

**Exh. JL-4C  
Docket UE-200115  
Witness: Jing Liu  
REDACTED VERSION**

**BEFORE THE WASHINGTON  
UTILITIES AND TRANSPORTATION COMMISSION**

**In the Matter of the Application of**

**DOCKET UE-200115**

**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**

**EXHIBIT TO  
TESTIMONY OF**

**Jing Liu**

**STAFF OF  
WASHINGTON UTILITIES AND  
TRANSPORTATION COMMISSION**

*Cost-Benefit Analysis with Staff's Alternative Cost Assumptions*

**October 2, 2020**

**CONFIDENTIAL PER PROTECTIVE ORDER - REDACTED VERSION**

**Shaded information Is Designated as CONFIDENTIAL per Protective Order in WUTC Docket UE-200115**

**as Usual" Scenario and the "Proposed Sale" Scenario  
with UTC Staff Alternative Cost Assumptions**

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PROTECTIVE ORDER IN WUTC DOCKET UE-200115

<u>Line</u>	(A)	(B) Scenario 1 No hedging	(C) Scenario 2 Hedge 95MW
1 <b>Operational cost (\$ in millions)</b>			
2 Colstrip unit 4 continuing operations			
3 90MW 5-year PPA + 95MW replacement			
4 PPA Savings NPV			
5 Average Annual Saving			
6 <b>Operational cost (\$/MWh)</b>			
7 Colstrip unit 4 continuing operations			
8 90MW 5-year PPA + 95MW replacement			
9 Savings \$/MWh			

**Quantitative Analysis Comparing "Business  
as Usual" Scenario and the "Proposed Sale" Scenario  
Five-Year Comparison  
with UTC Staff Alternative Cost Assumptions**

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PROTECTIVE ORDER IN WUTC DOCKET UE-200115

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
<b>Scenario 1 - No hedging</b>							
		12/17/2020					
<b>Line</b>		12/31/2020	12/31/2021	12/31/2022	12/31/2023	12/31/2024	12/31/2025
1	<b>Operational cost (\$ in millions)</b>	<b>Present Value</b>					
2	Colstrip unit 4 continuing operations						
3	90MW 5-year PPA + 95MW replacement						
4	PPA savings						
5							
6	<b>Operational cost (\$/MWh)</b>	<b>Average</b>					
7	Colstrip unit 4 continuing operations						
8	90MW 5-year PPA + 95MW replacement						
9	Savings \$/MWh						
10							
11	<b>Scenario 2 - Hedge 95MW</b>						
		12/17/2020					
<b>Line</b>		12/31/2020	12/31/2021	12/31/2022	12/31/2023	12/31/2024	12/31/2025
12	<b>\$ in millions</b>						
13	<b>Operational cost</b>	<b>Present Value</b>					
14	Colstrip unit 4 continuing operations						
15	90MW 5-year PPA + 95MW replacement						
16	PPA savings						
17							
18	<b>Operational cost (\$/MWh)</b>	<b>Average</b>					
19	Colstrip unit 4 continuing operations						
20	90MW 5-year PPA + 95MW replacement						
21	Savings \$/MWh						

**Colstrip Unit 4 - Continuing Operations**  
with UTC Staff Alternative Cost Assumptions

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Line	\$ in millions	12/17/2020-						Average
		12/31/2020	12/31/2021	12/31/2022	12/31/2023	12/31/2024	12/31/2025	
1	PSE's share of unit 4 capacity	185 MW	185 MW	185 MW	185 MW	185 MW	185 MW	185 MW
2	PSE's take (MWh)							
3								
4	Net capacity factor							
5								
6	<b>Colstrip unit 4 operating cost</b>							
7	Fixed operating expenses							
8	Overhaul							
9	Capital							
10	Dispatch cost							
11	<b>Colstrip unit 4 operating cost</b>							
12								
13	<b>Property Tax</b>							
14								
15	<b>Total cost (line 11 +13)</b>							
16								
17	Dispatch cost (line 10 / 2)							
18	Cost \$/MWh (line 15 / 2)							
19								
20	<b>Total cost NPV (line 15)</b>							
21	<b>Cost \$/MWh (5-year average)</b>							

**Scenario 1 - No Hedging**  
**with UTC Staff Alternative Cost Assumptions**

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Line	\$ in millions	12/17/2020-					1/1/2025-
		12/31/2020	12/31/2021	12/31/2022	12/31/2023	12/31/2024	12/2/2025
1	<b>90 MW NEW PPA</b>						
2	NW + Talen PPA capacity	90 MW	90 MW	90 MW	90 MW	90 MW	90 MW
3							
4	Energy (MWh)						
5	PPA price (\$/MWh)						
6	PPA cost						
7	Base O&M						
8	<b>Total PPA (line 6+7)</b>						
9							
		12/17/2020-					12/31/2025
10	<b>95 MW Replacement</b>	12/31/2020	12/31/2021	12/31/2022	12/31/2023	12/31/2024	12/31/2025
11	Replacement energy post PPA						
12	Replacement energy (MWh)						
13	Mid-C price (\$/MWh)						
14	<b>Energy replacement</b>						
15							
16	Replacement capacity winter only						
17	Capacity (MW)	95 MW	95 MW	95 MW	95 MW	95 MW	95 MW
18	Capacity charge \$/KW-yr						
19	<b>Capacity replacement cost</b>						
20							

**Scenario 1 - No Hedging**  
**with UTC Staff Alternative Cost Assumptions**

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		12/3/2020-
		12/31/2020
21	<b>90 MW Replacement after PPA Ends</b>	
22	Replacement energy post PPA	
23	Replacement energy (MWh)	
24	Mid-C price (\$/MWh)	
25	<b>Energy replacement</b>	
26		
27	Replacement capacity winter only	
28	Capacity (MW)	90 MW
29	Capacity charge \$/KW-yr	
30	<b>Capacity replacement cost</b>	
31		
32	<b>Total cost (line 8+14+19+25+30)</b>	
33		
34	Total capacity	185 MW
35	Total energy MWh	
36	Cost \$/MWh (line 32 / 35)	
37		
38	<b>Total cost NPV (line 32)</b>	
39	<b>Cost \$/MWh (5-year average)</b>	

**Scenario 2 - Hedge 95MW**  
**with UTC Staff Alternative Cost Assumptions**

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Line	\$ in millions	12/17/2020- 12/31/2020	12/31/2021	12/31/2022	12/31/2023	12/31/2024	1/1/2025- 12/2/2025
1	<b>90 MW NEW PPA</b>						
2	NW + Talen PPA capacity	90 MW	90 MW	90 MW	90 MW	90 MW	90 MW
3							
4	Energy (MWh)						
5	PPA price (\$/MWh)						
6	PPA cost						
7	Base O&M						
8	<b>Total PPA (line 6+7)</b>						
9							
10	<b>95 MW Replacement</b>						
11	Replacement energy post PPA						
12	Replacement energy (MWh)						
13	Mid-C price (\$/MWh)						
14	<b>Energy replacement</b>						
15							
16	Replacement capacity winter only						
17	Capacity (MW)	95 MW	95 MW	95 MW	95 MW	95 MW	95 MW
18	Capacity charge \$/KW-yr						
19	<b>Capacity replacement cost</b>						
20							



**Scenario 2 - Hedge 95MW**  
**with UTC Staff Alternative Cost Assumptions**

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Line	\$ in millions	12/17/2020- 12/31/2020	12/31/2021	12/31/2022	12/31/2023	12/31/2024	1/1/2025- 12/2/2025
21	90 MW Replacement after PPA Ends						12/3/2020- 12/31/2020
22	Replacement energy post PPA						
23	Replacement energy (MWh)						
24	Mid-C price (\$/MWh)						
25	<b>Energy replacement</b>						
26							
27	Replacement capacity winter only						
28	Capacity (MW)						90 MW
29	Capacity charge \$/KW-yr						
30	<b>Capacity replacement cost</b>						
31							
32	<b>Total cost (line 8+14+19+25+30)</b>						
33							
34	Total capacity	185 MW	185 MW	185 MW	185 MW	185 MW	185 MW
35	Total energy MWh						
36	Cost \$/MWh (line 32 / 35)						
37							
38	<b>Total cost NPV (line 32)</b>						
39	<b>Cost \$/MWh (5-year average)</b>						

**Proposed 2020 Budget**

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Line Total	2020	2021	2022	2023	2024	2025
1 Output						
2						
3 O&M Costs						
4 High Calcium						
5 Startup Fuel						
6 Pollution Control Fees						
7 Mercury Control Fees						
8 Water Treatment Chemicals						
9 O&M Maintenance						
10 Overhaul						
11 Reserves						
12 Total						
13						
14 Capital						
15						
16 Total						
17 PSE Unit 4 Share						

**Proposed 2020 Budget**

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	2020	2021	2022	2023	2024	2025
18						
19 <b>Output</b>						
20						
21 <b>O&amp;M Costs</b>						
22 <b>High Calcuim</b>						
23 <b>Startup Fuel</b>						
24 <b>Pollution Control Fees</b>						
25 <b>Mercury Control Fees</b>						
26 <b>Water Treatment Chemicals</b>						
27 <b>O&amp;M Maintenance</b>						
28 <b>Overhaul</b>						
29 <b>Reserves</b>						
30 <b>Total</b>						
31						
32 <b>Capital</b>						

**Cost Breakdown**

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		No Hedging					
	Present Value	12/17/2020- 12/31/2020	12/31/2021	12/31/2022	12/31/2023	12/31/2024	1/1/2025- 12/2/2025
1 <b>Cost</b>							
2 90 MW PPA							
3 Market Replacement							
4 Total							
5							
6 <b>\$/MWh</b>	<b>Average</b>						
7 90 MW PPA							
8 Market Replacement							
9 Total							
10							
11 <b>100% Market Replacement</b>	<b>Present Value</b>						
12 Energy MWh							
13 Rate							
14 Market Value							
15							
16 Capacity MW		95	185	185	185	185	185
17 Capacity charge \$/KW-yr							
18 Capacity Cost							
19							
20 Total							
21							
22	<b>Average</b>						
23 \$/MWh							
24							

**Cost Breakdown**

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	Present Value	12/31/2021	Hedging 12/31/2022	12/31/2023	12/31/2024	1/1/2025-12/2/2025
25						
26						
27 <b>Cost</b>						
28 90 MW PPA						
29 Market Replacement						
30 Total						
31						
32 <b>Average</b>						
33 90 MW PPA						
34 Market Replacement						
35 Total						
36						
37 <b>100% Market Replacement</b>						
38 Energy MWh						
39 Rate						
40 Market Value						
41						
42 Capacity MW			185	185	185	185
43 Capacity charge \$/KW-yr						
44 Capacity Cost						
45						
46 Total						
47						
48 <b>Average</b>						
49 \$/MWh						
50						

**Colstrip Unit 4 Dispatch Assumptions  
with UTC Staff Alternative Cost Assumptions**

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**Assumption Coal Contract**

Line	12/17/2020- 12/31/2020	2020	2021	2022	2023	2024	2025	PPA		Replacment
								1/1/2025- 12/2/2025	1/1/2025- 12/2/2025	Power
1	Energy (MWh)									
2	Revenue (\$'000)									
3	Cost (\$'000)									
4										
5	Market Rate (\$/MWh)									
6	Dispatch costs (\$/MWh)									

O&M Adder	O&M Base Equivalent			Time Frame	MWH	PPA MWH	PPA Costs
	Rate	O&M Base	MWH				
2020				12/15/2020-12/31/2025			
2021				2021			
2022				2022			
2023				2023			
2024				2024			
2025				1/1/2025-12/2/2025			

### PSE's Weighted Average Cost of Capital

Line

1

2	<b>Capital Structure</b>	<b>Ratio</b>	<b>Cost</b>	<b>Weighted Cost</b>	<b>Tax Rate</b>	<b>After-tax Weighted Cost</b>
3	Debt	51.5%	5.50%	2.83%	21.00%	2.24%
4	Equity	48.5%	9.40%	4.56%		4.56%
5	<b>Total</b>	<b>100.0%</b>		<b>7.39%</b>		<b>6.80%</b>