the 2010 RFP analysis demonstrate that carbon price is not a key factor in the cost-effectiveness of early wind.

In short, the Commission should ignore his criticisms of PSE's use of the higher CO_2 price forecasts in the re-run of the 2009 IRP analysis because the analyses conducted by PSE in the 2010 RFP superseded the re-run of the 2009 IRP analysis and relied on the lower CO_2 price forecasts issued by the EPA in 2009.

5. PSE's End Effects are Thorough and PSE Has Used the Same End Effects Adjustment in Each of Its Last Several Requests for Proposals

Q. Please describe Mr. Norwood's concerns regarding PSE's calculations of end effects for its analysis of the cost effectiveness of early wind additions.

A. Mr. Norwood expresses two concerns with respect to PSE's end effects calculations. The first concern is an allegation that PSE "improperly assumed that wind resources which retired after the 20-year planning period would not be replaced." Exhibit No. ___(SN-1HCT) at page 41, lines 21-22.

The second concern is that PSE's "end effects calculations are inherently uncertain due to the fact that they involve forecasts of market prices, generating unit performance and generation for a period that is 20 to 50 years into the future." Exhibit No. ___(SN-1HCT) at page 42, lines 10-12.

These concerns appear to be contradictory. Mr. Norwood seems to suggest, that beyond the 20-year planning horizon, PSE should assume an uncertain replacement cost, but ignore portfolio benefits and operating costs that arise from generation plants' operation performance in the power market.

Q. Why are end effects calculations necessary?

A. End effects calculations are necessary because proposed resources may have book lives or contract terms that extend beyond PSE's 20-year planning horizon. For example, a generic wind resource with a book life of 25 years could be added in

the 15th year of PSE's planning model, which means the majority of that facility will be evaluated within the end effects portion of PSE's financial models. It would be imprudent for PSE to evaluate only the first 5 years of the added facility's costs and benefits and ignore the remaining 20 years that it will provide service to customers.

Q. Please explain PSE's end effects calculation.

A. At a high level, PSE's end effects calculation compiles the projected revenues and operating costs for each generation plant with a book life extending beyond the 20-year planning horizon. The calculation then compares this portfolio benefit with rate base cost remaining in year 20. PSE has utilized this end effects methodology in evaluating resources submitted in each of its last several requests for proposals.

Q. What are the details of this methodology?

A. End effects represent the cost of a resource when its life extends beyond PSE's 20-year planning horizon. In the 2009 IRP, the re-run of the 2009 IRP analysis, and the 2010 RFP analysis, end effects are calculated as the difference in the remaining book cost at the end of the 20-year planning horizon and positive cash flows. Cash flow is the difference in operating expenses and market revenues.

In the analysis, to deal with the planning horizon in year 21 and beyond, PSE uses the following methodology:

- **Step 1.** Forecast the cash flows (100% equity basis) from the assets for years 21 to 50.

- **Step 2.** Calculate the net present value of cash flows to year 20 at a weighted-average cost of capital.

- **Step 3.** Compare the net present value of cash flows at year 20 to the remaining book value at year 20.

    - If the net present value of cash flows at year 20 is positive, net the value of cash flows from the remaining book value and calculate the net present value of the result to year 1 at a weighted average cost of capital.

    - If the net present value of cash flows at year 20 is negative, calculate the net present value of such remaining book value to year 1 at a weighted average cost of capital.

- **Step 4.** Add the calculated year 1 value to the total 20-year net present value incremental portfolio cost (revenue requirement).

PSE estimates the cash flow by taking the projected market revenue and subtracting variable operating costs, fixed operating costs, property tax, insurance cost, interest cost and an estimate of current Federal taxes.

Q. How does PSE respond to Mr. Norwood's first concern that resources would not be replaced after the 20-year planning horizon?

A. Mr. Norwood asserts that "[b]y failing to replace units that retire during the end effects evaluation period, PSE's end effects calculation has improperly created a mismatch in the level of wind resources during the end effects period." Exhibit No. ___(SN-1HCT) at page 42, lines 2-5. Replacing resources after the end of a

planning horizon is an alternative way to handle end effects. The replacement methodology often uses multiple replacements to minimize the present value effect of having resources retire on different dates, creating a mismatch in the level of resources. The replacement methodology, however, does not solve the mismatch in the level of wind resources during the end effects period when comparing alternative portfolios.

As an alternative to the replacement cost methodology, PSE's end effect calculation, as described above, is thorough and treats all portfolios consistently. PSE's end effects calculation includes all the costs of resources assumed during the 20-year planning horizon, the remaining rate base cost at the end of the planning horizon, and any portfolio benefit from the book life beyond the planning horizon.

In addition, Mr. Norwood argues that "[t]his mismatch results in a higher end effects cost for the "No Early Wind" scenarios which add wind resources later, while at the same time understating end effects costs for the early wind addition scenarios whose units are retired earlier during the end effects period." Exhibit No. ___(SN-1HCT) at page 42, lines 5-8. Mr. Norwood fails to recognize that since resources are added later in the "No Early Wind" build schedule, the resources will also retire later than other build schedules. If PSE were to use the replacement cost methodology, then the No Early Wind build schedule would also have additional end effect costs. To suggest that PSE "improperly" used its

end effects analysis to create some sort of bias in favor of the accelerated addition of wind projects is unfounded.

Q. How does PSE respond to Mr. Norwood's second concern that end effects that rely on forecasts of generating unit performance and market prices are inherently uncertain?

A. Mr. Norwood's second concern suggests that "end effects calculations are inherently uncertain due to the fact that they involve forecasts of market prices, generating unit performance and generation for a period that is 20 to 50 years into the future." Exhibit No.__(SN-1HCT) at page 42, lines 10-12. PSE agrees that forecasts are uncertain; however, Mr. Norwood's implied suggestion to use replacement costs is also subject to this uncertainty. Moreover, a new plant may not be necessary because the existing plant may be refurbished, repowered, or continue to run with scheduled maintenance.

PSE's analytic team uses an end effects calculation that is thorough and consistent across portfolios in an effort to be fair and reasonable in evaluating its investment decisions. Recognizing that PSE does not know future market prices, PSE uses multiple market price scenarios. Additionally, PSE consistently treats the generating unit performance for all resources to eliminate bias.

Q. Does Mr. Norwood propose an alternative analysis with respect to the calculation of end effects in considering the cost effectiveness of early wind additions?

A. No, Mr. Norwood does not propose an alternative end effects calculation. Rather he shows an analysis that essentially removes PSE's calculation of end effects.

Q. Please explain.

A. Mr. Norwood presents an analysis in Exhibit No. ___(SN-11C) This analysis contains the following analytical errors.

First, the adjustment in Exhibit No. ___(SN-11C) essentially eliminates end effects by making end effects the same in a scenario for each build plan. This Commission has consistently considered end effects to be a necessary adjustment to consider for resource acquisitions. *See, e.g., Wash. Utils. & Transportation Comm'n v. Puget Sound Energy, Inc.*, Docket No. UE-031725, Order No. 12 at ¶ 20 (2004) ("The utility must analyze the resource alternatives using current information that adjusts for such factors as end effects . . . at the time of a purchase decision."). More fundamentally, Mr. Norwood's adjustment ignores the costs or benefits of any project with a life that is projected to extend beyond PSE's 20-year planning horizon. In particular, eliminating the end effects removes the value of market revenues that are an important benefit of wind projects because of their low variable costs.

Further, the analysis presented in Exhibit No. ___(SN-11C) focuses exclusively on the re-run of the 2009 IRP analysis. As discussed above, the re-run of the 2009 IRP analysis was not the final contemporaneous evaluation that PSE used in its decision to construct LSR Phase 1. By focusing exclusively on the re-run of the 2009 IRP analysis, Mr. Norwood fails to consider either the economics of LSR Phase 1 or the updated assumptions used by PSE in the 2010 RFP analyses.

6. Mr. Norwood Incorrectly Assumes that PSE Never Considered Unbundled REC Purchase Alternatives in Its 2010 RFP

Q. Please explain Mr. Norwood's allegations with respect to PSE's consideration of REC purchases as an alternative in evaluating the cost-effectiveness of adding renewable resources early.

A. Mr. Norwood alleges that "PSE's economic analysis did not evaluate REC purchases as an alternative to the acquisition of new wind generation facilities as a means to supply a portion of [PSE's] RPS requirements." Exhibit No. ___(SN-1HCT) at page 43, lines 4-6. He further alleges that PSE biased its analyses in favor of the early addition of renewable resources by not evaluating a scenario with REC purchases only:

> The failure to consider the option of purchasing RECs, which the Company forecasts would cost approximately $8/MWh, greatly overstated the cost of RPS compliance in the "No Early Wind" scenario. This, in turn, overstated the estimated benefits of acquiring new wind energy projects, such as LSR 1, early by approximately [redacted].

Id. at page 43, lines 10-15.

REDACTED VERSION

Q. Did PSE evaluate REC purchases as an alternative to the acquisition of new wind generation facilities as a means to supply a portion of PSE's RPS requirements?

A. Yes. Contrary to the allegations of Mr. Norwood, PSE evaluated REC purchases as an alternative to the acquisition of new wind generation facilities as a means to supply a portion of PSE's RPS requirements. As described in PSE's Response to Public Counsel Data Request No. 293, PSE's 2010 RFP called for submissions of proposals of unbundled RECs, and PSE received two proposals containing a total of six offers for unbundled RECs, as shown in Table 7 below.

Table 7. Proposals for Unbundled RECs Received and Evaluated in Response to PSE's 2010 RFP

Project name	Respondent	Location	Brief offer summary	Status	Term
[redacted] (#10053, a-d)	[redacted]	[redacted]	• [redacted] • [redacted] • [redacted] • [redacted]	[redacted]	[redacted]
[redacted] (#10059-a)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted] (#10059-b)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

REDACTED VERSION

PSE evaluated these unbundled REC proposals the same as it evaluated any other renewable energy proposal in the 2010 RFP. However, PSE did not receive a sufficient volume of proposed RECs to evaluate a REC-only purchase scenario. Therefore, any suggestion that PSE's economic analyses failed to evaluate REC purchases is false.

Q. Please describe the unbundled REC proposals considered by PSE in the 2010 RFP.

A. As stated above, PSE received two unbundled REC proposals containing a total of six offers for unbundled RECs. The first proposal was by [redacted] for the [redacted] (#10059). [redacted]

[redacted]

The second proposal was from [redacted]

[redacted].

The total volume offered over the next 20 years was 2,224,350 RECs, and the maximum volume offered in any one year was 148,825 RECs. *See* Exhibit No. ___(AS-3HC) at page 18. Even when combined, the unbundled REC

REDACTED VERSION

proposals simply did not provide a sufficient amount of RECs to offset the need to acquire another resource.

Q. How did the unbundled REC proposals fare in PSE's 2010 RFP analyses?

A. Table 8 below presents the Quantitative Screening Model results for the unbundled REC proposals from the 2010 RFP.

Table 8. Quantitative Screening Model Results for Unbundled REC Offers

Project	Project ID	Benefit Ratio	Portfolio Benefit (Cost) $000	Levelized $/MWh
[redacted]	10059-b	2.26	14,244	N/A
[redacted]	10059-a	(0.46)	(1,789)	N/A
[redacted]	10053-b	(1.73)	(2,687)	N/A
[redacted]	10053-c	(1.78)	(5,154)	N/A
[redacted]	10053-a	(4.03)	(12,408)	N/A

See also Exhibit No. ___(AS-3HC) at page 37. As demonstrated in Table 8 above, Quantitative Screening Model projected that only the [redacted] (#10059-b) proposal, 61,225 RECs per year, would provide benefits to PSE. Although the [redacted] (#10059-b) evaluated highly in the initial screening, the Optimization Model selected this proposal only once in five scenarios.

REDACTED VERSION

In short, PSE's analyses did consider unbundled REC proposals. Moreover, the unbundled REC proposals simply did not provide a sufficient amount of RECs to offset the need to acquire another resource.

Q. Is the characterization of PSE's REC price forecast cited in Mr. Norwood's allegation that PSE overestimated the benefits of acquiring new wind energy projects accurate?

A. No. Mr. Norwood incorrectly alleges that PSE forecasts a REC purchase price of approximately $8/MWh, Exhibit No. ___(SN-1HCT) at page 43, lines 10-15:

> The failure to consider the option of purchasing RECs, which the Company forecasts would cost approximately $8/MWh, greatly overstated the cost of RPS compliance in the "No Early Wind" scenario. This, in turn, overstated the estimated benefits of acquiring new wind energy projects, such as LSR 1, early by approximately [redacted].

This is an incorrect interpretation of PSE's REC price assumption. At the time of the 2010 RFP, PSE used an $8/REC proxy price in its modeling as a conservative assumption of the price at which surplus RECs could be monetized in a voluntary market—and not a price RECs could be purchased for in a compliance market when competition to acquire RECs to meet RPS mandates may be more intense. The $8/REC forecast was derived from voluntary market prices, and at the time was significantly lower than either Washington or California compliance market prices. This conservative assumption was appropriately selected by PSE to avoid a bias to build new renewable resources early to capture potentially inflated prices.

REDACTED VERSION

It should be noted that *all* of the unbundled REC offers submitted in response to the 2010 RFP were priced higher than $8/REC.

C. DCF Analyses

Q. Please describe Mr. Norwood's assertions with respect to the Discounted Cash Flow ("DCF") analysis.

A. Mr. Norwood asserts "[t]he DCF analysis did not evaluate any "No Early Wind" scenario." He further asserts that the DCF only considered the difference in capital costs between the alternative wind resource plans. *See* Exhibit No. ___(SN-1HCT) at page 43, line 17, through page 44, line 9.

Q. Should PSE have looked at the "No Early Wind" scenario with the DCF model?

A. Not necessarily. The DCF model is just one of several models used to test the assumptions of the 2009 IRP. Consistent with the 2009 IRP, those models indicated that it was cost-effective to build wind early. Specifically the DCF model is helpful in estimating the optimal size of a wind project in 2012 to take advantage of the Section 1603 Treasury Grant and Washington State sales tax exemption to meet the RPS need. The DCF model was just one of the quantitative inputs used to size LSR as explained in the May 2010 Board Presentation. *See, e.g.,* Exhibit No. ___(RG-13HC) at pages 172-185. The results of this analysis generally showed that more wind earlier is lower cost. More

importantly, it showed that PSE should consider wind proposals in the 2010 RFP to meet this 2012 deadline.

Q. Is Mr. Norwood correct in asserting that the DCF model did not consider a "No Early Wind" scenario?

A. No. PSE provided to Mr. Norwood the location of the workpaper files that contained a DCF analysis with 400 MW of wind in 2016 and 600 MW of wind in 2020. The initial DCF analyses in October and November 2009 did not consider a "No Early Wind" scenario. However, PSE staff updated the DCF model in January 2010 and that model did estimate DCF costs for a "No Early Wind" scenario.

Q. What were the results of the updated DCF model that considered a "No Early Wind" scenario?

A. As demonstrated in Table 9 below, the updated DCF model that considered a "No Early Wind" scenario projected that the lowest cost wind development was about 800 MW by the end of 2012. This result is similar to the results produced by the DCF model analyses conducted in October and November 2009 that showed the lowest cost wind development was about 600 MW by the end of 2012 and the second lowest cost wind development was about 800 MW by the end of 2012.

Table 9. Quantitative Screening Model Results for Unbundled REC Offers ($ in Thousands)

	No Future PTC Extension	Scenario cost versus best	Rank
1	Only 250MW Incentive then IRP	$162,500	9
2	Accelerated 500 Development, then IRP	$108,741	7
3	IRP Development Plan	$151,122	8
4	Phase 400 MW Development - then IRP	$84,920	4
5	Phase 500 in 2 yrs - then IRP	$54,432	3
6	Phase 600 MW Development - then IRP	$23,944	2
7	Phase 800 MW Development - then IRP	$0	1
8	Test 340MW in by 2012 then IRP	$103,213	6
9	No Early Wind, 400 MW in '16, 600 MW '20	$103,076	5

Table 9 above indicates that PSE could select up to 800 MW of wind by 2012 to take advantage of federal and state tax incentives.

Q. Please explain Scenarios 8 and 9 in Table 9.

A. Scenario 9 (No Early Wind with 400 MW in 2016 and 600 MW in 2020) is about $103 million more costly than building 800 MW by 2012. Similarly, Scenario 8 with 340 MW, about the size of LSR, is also about $103 million more costly than building 800 MW by 2012.

Q. What costs are included in the DCF model?

A. As initially explained on page 21 of the Prefiled Direct Testimony of Aliza Seelig, Exhibit No. ___(AS-1HCT), the Discounted Cash Flow Analysis considered capital cost, the Section 1603 Treasury Grant, and REC sales. The updated DCF model also included an estimate of the market value benefit of wind energy relative to the incremental operating cost and transmission of wind projects.

Q. Does Table 9 indicate that PSE customers would be indifferent between No Early Wind and a wind project of 340 MW?

A. No. The DCF model is only an indicator of costs for several reasons. First, the DCF does not include total portfolio costs and benefits of wind projects such as the wind shape and impacts on power costs. Second, it does not include end effects. Finally, the DCF model does not include any risk assessment such as cost uncertainty of future capital costs or market prices. The DCF analysis, however, did suggest that PSE should consider wind proposals in the 2010 RFP to capture the federal and state tax incentives.

Q. Can the DCF model suggest anything about whether the decision to construct LSR Phase 1 was cost-justified?

A. No. As stated above, the decision to construct LSR Phase 1 rests, in part, on the screening analysis and the multiple scenarios run with the optimization model in the 2010 RFP. PSE did not intend that the DCF analysis would be used alone to demonstrate that early acquisition of LSR Phase 1 was cost-justified.

D. PSE's 2010 RFP Analyses Considered Scenarios of No New Wind Additions Until 2016 or Later

Q. Please describe Mr. Norwood's concern with respect to the analyses of the cost-effectiveness of early wind additions in the 2010 RFP.

A. Mr. Norwood's testimony states that PSE's 2010 RFP analyses failed to address the cost-effectiveness of early wind additions:

> The comparative analyses of wind energy proposals received in response to PSE's 2010 RFP did not address whether adding new wind generation early was cost justified. These analyses simply compared the costs of LSR [Phase 1] and other wind energy proposals, all of which were anticipated to begin service in 2012. The analyses did not examine whether such proposals were cost-justified when compared to an alternative of not adding new wind generation until needed to meet PSE's RPS requirements.

Exhibit No. ___(SN-1HCT) at page 45, lines 5-11.

Q. Does Mr. Norwood correctly describe PSE's 2010 RFP analyses?

A. No. PSE's 2010 RFP analyses considered no new wind additions until 2016 or later in each of the five scenarios analyzed. PSE apprised Mr. Norwood of this fact in PSE's Response to Public Counsel Data Request No. 197, which stated as follows:

> Yes, the comparative analysis referenced in Public Council Data Request No. 038 considered "no new wind additions until 2016 or later" in each of the five future scenarios. The optimization model, Portfolio Screening Model III ("PSM III"), selected the renewable resources presented in the referenced comparative analysis. Using the Front Line Systems, Inc. Risk Solver Platform optimization algorithm, the optimization model finds the least-cost portfolio that meets Puget Sound Energy, Inc.'s capacity and renewable portfolio standard needs. The model did not choose delaying wind additions until 2016 or later because this solution was not as economic.

To reiterate the optimization model could have chosen a delayed wind additional alternative, but did not. Mr. Norwood's statement that PSE's 2010 RFP analyses failed to address the cost-effectiveness of early wind additions underscores his failure to consider PSE's 2010 RFP analyses. As discussed above, Mr. Norwood's testimony contains numerous criticisms of assumptions used by

PSE prior to the 2010 RFP but does not acknowledge that PSE updated each of these assumptions for its 2010 RFP analyses. PSE's 2010 RFP analyses did consider no new wind additions until 2016 or later in each of the five scenarios analyzed.

Q. What were the results of PSE's 2010 RFP analyses?

A. In the 2010 RFP, which included information updated from the 2009 IRP and the re-run of the 2009 IRP analysis, LSR Phase 1 was selected in four out of five price scenarios, and the analysis accelerated between 1,954,858 RECs and 2,593,988 RECs before 2016.

Q. Please describe the results of the scenario that did not include LSR Phase 1 in the selection.

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A. In the Low Growth scenario, which is just 1 of 5 scenarios tested, the analysis showed that PSE should not accelerate the majority of renewable builds to fulfill the 15% RPS requirement to meet the Treasury Grant deadline. In the low growth scenario, the [redacted] Unsolicited project (346,265 RECs) was accelerated before 2016 and the remaining renewable resource additions were 2016 and later. In the Low Growth scenario, the driver of the decision to accelerate fewer future builds was based on a lower future capital cost of wind, not lower power prices. This is found by comparing the model results between the Low Growth scenario and the Low Growth with Base capital costs where the only differences in the runs is the capital costs of generic resources. The key conclusion is that in all but

the one of the scenarios, Low Growth, the model chose to accelerate wind builds before 2016.

Q. Did PSE revise any analyses used in the 2010 RFP scenarios?

A. Yes, when responding to Public Counsel Data Request No. 345, PSE again reviewed its results from the 2010 RFP as well as the earlier evaluations presented in the 2011 GRC. PSE staff observed that the builds in the 2010 RFP BAU scenario appeared reasonable given the only difference between the 2010 BAU and 2010 Trends scenarios was the carbon price assumption. However, the lower portfolio cost shown in Table 13 on page 36 of the Prefiled Direct Testimony of Ms. Aliza Seelig did not look correct because the Low Growth scenario had higher portfolio cost but included lower natural gas prices and lower market power prices.

Q. What did PSE staff determine about the 2010 RFP BAU scenario?

A. After reviewing the models, PSE staff concluded that the BAU market price scenario in the 2010 RFP inadvertently reflects the costs of secondary market purchases and dispatch using the market prices in the 2010 Trends market price scenario. Since this was an important scenario, PSE corrected this error to understand the implications.

Q. Please describe the results of the revised 2010 RFP BAU scenario?

A. Table 10 below presents the 2010 RFP scenario results with the revised BAU scenario. The results continue to project that, in four of five scenarios, the construction of LSR Phase 1 was less expensive than waiting for just in time builds. Although the original BAU run contained an error, this error did not affect the decision to build early.

Table 10. 2010 RFP Scenario Results with the Revised BAU Scenario

Proposed Project	2010 RFP Scenarios				
	Trends 2010	BAU	GW	LG	LG With Base Capital Costs
LSR Phase 1	X	X	X		X
[redacted] (Unsolicited)	X	X	X	X	X
[redacted] REC (#10059-b)	X	X			
[redacted] (#10009)		X	X		
[redacted] (#10025)			X		X
[redacted] (#10163)					
[redacted] (#10075-a)	X	X	X		X
[redacted] (#10117-a)		X	X		
[redacted] (#10117-b)	X		X		
Portfolio Cost	$13,992,578	$12,960,399	$18,253,665	$11,703,593	$11,180,096
Levelized Cost	$106.64	$112.76	$106.31	$102.85	$114.29
RECs from Wind Acquisition	2,283,884	2,264,962	2,593,988	346,265	1,954,858
Equivalent MW Wind 30% CF	869	862	987	132	744

REDACTED VERSION

Q. What are the key conclusions from this revised analysis?

A. As concluded during the 2010 RFP and reconfirmed in the revised BAU scenario, PSE determined that the combination of tax incentives (Section 1603 Treasury grant and state sales tax exemption) and renewable portfolio standard requirements—and not carbon prices—were the key factors causing PSE's models to select wind resources.

IV. DISCUSSION OF THE FEDERAL LEGISLATION THAT REMOVES THE NORMALIZATION REQUIREMENTS FOR THE SECTION 1603 TREASURY GRANT

Q. Please describe the federal legislation that removes the normalization requirements for the Section 1603 Treasury Grant.

A. As discussed in the Prefiled Rebuttal Testimony of Mr. Roger Garratt, Exhibit No. ___(RG-28HCT), the National Defense Authorization Act for 2012 eliminated the requirement for utilities to normalize the Section 1603 Treasury Grant. Based on PSE's understanding of this change, PSE may credit carrying costs on the unamortized balance of the Section 1603 Treasury Grant to customers. PSE did not include this incremental benefit of the Section 1603 Treasury Grant in the 2010 RFP analysis of LSR Phase 1.

Q. Has PSE revised the Phase II optimization models to model the effects of the removal of the normalization requirements for the Section 1603 Treasury Grant?

A. No. The optimization models selected LSR Phase 1 in four out of five price scenarios in Phase II of the RFP analysis and in the sensitivity analyses testing extensions of the PTC to 2016 and 2020. If PSE were to improve customer benefits to reflect the elimination of the normalization requirements for the Section 1603 Treasury Grant, the optimization models would still continue to show selection of LSR Phase 1 in at least four out of five price scenarios, and in the same sensitivity analyses of the PTC extensions.

V. CONCLUSION

Q. What are the key factors that led PSE to conclude that it was cost-effective to acquire LSR Phase 1 ahead of the RPS requirement?

A. The Section 1603 Treasury Grant and state sales tax exemption provide significant known and measurable reductions in the cost of new wind generation. Although Mr. Norwood believes that the PTC will continue to be extended, he can neither guarantee that this extension will occur nor confirm that it will be at the same level of benefits. Furthermore, the overwhelming majority of results from the numerous and rigorous quantitative analyses that culminated in the 2010 RFP analyses demonstrated that PSE's decision to construct LSR Phase 1 to

meet its 2016 RPS need was cost-justified, even including the sensitivity analyses where the PTC was extended to 2016 and 2020.