

**EXH. CLS-1CT
DOCKET UE-191037
COLSTRIP UNIT 4 SALE
WITNESS: CINDY L. SONG**

**BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**In the Matter of the Application of
PUGET SOUND ENERGY**

**For an Order Authorizing the Sale of
All of Puget Sound Energy's Interests
in Colstrip Unit 4 and Certain of
Puget Sound Energy's Interests in
the Colstrip Transmission System**

Docket UE-191037

**PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF
CINDY L. SONG
ON BEHALF OF PUGET SOUND ENERGY**

**REDACTED
VERSION**

FEBRUARY 19, 2020

PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF

CINDY L. SONG

ON BEHALF OF PUGET SOUND ENERGY

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**PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF
CINDY L. SONG
ON BEHALF OF PUGET SOUND ENERGY**

LIST OF EXHIBITS

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1 **PREFILED DIRECT TESTIMONY (CONFIDENTIAL) OF**
2 **CINDY L. SONG**
3 **ON BEHALF OF PUGET SOUND ENERGY**

4 **I. INTRODUCTION**

5 **Q. Please state your name, business address and present position with Puget**
6 **Sound Energy.**

7 A. My name is Cindy L. Song. My business address is 355 110th Avenue NE,
8 Bellevue, Washington 98004. I am the Manager, Business Initiatives for Puget
9 Sound Energy (“PSE”).

10 **Q. Have you prepared an exhibit describing your education, relevant**
11 **employment experience, and other professional qualifications?**

12 A. Yes. Please see the First Exhibit to the Prefiled Direct Testimony of Cindy L.
13 Song, Exh. CLS-2, for an exhibit describing my education, relevant employment
14 experience, and other professional qualifications.

15 **Q. What are your duties as Manager, Business Initiatives for PSE?**

16 A. As Manager of Business Initiatives, I manage resource additions to PSE’s electric
17 supply portfolio. I lead and coordinate key functions, including negotiations and
18 oversight, in the acquisition or contracting of new energy resources.

1 **Q. Please summarize your testimony.**

2 A. The purpose of my testimony is to provide the quantitative analysis performed in
3 support of the potential sale of PSE's interests in Colstrip Unit 4. My testimony is
4 focused on the quantitative analysis only. Please see the Prefiled Direct
5 Testimony of Ronald J. Roberts, Exh. RJR-1T, for a discussion of (i) the
6 qualitative factors considered in the potential sale of PSE's interests in Colstrip
7 Unit 4 to NorthWestern Energy and (ii) all factors considered in the potential sale
8 of (a) an 8.2 percent interest in the Colstrip to Broadview Segment of the Colstrip
9 Transmission System and (b) a 9.1 percent interest in the Broadview to Townsend
10 Segment of the Colstrip Transmission System. Also included in the Prefiled
11 Direct Testimony of Mr. Roberts, Exh. RJR-1T, is a discussion of the contract
12 terms for the transactions described above and for a five-year power purchase
13 agreement with NorthWestern Energy for 90 megawatts (MW) of output from
14 Colstrip Unit 4, commencing June 1, 2020, and expiring on May 15, 2025 (the
15 "NorthWestern Energy PPA"). Collectively, these transactions are referred to as
16 the "Proposed Transactions" throughout this testimony.

17 **Q. What were the results of the quantitative analyses performed in support of**
18 **the potential sale of PSE's interests in Colstrip Unit 4, and what conclusion**
19 **did PSE draw from these results?**

20 A. PSE's analyses of the proposed sale of PSE's interests in Colstrip Unit 4 (referred
21 to as the "Proposed Colstrip Unit 4 Sale" throughout this testimony) consistently
22 demonstrated an economic benefit to PSE customers over the status quo. The final

1 results, which were presented to the Board of Directors in October 2019, project
2 that the Proposed Colstrip Unit 4 Sale would result in a net present value savings
3 of approximately \$25 to \$46 million¹ compared to a Business As Usual scenario
4 (representing the costs associated with ongoing PSE ownership interests in
5 Colstrip Unit 4). PSE determined from these results that the Proposed Colstrip
6 Unit 4 Sale represents a quantitatively prudent solution to help meet PSE's
7 obligation under the Clean Energy Transformation Act to eliminate coal-fired
8 generation from its resource portfolio before 2026 that presents no harm to
9 customers.

10 II. BACKGROUND AND TIMING

11 **Q. Please provide a timeline of the quantitative analyses conducted by PSE to**
12 **support the Proposed Colstrip Unit 4 Sale.**

13 A. NorthWestern Energy first approached PSE in July 2019 regarding the Proposed
14 Transactions. At the time, this was a relatively conceptual offer with few details.
15 Based on this preliminary information presented by NorthWestern Energy,
16 PSE performed an initial quantitative analysis on July 22, 2019 to determine the
17 financial feasibility of the Proposed Colstrip Unit 4 Sale. As the conversation
18 continued with NorthWestern Energy between July and October 2019 and more
19 information became available, PSE continued to refine its analysis of the
20 Proposed Colstrip Unit 4 Sale. This testimony describes PSE's analytical

¹ As used in this testimony, total costs and savings refers to net present value.

1 approach and results, updates to the analyses as PSE's understanding of the offer
2 developed over time, and updates to the modeling assumptions to reflect the best
3 and most current information available to PSE at the time the analyses were
4 conducted.

5 **Q. Did PSE present its quantitative analyses to its Board of Directors?**

6 A. Yes. Throughout the period between July and October 2019, PSE presented to its
7 Board of Directors multiple updates to the ongoing quantitative analyses, as new
8 information became available and assumptions were refined.

9 **Q. Is PSE providing exhibits that present the results of the quantitative analyses**
10 **conducted by PSE and presented to its Board of Directors between July and**
11 **October 2019?**

12 A. Yes. The quantitative analyses conducted by PSE are provided in the following
13 exhibits:

- 14 (i) Please see the Second Exhibit to the Prefiled Direct
15 Testimony of Cindy L. Song, Exh. CLS-3, for the initial
16 results of quantitative analysis, dated July 22, 2019,
17 prepared by PSE.
- 18 (ii) Please see the Third Exhibit to the Prefiled Direct
19 Testimony of Cindy L. Song, Exh. CLS-4, for the results of
20 quantitative analysis, dated August 23, 2019, conducted by
21 PSE to consider the effect of a potential hedge for the
22 95 MW market power purchase.
- 23 (iii) Please see the Fourth Exhibit to the Prefiled Direct
24 Testimony of Cindy L. Song, Exh. CLS-5, for the results of
25 quantitative analysis, dated August 29, 2019, conducted by
26 PSE to reflect updated market price forecasts.

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- (iv) Please see the Fifth Exhibit to the Prefiled Direct Testimony of Cindy L. Song, Exh. CLS-6, for the results of quantitative analysis, dated September 11, 2019, conducted by PSE to reflect an updated budget for Colstrip Unit 4 and potential pricing of a new coal supply agreement for Colstrip Units 3 & 4.

- (v) Please see the Sixth Exhibit to the Prefiled Direct Testimony of Cindy L. Song, Exh. CLS-7, for the results of quantitative analysis, dated October 21, 2019, conducted by PSE to reflect updated pricing for the NorthWestern Energy PPA.

Q. When did PSE first present the results of its preliminary quantitative analysis to PSE’s Board of Directors?

A. PSE first presented the initial results of the quantitative analysis to PSE’s Board of Directors in correspondence dated August 19, 2019. The correspondence informed the Board of Directors that PSE and NorthWestern Energy had reached agreement on a term sheet detailing the commercial terms of the Proposed Transactions. Please see the Sixth Exhibit to the Prefiled Direct Testimony of Ronald J. Roberts, Exh. RJR-7HC, at 320-29, for a copy of the correspondence dated August 19, 2019.

PSE followed up with the Board of Directors with a more detailed presentation on September 4, 2019. Please see the Fourth Exhibit to the Prefiled Direct Testimony of Cindy L. Song, Exh. CLS-5, for a copy of the presentation that included results of the updated quantitative analysis dated August 29, 2019.

1 **Q. Did the quantitative results presented to PSE’s Board of Directors on**
2 **September 4, 2019 project savings to PSE customers resulting from the**
3 **Proposed Colstrip Unit 4 Sale?**

4 A. Yes. The quantitative results presented to PSE’s Board of Directors on
5 September 4, 2019 project savings to PSE customers from the Proposed Colstrip
6 Unit 4 Sale that ranged between \$61 million (inclusive of a hedge for the 95 MW
7 market power purchase) and \$94 million (exclusive of a hedge for the 95 MW
8 market power purchase). Please see Exh. RJR-7HC, at 350-55, for a copy of the
9 presentation dated September 4, 2019.

10 **Q. Did PSE present further results of its quantitative analyses to PSE’s Board of**
11 **Directors?**

12 A. Yes. Concurrent with the negotiation for the Proposed Transactions, PSE and
13 other owners of the Colstrip units were negotiating a new coal supply agreement
14 with Westmoreland Rosebud Mining Company LLC (“Westmoreland”) for
15 Colstrip Units 3 & 4.

16 Whereas the quantitative results dated August 29, 2019 included an assumed coal
17 price of \$ [REDACTED] per ton based on an earlier Westmoreland proposal, PSE
18 subsequently learned that the new pricing was likely to be \$ [REDACTED] per ton, with a
19 [REDACTED] for PSE’s combined share of Colstrip Unit 3
20 and Unit 4. Please see Exh. RJR-7C at 331 for a copy of the updated coal supply
21 information relied upon by PSE to refine its quantitative analyses. As a result of

1 the new reduced pricing structure, the potential savings for PSE customers
2 resulting from the Proposed Colstrip Unit 4 Sale decreased to a range of between
3 \$37 million (inclusive of a hedge for the NorthWestern Energy PPA) and
4 \$58 million (exclusive of a hedge for the NorthWestern Energy PPA).²

5 PSE presented to its Board of Directors the quantitative analysis dated
6 September 11, 2019, which reflects the updated projected coal pricing. Please see
7 Exh. RJR-7HC at 357-374 for the quantitative analyses reported to PSE's Board
8 of Directors on a conference call on September 11, 2019.

9 **Q. Did PSE present any additional results of its quantitative analyses to PSE's**
10 **Board of Directors?**

11 A. Yes. During the negotiations of the NorthWestern Energy PPA, the pricing
12 increased by \$5.63 per megawatt-hour (MWh) to reflect changes to the term of
13 the contract to capture the fixed O&M cost adder. In October, PSE presented final
14 results to its Board of Directors. Final results showed the Proposed Colstrip Unit 4
15 Sale would result in a savings between the ranges of \$25 to \$46 million compared
16 to a Business As Usual scenario. Please see the Sixth Exhibit to the Prefiled
17 Direct Testimony of Cindy L. Song, Exh. CLS-7, for the results of quantitative
18 results dated October 21, 2019. PSE did inform the PSE Board of Directors of the
19 lower quantitative results that reflected the change in pricing of the NorthWestern
20 Energy PPA in the subsequent meeting to discuss the Proposed Transactions.

² See Song, Exh. CLS-6, at page 1, line 4 (Tab: NPV savings comparison).

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**III. QUANTITATIVE ANALYSIS
DATED JULY 22, 2019**

Q. Please describe the quantitative analysis dated July 22, 2019.

A. PSE prepared financial analysis to compare the following two scenarios:

- (i) a “Business as Usual” scenario, which represents the projected total costs to PSE (on a net present value basis) of continuing operations of Colstrip Unit 4 over the term of the NorthWestern Energy PPA; and
- (ii) a “Proposed Colstrip Unit 4 Sale” scenario, which represents the projected total costs to PSE (on a net present value basis) of replacing the capacity and energy reductions associated with the proposed sale of all of PSE’s interests in Colstrip Unit 4 with the NorthWestern Energy PPA and market power purchases over the term of the NorthWestern Energy PPA.

In short, PSE compared the net present value of costs of the “Business as Usual” scenario with the “Proposed Colstrip Unit 4 Sale” scenario over the term of the NorthWestern Energy PPA for this analysis.

Please see the Second Exhibit to the Prefiled Direct Testimony of Cindy L. Song, Exh. CLS-3, for a copy of PSE’s quantitative analysis dated July 22, 2019.³

³ See also Roberts, Exh. 7C, at 300-02.

1 **A. PSE's Quantitative Analysis Dated July 22, 2019 Projected the Costs**
2 **for Continuing Operations of Colstrip Unit 4 Over the Term of the**
3 **NorthWestern Energy PPA to be \$218 Million on a Net Present Value**
4 **Basis**

5 **Q. What assumptions did PSE make in the quantitative analysis dated July 22,**
6 **2019 about the costs for continuing operations of Colstrip Unit 4 on page 2,**
7 **lines 6-8 (Tab: Proforma Cont Unit 4), of Exhibit CLS-3?**

8 A. For the quantitative analysis dated July 22, 2019, PSE based the operating costs
9 for Colstrip Unit 4 on 12.5 percent of the total projected operating budgets for
10 Colstrip Units 3 & 4. PSE currently owns 25 percent of each of Colstrip
11 Unit 3 & 4 and pays 25 percent of the fixed operating costs of these units. If the
12 Proposed Colstrip Unit 4 Sale closes, then PSE would own 25 percent of Colstrip
13 Unit 3 and would continue to be responsible for 25 percent of the fixed operating
14 costs of Colstrip Unit 3, which represents 12.5 percent of the total projected
15 operating budgets for Colstrip Units 3 & 4.

16 PSE assumed a coal cost of \$ [REDACTED] per ton. PSE based this assumption on a
17 proposal for a new coal supply contract provided by Westmoreland in early 2019.

18 **Q. Please explain the dispatch costs included on page 2, line 9 (Tab: Proforma**
19 **Cont Unit 4), of Exhibit CLS-3?**

20 A. Dispatch cost includes (i) variable operations and maintenance costs and
21 (ii) variable fuel costs. PSE performed this calculation within the AURORA
22 model. AURORA uses various information as inputs to build an economic
23 dispatch of generating resources for the market. AURORA dispatches units

1 according to variable cost, subject to non-cycling and minimum-run constraints
2 until hourly demand is met in each area. Accordingly, the dispatch costs included
3 on page 2, line 9 (Tab: Proforma Cont Unit 4), of Exhibit CLS-3 reflect the output
4 from the AURORA model.

5 **Q. Please explain how PSE determined property tax expense on page 2, line 13**
6 **(Tab: Proforma Cont Unit 4), of Exhibit CLS-3?**

7 A. PSE currently pays annual Montana property taxes of approximately \$10 million
8 for all four units of the Colstrip Generating Station. PSE determined the property
9 tax expense for Colstrip Unit 4 by applying a ratio of the capacity of PSE's
10 ownership interest in Colstrip Unit 4 (185 MW) over the capacity of PSE's
11 ownership interest in all four units of the Colstrip Generating Station (677 MW).

12 **Q. What is the projected total cost to PSE for continuing operations of Colstrip**
13 **Unit 4 over the term of the NorthWestern Energy PPA?**

14 A. According to the quantitative analysis dated July 22, 2019, the total projected net
15 present value to PSE for continuing operations of Colstrip Unit 4 is \$218 million
16 over the term of the NorthWestern Energy PPA. The average cost per MWh for
17 continuing operations of Colstrip Unit 4 over the term of the NorthWestern
18 Energy PPA is approximately \$42/MWh.⁴

⁴ See Song, Exh. CLS-3, at page 2, line 22 (Tab: Proforma Cont Unit 4).

1 **B. PSE's Quantitative Analysis Dated July 22, 2019 Projected Costs of**
2 **\$193 Million on a Net Present Value Basis Associated with the**
3 **Proposed Colstrip Unit 4 Sale**

4 **Q. How did PSE project the total cost to PSE associated with the Proposed**
5 **Colstrip Unit 4 Sale?**

6 A. The Proposed Transactions, upon approval, would result in a 5-year 90 MW PPA
7 with NorthWestern Energy and a reduction of 95 MW of capacity and
8 accompanying energy. PSE projected the total costs associated with the Proposed
9 Colstrip Unit 4 Sale to include both (i) the cost of the 90 MW NorthWestern
10 Energy PPA and (ii) the cost of energy and capacity to replace 95 MW reduction
11 as a result of the Proposed Colstrip Unit 4 Sale. PSE assumed the costs of a
12 generic peaker to replace the remaining capacity reduction (95 MW) and the costs
13 of projected equivalent market energy to replace associated lost energy.
14 Sections III.B.1 and III.B.2 below describe PSE's calculations and assumptions
15 related to these costs.

16 **1. Results of PSE's Quantitative Analysis Dated July 22, 2019 of**
17 **the Projected Costs for the NorthWestern Energy PPA**

18 **Q. How did PSE project the total cost of the NorthWestern Energy PPA?**

19 A. The per MWh price paid by PSE for power under the NorthWestern Energy PPA
20 is the higher of (i) the Mid-C Day-Ahead Index Price and (ii) the marginal
21 operating cost of Colstrip Unit 4. For the purposes of the quantitative analysis
22 dated July 22, 2019, PSE used a Mid-C Day-Ahead Index Price forecast
23 developed by PSE in March 2019. The Mid-C Day-Ahead Index Price forecast

1 was updated in a later analysis, performed on August 29, 2019, to reflect fall 2018
2 gas prices and the passage of California Senate Bill 100, which increased
3 renewable portfolio standard requirements in California. The combination of the
4 two items lowered projected Mid-C prices.⁵

5 **Q. How did PSE calculate the projected Mid-C prices?**

6 A. PSE used the AURORA model to calculate the projected Mid-C prices.
7 AURORA is a fundamentals-based program. This means that AURORA relies on
8 factors such as the performance characteristics of supply resources and regional
9 demand for power and transmission to drive the electric energy market using the
10 logic of a production costing model. AURORA models the competitive electric
11 market, using the following modeling logic and approach to simulate the markets:

- 12 (i) AURORA identifies the projected marginal resources
13 necessary to meet load in the region for an hour by
14 “dispatching” all of the resources in the system to meet
15 loads for such hour in a least-cost manner subject to
16 transmission constraints.
- 17 (ii) AURORA determines projected market prices from the
18 clearing price of the marginal resources identified for each
19 such hour.
- 20 (iii) AURORA continues the process identified in items (i)
21 and (ii) above for each hour that AURORA dispatches
22 resources in the analysis.

⁵ Compare Song, Exh. CLS-4, at page 3, line 15 (Tab: Proforma PPA NWE) (showing projected Mid-C prices in a range of between \$24/MWh and \$28/MWh) with Song, Exh. CLS-4, at page 3, line 15 (Tab: Proforma PPA NWE) (projecting Mid-C prices in a range of between \$24/MWh and \$28/MWh over the term of the NorthWestern Energy PPA) with Song, Exh. CLS-5, at page 4, line 11 (Tab: No Hedging) (projecting Mid-C prices in a range of between \$23/MWh and \$25.40/MWh over the term of the NorthWestern Energy PPA).

1 (iv) AURORA derives monthly or annual hourly prices based
2 on the hourly dispatches calculated in items (i), (ii) and (iii)
3 above.

4 AURORA uses information to build an economic dispatch of generating resources
5 for the market. AURORA dispatches units according to variable cost, subject to
6 non-cycling and minimum-run constraints until hourly demand is met in each
7 area. Transmission constraints, losses, wheeling costs and unit start-up costs are
8 reflected in the dispatch. The market-clearing price is then determined by
9 observing the cost of meeting an incremental increase in demand in each area. All
10 operating units in an area receive the hourly market-clearing price for the power
11 they generate.

12 AURORA estimates all market-clearing prices for the entire Western
13 Interconnection. PSE uses the market-clearing price modeled for the Mid-
14 Columbia (or Mid-C) hub.

15 **2. Results of PSE's Quantitative Analysis Dated July 22, 2019 of**
16 **the Projected Costs for Resources Necessary to Replace the**
17 **Energy and Capacity Lost as a Result of the Proposed Colstrip**
18 **Unit 4 Sale**

19 **Q. How did PSE calculate the projected costs of the resources needed to replace**
20 **the energy and capacity lost as a result of the Proposed Colstrip Unit 4 Sale ?**

21 A. PSE projected the cost of resources needed to replace the energy lost as a result of
22 the Proposed Colstrip Unit 4 Sale by projecting the costs of equivalent market
23 energy purchases at Mid-C prices. PSE used the same Mid-C price forecast used
24 to calculate the cost of the NorthWestern Energy PPA.

1 PSE projected the cost of resources needed to replace the capacity lost as a result
2 of the Proposed Colstrip Unit 4 Sale as the cost of a proxy generic peaking plant.
3 The projected cost of a proxy generic peaking plant from PSE' Integrated
4 Resource Planning process is approximately \$85/kw-year (or \$8 million per year)
5 over the term of the NorthWestern Energy PPA.

6 **Q. Is PSE concerned about increased exposure to market power price volatility?**

7 A. Yes. While an increased exposure to market power price volatility is a concern,
8 PSE manages its exposure to market power price volatility using an overall
9 programmatic hedging program. If the market replacement energy purchase was
10 completely hedged, it would cost an additional \$21 million over the term of the
11 NorthWestern Energy PPA.⁶

12 **3. PSE's Quantitative Analysis Dated July 22, 2019 Projected**
13 **Savings to PSE Customers of Approximately \$25 Million**
14 **Associated with the Proposed Colstrip Unit 4 Sale**

15 **Q. What did the quantitative analysis dated July 22, 2019 project to be the costs**
16 **of both the NorthWestern Energy PPA and replacement capacity and energy**
17 **over the term of the NorthWestern Energy PPA?**

18 A. PSE's quantitative analysis dated July 22, 2019 projected combined costs of
19 \$193 million on a net present value basis for the NorthWestern Energy PPA and

⁶ Compare Song, Exh. CLS-7, at page 4, line 27 (No Hedge) (presenting a total cost net present value of \$122 million) with Exh. CLS-7, at page 5, line 27 (Hedge) (presenting a total cost net present value of \$143 million).

1 the replacement capacity and energy. This results in an average cost of
2 approximately \$32/MWh over the term of the NorthWestern Energy PPA.⁷

3 Accordingly, the analysis projected savings to PSE customers of approximately
4 \$25 million (on a net present value basis) associated with the Proposed Colstrip
5 Unit 4 Sale. This represents the amount by which the projected costs of the
6 “Business as Usual” scenario (\$218 million on a net present value basis) exceeded
7 the projected costs of the “Proposed Colstrip Unit 4 Sale” scenario (\$193 million
8 on a net present value basis) over the term of the NorthWestern Energy PPA.

9 **IV. QUANTITATIVE ANALYSIS,**
10 **DATED AUGUST 23, 2019**

11 **Q. What changes did PSE make in the quantitative analysis dated**
12 **August 23, 2019?**

13 A. PSE made two changes in the quantitative analysis dated August 23, 2019.

14 First, PSE added a scenario in which PSE would hedge the exposure to market
15 power price volatility attributable to the purchase of energy associated with the
16 reduction of 95 MW of capacity resulting from the Proposed Colstrip Unit 4 Sale.

17 Second, PSE corrected an error contained in the quantitative analysis, dated
18 July 22, 2019. Specifically, line 28 of the tab entitled “Proforma PPA NWE”
19 incorrectly included six years of projected costs in calculating the net present

⁷ See Song, Exh. CLS-3, at page 3, line 29 (Tab: Proforma PPA NWE).

1 value. As a result, the net present value of the projected costs of the Proposed
2 Colstrip Unit 4 Sale was overstated and the benefit of the Proposed Colstrip
3 Unit 4 Sale was understated. In the quantitative analysis dated August 23, 2019,
4 PSE corrected the error in line 3 of the tab entitled "Summary". With this
5 correction, the net present value of the projected costs of the Proposed Colstrip
6 Unit 4 Sale was \$159 million. This value is \$34 million less than the \$193 million
7 net present value of the projected costs of the Proposed Colstrip Unit 4 Sale
8 identified in the quantitative analysis dated July 22, 2019.

9 **Q. Please explain the changes in the quantitative analysis to include a hedge on**
10 **the energy associated with the reduction of 95 MW of capacity resulting from**
11 **the Proposed Colstrip Unit 4 Sale.**

12 A. Typically, PSE would not engage in a separate hedge transaction for a single
13 specific transaction and would instead include the transaction as part of PSE's
14 overall programmatic hedging program. However, since it is difficult to separate
15 the costs of hedging a single transaction from the costs of the overall
16 programmatic hedging program, PSE performed additional analysis to estimate
17 the economics of the Proposed Colstrip Unit 4 Sale with the inclusion of hedging
18 costs.

19 The best estimate available to PSE of the cost of a five-year hedge was indicative
20 pricing for a five-year hedge at a fixed price of \$37.52/MWh, which was provided
21 by PSE's trade floor. PSE calculated the costs of a hedge on the energy associated
22 with the reduction of 95 MW of capacity resulting from the Proposed Colstrip

1 Unit 4 Sale as the difference between the hedged price of \$37.52/MWh and the
2 projected Mid-C prices. This calculation resulted in a projected cost of
3 approximately \$34 million for the hedge over the term of the NorthWestern
4 Energy PPA.⁸

5 **Q. Did the projected costs of \$34 million associated with a five-year hedge**
6 **eliminate the projected benefits of the Proposed Colstrip Unit 4 Sale to PSE**
7 **customers?**

8 A. No. The projected costs of \$34 million associated with a five-year hedge did not
9 eliminate the projected benefits of the Proposed Colstrip Unit 4 Sale to PSE
10 customers. As discussed previously, the quantitative analysis dated July 22, 2019
11 incorrectly calculated the net present value of the benefits of the Proposed
12 Colstrip Unit 4 Sale over six years, and PSE corrected this error to calculate the
13 net present value of the benefits of the Proposed Colstrip Unit 4 Sale over five
14 years.

15 The correction of this error improved the net present value of the benefits of the
16 Proposed Colstrip Unit 4 Sale by \$34 million, which is, coincidentally, the same
17 as the projected costs associated with a five-year hedge. Therefore, the projected
18 costs of \$34 million associated with a five-year hedge did not eliminate the
19 projected benefits of the Proposed Colstrip Unit 4 Sale to PSE customers. In sum,
20 the net present value of projected costs to PSE associated with the “Proposed

⁸ See Song, Exh. CLS-4, at page 1, line 6 (Tab: Summary).

1 Colstrip Unit 4 Sale” scenario was \$159 million (exclusive of hedging costs) and
2 \$193 million (inclusive of hedging costs).

3 **Q. Did PSE make any changes in the quantitative analysis dated August 23,**
4 **2019 for the “Business as Usual” scenario representing continued operations**
5 **of Colstrip Unit 4?**

6 A. No. PSE did not make any changes in the quantitative analysis dated August 23,
7 2019 for the “Business as Usual” scenario representing continued operations of
8 Colstrip Unit 4 during the term of the NorthWestern Energy PPA. The projected
9 net present value of PSE’s costs for continued operations of Colstrip Unit 4
10 remained at \$218 million over the term of the NorthWestern Energy PPA.⁹

11 **Q. Please summarize the benefits to PSE customers associated with the**
12 **Proposed Colstrip Unit 4 Sale, as projected by the quantitative analysis dated**
13 **August 23, 2019?**

14 A. PSE’s quantitative analysis dated August 23, 2019 projected the following net
15 benefits to PSE customers associated with the Proposed Colstrip Unit 4 Sale :

- 16 (i) net benefits of \$59 million,¹⁰ which do not include costs of
17 the hedge previously discussed; and
- 18 (ii) net benefits of \$25 million,¹¹ which include projected costs
19 of \$34 million for the hedge previously discussed.

⁹ See Song, Exh. CLS-4, at page 1, line 2 (Tab: Summary).

¹⁰ See Song, Exh. CLS-4, at page 1, line 4 (Tab: Summary).

¹¹ See Song, Exh. CLS-4, at page 1, line 7 (Tab: Summary).

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**V. QUANTITATIVE ANALYSIS,
DATED AUGUST 29, 2019**

Q. What changes did PSE make in the quantitative analysis dated August 29, 2019?

A. PSE made a number of changes in the quantitative analysis dated August 29, 2019. First, PSE updated the market price forecast used in its analysis to the then-current market price forecast from the 2019 Integrated Resource Plan (IRP) process. This update resulted in a 2.8 percent reduction in projected Mid-C prices over the term of the NorthWestern Energy PPA. (Projected Mid-C prices over the term of the NorthWestern Energy PPA dropped from \$24.70/MWh to \$24.00/MWh.) As a result of this decrease in projected Mid-C prices, AURORA's calculation of the five-year average capacity factor dropped from 79 percent¹² to 70 percent,¹³ and AURORA's calculation of dispatch cost also changed.

Second, PSE updated the projected costs of resources needed to replace the capacity lost as a result of the Proposed Colstrip Unit 4 Sale from \$85/kw-year to \$12/kw-year. As discussed previously, PSE's quantitative analysis projected these capacity costs by using projected capacity costs of \$85/kw-year (or \$8 million per year) over the term of the NorthWestern Energy PPA associated with a proxy generic peaking plant. For the quantitative analysis dated August 29, 2019, PSE

¹² See Song, Exh. CLS-3, at page 2, line 3 (Tab: Proforma Cont Unit 4).

¹³ See Song, Exh. CLS-5, at page 3, line 3 (Tab: Continuing Operations).

1 used capacity costs of \$12/kw-year (or \$1 million annually) for a winter-only
2 power purchase agreement. PSE based this projected capacity cost on the results
3 of a short-term request for proposals to replace capacity resulting from the
4 retirement of Colstrip Units 1 & 2 on January 1, 2020.¹⁴

5 Third, PSE refined assumptions for the Proposed Colstrip Unit 4 Sale with
6 updated information from the proposed term sheet. Whereas earlier quantitative
7 analyses used calendar years as an approximation of the term of the NorthWestern
8 Energy PPA, the quantitative analysis dated August 29, 2019, used the term of the
9 NorthWestern Energy PPA, which begins on June 1, 2020, and ends on May 15,
10 2025. For example, previous quantitative analyses assumed that the first year of
11 the NorthWestern Energy PPA would be calendar year 2020, but the quantitative
12 analysis dated August 29, 2019, used the period June 1, 2020, through May 31,
13 2021, as the first year of the term of the NorthWestern Energy PPA.

14 Finally, the quantitative analysis dated August 29, 2019, provided two separate
15 projected net benefits to PSE customers associated with the Proposed Colstrip
16 Unit 4 Sale—one that was inclusive and one that was exclusive of the projected
17 \$34 million of hedging costs.¹⁵

¹⁴ See Song, Exh. CLS-5, at page 4, line 16 (Hedging), and at page 5, line 16 (No Hedging).

¹⁵ See Song, Exh. CLS-5, at page 1, line 4

1 **Q. What caused the 2.8 percent reduction in projected Mid-C prices over the**
2 **term of the NorthWestern Energy PPA?**

3 A. The 2.8 percent reduction in projected Mid-C prices over the term of the
4 NorthWestern Energy PPA reflects the following:

- 5 (i) projected increases in energy resulting from additional
6 development of renewable resources to satisfy the
7 Washington Clean Energy Transformation Act, the
8 California Senate Bill 100 renewable portfolio standard,
9 and similar policies; and
- 10 (ii) updated results from the then-current market price forecast
11 developed in the 2019 IRP process.

12 In general, this update had the impact of lowering projected Mid-C prices during
13 the term of the NorthWestern Energy PPA, further eroding the economic viability
14 of the Colstrip units to PSE.

15 **Q. Did PSE make any changes in the quantitative analysis dated August 29,**
16 **2019 to the “Business as Usual” scenario representing continued operations**
17 **of Colstrip Unit 4?**

18 A. Yes. PSE reduced the net present value of the projected total costs to PSE of
19 continued operations of Colstrip Unit 4 during the term of the
20 NorthWestern Energy PPA by \$9 million (from \$218 million to \$209 million) as a
21 result of shifting the time period to better reflect the period term of the PPA. This
22 \$9 million reduction in the net present value resulted from the changes in the
23 quantitative analysis to better reflect the term of the NorthWestern Energy PPA.

1 **Q. Did the quantitative analysis dated August 29, 2019 project benefits to PSE's**
2 **customers resulting from the Proposed Colstrip Unit 4 Sale ?**

3 A. Yes. The quantitative analysis dated August 29, 2019 projected the net present
4 value of the total costs to PSE of the Proposed Colstrip Unit 4 Sale as a range
5 between \$148 million (inclusive of projected hedging costs) and \$115 million
6 (exclusive of projected hedging costs).¹⁶

7 Accordingly, the quantitative analysis dated August 29, 2019 projected net
8 benefits to PSE from the Proposed Colstrip Unit 4 Sale as a range between
9 \$61 million and \$94 million, with and without the costs of hedging,
10 respectively.¹⁷

11 **VI. QUANTITATIVE ANALYSIS**
12 **DATED SEPTEMBER 11, 2019**

13 **Q. What updates did PSE include in the quantitative analysis dated**
14 **September 11, 2019?**

15 A. PSE incorporated a number of updates in the quantitative analysis dated
16 September 11, 2019. First, PSE updated the projected budget for Colstrip
17 Units 3 & 4 for calendar years 2020 to 2024 based on information provided by the
18 operator of the units (Talen Montana LLC) on August 30, 2019.

¹⁶ See Song, Exh. CLS-5, at page 1, line 3 (Tab: Summary).

¹⁷ See Song, Exh. CLS-5, at page 1, line 4 (Tab: Summary).

1 Second, PSE updated the projected costs of coal, based on new information
2 received during the then-in-progress negotiations for a new coal supply agreement
3 with Westmoreland. Specifically, PSE made the following changes based on the
4 updated coal supply negotiations:

- 5 (i) updated the projected price of coal to \$27/ton, which was
6 less than the \$44/ton previously assumed for purposes of
7 analysis and based on a proposal provided by
8 Westmoreland in early 2019;
- 9 (ii) based on the terms of the proposed coal supply agreement
10 coal costs are 100% variable instead of split between fixed
11 and variable based on the previous coal supply agreement;
12 and
- 13 (iii) updated the minimum volume to 1.25 million tons for both
14 Colstrip Units 3 & 4.

15 As a result of the above changes, Colstrip Unit 4 has a higher dispatch cost. The
16 five-year average capacity factor reduced to 59 percent from 70 percent.

17 **Q. How does the new coal supply agreement with Westmoreland affect the costs**
18 **and operations of Colstrip Unit 4?**

19 A. As mentioned previously, prior quantitative analyses assumed coal prices of
20 \$44/ton based on a Westmorland proposal from earlier in 2019. PSE split the coal
21 price of \$44/ton between fixed and variable costs. The resulting average dispatch
22 cost of approximately \$16/MWh over the term of the NorthWestern Energy PPA.

23 The new coal supply agreement with Westmoreland has coal prices of \$27/ton, all
24 of which is now in variable cost. This new coal price, along with the minimum
25 volume of 1.25 million tons for both Colstrip Units 3 & 4, resulted in an average

1 dispatch cost of approximately \$21/MWh over the term of the NorthWestern
2 Energy PPA. As a result, the five-year average capacity factor decreased from
3 70 percent to 59 percent.

4 The change in, and the terms and conditions of, coal pricing under the new coal
5 supply agreement, the minimum volumes, and the resulting reduction in the five-
6 year average capacity factor, affected the net present value of the projected total
7 costs to PSE associated with the Proposed Colstrip Unit 4 Sale .

8 **Q. Did the net present value of total costs to PSE under the “Business as Usual”**
9 **scenario representing continuing operations of Colstrip Unit 4 over the term**
10 **of the NorthWestern Energy PPA change as a result of the new coal supply**
11 **agreement?**

12 A. Yes. The change in assumptions due to the new coal supply agreement resulted in
13 a reduction in the net present value of total costs to PSE under the “Business as
14 Usual” scenario representing continuing operations of Colstrip Unit 4 over the
15 term of the NorthWestern Energy PPA. Whereas the net present value of total
16 costs to PSE under the “Business as Usual” scenario in the quantitative analysis
17 dated August 29, 2009 was \$209 million, the net present value of total costs to
18 PSE under the “Business as Usual” scenario in the quantitative analysis dated
19 September 11, 2019 was \$168 million over term of the NorthWestern
20 Energy PPA.¹⁸

¹⁸ See Song, Exh. CLS-6, at page 1, line 2 (Tab: NPV savings comparison).

1 **Q. Did the quantitative analysis dated September 11, 2019 project benefits to**
2 **PSE's customers resulting from the Proposed Colstrip Unit 4 Sale?**

3 A. Yes. The quantitative analysis dated September 11, 2019 projected the net present
4 value of the total costs to PSE of the Proposed Colstrip Unit 4 Sale as a range
5 between \$131 million (inclusive of projected hedging costs) and \$110 million
6 (exclusive of projected hedging costs).¹⁹ Accordingly, the quantitative analysis
7 dated September 11, 2019 projected the net benefits to PSE from the Proposed
8 Colstrip Unit 4 Sale as a range between \$37 million and \$58 million, with and
9 without the costs of hedging, respectively.²⁰

10 **VII. QUANTITATIVE ANALYSIS,**
11 **DATED OCTOBER 21, 2019**

12 **Q. What changes did PSE make in the quantitative analysis dated**
13 **October 21, 2019?**

14 A. For the quantitative analysis dated October 21, 2019, PSE updated the costs of the
15 NorthWestern Energy PPA to incorporate an operations and maintenance
16 ("O&M") adder of \$5.63/MWh to the Mid-C index prices.

¹⁹ See Song, Exh. CLS-6, at page 1, line 3 (Tab: NPV savings comparison).

²⁰ See Song, Exh. CLS-6, at page 1, line 4 (Tab: NPV savings comparison)..

1 **Q. How did the operations and maintenance cost adder change the net present**
2 **value of total costs to PSE under the “Proposed Colstrip Unit 4 Sale”**
3 **scenario?**

4 A. The incorporation of an operations and maintenance adder of \$5.63/MWh to the
5 Mid-C index prices under the NorthWestern Energy PPA increases the net present
6 value of the total projected costs to PSE of the “Proposed Colstrip Unit 4 Sale”
7 scenario by \$12 million (i.e., \$143 million and \$122 million, with and without
8 hedging costs, respectively).²¹ Accordingly, the quantitative analysis dated
9 October 21, 2019, projected net benefits to PSE customers from the Proposed
10 Colstrip Unit 4 Sale as a range between \$25 million and \$46 million, with and
11 without the costs of hedging, respectively.²²

12 **VIII. CONCLUSION**

13 **Q. What conclusion can be drawn from these results?**

14 A. The quantitative analysis results demonstrate that the Proposed Colstrip Unit 4
15 Sale offer projected savings for customers when compared to a Business As Usual
16 scenario (representing the costs associated with ongoing PSE ownership interests
17 in Colstrip Unit 4). As such, the Proposed Colstrip Unit 4 Sale represents a
18 quantitatively prudent, no harm to customers solution to help meet PSE’s Clean

²¹ See Song, Exh. CLS-7, at page 1, line 3 (Tab: NPV savings comparison).

²² See Song, Exh. CLS-7, at page 1, line 4 (Tab: NPV savings comparison).

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Energy Transformation Act obligations to eliminate coal-fired generation from its portfolio before 2026.

Q. Does this conclude your prefiled direct testimony?

A. Yes, it does.