

**EXH. CLS-6HC  
DOCKET UE-20\_\_\_\_  
2020 PSE PCORC  
WITNESS: CINDY L. SONG**

**BEFORE THE  
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND  
TRANSPORTATION COMMISSION,**

**Complainant,**

**v.**

**PUGET SOUND ENERGY,**

**Respondent**

**Docket UE-20\_\_\_\_**

**FIFTH EXHIBIT (HIGHLY CONFIDENTIAL) TO THE  
PREFILED DIRECT TESTIMONY OF**

**CINDY L. SONG**

**ON BEHALF OF PUGET SOUND ENERGY**

**REDACTED  
VERSION**

**DECEMBER 9, 2020**

# 2018 All Resources RFP - SPI Contract Execution



***EMC Decisional***

January 23, 2019

**Zac Yanez**

*Business Initiatives*

# Decisional

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**Decisional:** Based on the RFP evaluation results and subsequent updates presented between July and November 2019\*, the RFP team recommends that the EMC authorize PSE to execute the following contract:

- SPI Biomass PPA (counterparty: Sierra Pacific Industries) 17 MW, 17-year project PPA.

*\*RFP evaluation results and a recommended short list were presented to the EMC in July 2019. The most recent optimization analysis update, presented at the Nov. 2019 EMC meeting, is provided as Appendix A.*



# SPI Biomass PPA Final Terms for Execution

**Seller:**

- Sierra Pacific Industries (SPI)

**Product:**

- Delivery of 17 MW of firm capacity (24/7)
- Delivery of up to 20 MW of energy (3 MW is variable)
- Minimum availability: Nov-Feb, Annual (92% historic)
- Contribution to Peak Capacity: 16 MW



\* The SPI Burlington lumber mill began operating in 2001. The biomass cogeneration facility was added in 2007. Facility is subject to an existing contract with a broker to sell the output through 2020.



**Term:**

- Start: Jan. 1, 2021\*
- 17 years

**Point of Delivery:**

- SPI.CABO.GEN at Fredonia Substation (also point of interconnection)

**Updated pricing:**

Calendar Year	Contract Year	Energy Price (\$/MWh)	Expected Energy Output (MWh/Year)
2021	1	\$	
2022	2	\$	
2023	3	\$	
2024	4	\$	
2025	5	\$	
2026	6	\$	
2027	7	\$	
2028	8	\$	
2029	9	\$	
2030	10	\$	
2031	11	\$	
2032	12	\$	
2033	13	\$	
2034	14	\$	
2035	15	\$	
2036	16	\$	
2037	17	\$	

\*\* Levelized cost of energy is \$

REDACTED VERSION

# SPI Biomass PPA: Key risks and benefits

## Risks and mitigations:

Risk	Responsibility	Impact without mitigation	Proposed PSE mitigation
Availability or production risk	PSE	PSE peak capacity need would be unmet in the short term	Liquidated Damages assessed on counterparty; Trade floor purchases short-term market capacity

## Benefits:

- Operational status, solid operating history, reliable fuel supply and interconnection to PSE’s system
- High-yield capacity contribution from a renewable resource
- No known community or reputational risks
- Consistent with Washington State’s clean energy goals
- Strong counterparty with no project subsidiary
- Quantitative analysis demonstrates that SPI Biomass performs well compared to alternatives on a standalone basis and is selected in all optimization portfolios, including the lowest reasonable cost solution



# APPENDIX A

## Updated optimization analysis results

*(Previously presented to the EMC in July 2019 and November 2019)*



# Updated portfolio optimization as of 11.21.2019

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	
List ID	Project ID	Resource	Project	Nameplate	Peak Capacity Credit	RECs <sup>1</sup>	Recommended Portfolio	
1	18100	Biomass	SPI	17 MW	16 MW		X	
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW		X	
3	18169	MT Wind					X	
4	18169	MT Wind						
5	18170	Wind	Golden Hills Shaped	200 MW	77 MW		X	
6	xxxxx	System PPA	Morgan Stanley Sys PPA	100 MW	81 MW		X	
7		<b>Total Peak Capacity Credits - MWs</b>						
8		<b>Total Annual RECs</b>						
9		<b>Portfolio Benefits - \$M</b>						\$679
10		<b>Portfolio Benefits w/ Carbon Costs as an Adder - \$M<sup>2,3</sup></b>						\$1,179

	2022	2023	2024	2025
Peak Capacity Need	299 MW	292 MW	358 MW	477 MW
Peak Need / (Surplus) after Resources				
REC Need	0	233,449	691,864	700,482
REC Need / (Surplus) after Resources	-2,189,656	-1,956,207	-1,497,791	-1,489,174

1. The annual project RECs in column G do not include 0.2X apprenticeship multiplier.

2. The social cost of carbon at \$62/metric ton in 2007 dollars plus escalation is added to the total portfolio costs as a fixed cost. Source: UTC docket U-190730, Sept 12, 2019.

3. Emission rate of 0.437 metric tons of CO2/MWh for market purchases is included in social cost of carbon calculation.

REDACTED VERSION

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Portfolio Optimization Summary: as of 11.21.2019

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
List ID	Project Resource	Project Nameplate	Peak Capacity Credit	RECs <sup>1</sup>	Recommended Portfolio: Renewables	Backup Portfolio: Renewables	Contingency: No MT, Wind	Optimized Least Cost Portfolio with NO Carbon Costs Consideration	Optimized Least Cost Portfolio with Carbon Costs Consideration		
1	18100 Biomass	SPI	17 MW	16 MW	X	X	X		X		
2	18161 Call Option	BPA Peak Capacity Product	100 MW	53 MW	X	X	X		X		
3a.	18169 MT Wind				X			X			
3b.	18169 MT Wind										
4a.	18173 MT Wind					X					
4b.	18173 MT Wind										
5a.	18170 Wind	Golden Hills Shaped	200 MW	77 MW	X	X	X		X		
5b.	18170 Wind										
6	xxxxx System PPA	Morgan Stanley Sys PPA	100 MW	81 MW	X	X	X		X		
7	18132 Wind										
8	18179 Wind										
9	18166 Wind										
10	18175 Wind										
11	18125 Solar										
12	18127 Solar										
13	18135 Solar										
14	18139 Solar										
15	18131 Solar										
16	18114 Solar										
17	18122 Solar										
18	18163 REC-only										
19	18165 REC-only										
20	UP-002 REC-only										
21	18103 Thermal										
22	XXXXX Thermal										
23	XXXXX Generic	Generic Peaker	237 MW	224 MW							
24	XXXXX Generic	Generic Battery	175 MW	66 MW							
25	Total Peak Capacity Credits - MWs				2,189,656	1,773,109	1,287,005	1,419,558	2,406,449		
26	Total Annual RECs				\$679	\$619	\$739	\$926	\$658		
27	Portfolio Benefits - \$M				\$1,179	\$945	\$827	\$1,046	\$1,206		
28	Portfolio Benefits w/ Carbon Costs as an Adder - \$M <sup>2,3</sup>										

Peak Capacity and REC Need 2022-2025	2022	2023	2024	2025
Peak Capacity Need	299 MW	292 MW	358 MW	477 MW
REC Need	0	233,449	691,864	700,482

1. The annual project RECs in column G do not include 0.2X apprenticeship multiplier.  
 2. The social cost of carbon at \$62/metric ton in 2007 dollars plus escalation is added to the total portfolio costs as a fixed cost. Source: UTC docket U-190730, Sept 12, 2019.  
 3. Emission rate of 0.437 metric tons of CO2/MWh for market purchases is included in social cost of carbon calculation.



REDACTED VERSION

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# 2018 All Resources RFP – BPA Contract Execution



***EMC Decisional***

February 27, 2020

**Zac Yanez**

*Business Initiatives*

# Recommendation

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Based on the RFP short list approved by the EMC in July 2019 and subsequent analysis in the reevaluation period, between July 2019 and February 2020\*, the RFP has updated the portfolio optimization results in appendix A. The team recommends that the EMC authorize PSE to execute the following contract:

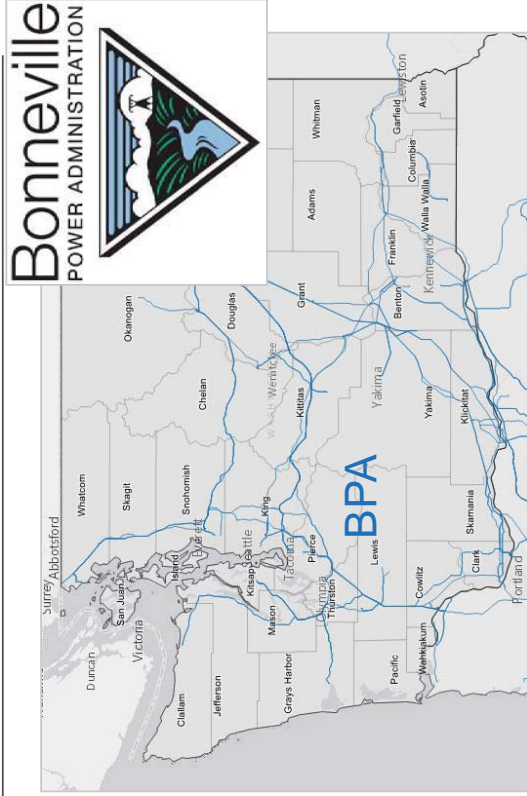
- Bonneville Power Administration Capacity Tolling Agreement, CTA, (counterparty: BPA) 100 MW, 5-year day ahead call PPA.



*\*RFP evaluation results and a recommended short list were presented to the EMC in July 2019, with an updated optimization presented at the Nov. 2019 EMC. The optimization analysis has been updated again on Feb 20th and is provided as Appendix A.*

# Selected proposal: BPA Capacity Tolling Agreement (CTA)

- Seller:**
- Bonneville Power Administration (BPA)
- Product:**
- Capacity: 100 MW Name Plate (53 MW peak capacity credit)
  - Firm Capacity that may be scheduled in increments from [REDACTED] MW on a day ahead basis for up to [REDACTED] a day
  - Western Systems Power Pool (WSPP) Schedule C, heavy load hour (HLH), low carbon firm energy



**Term:**

- Start: 01/01/2022
- Term: 5 years

**Point of Delivery:**

- BPAT.PSEI
- PSE Covington 230 kV Substation



**Pricing\*:**

Calendar Year	Contract Year	Energy Price (\$/MWh)	Possible Energy Output (MWH/Year)	Capacity Price (\$/kW-mo)	Capacity (MW)
2022	1	[REDACTED]	[REDACTED]	[REDACTED]	100
2023	2	[REDACTED]	[REDACTED]	[REDACTED]	100
2024	3	[REDACTED]	[REDACTED]	[REDACTED]	100
2025	4	[REDACTED]	[REDACTED]	[REDACTED]	100
2026	5	[REDACTED]	[REDACTED]	[REDACTED]	100

\*Mid-C price will be based on [REDACTED] price for each MWh delivered.  
 \*\*Capacity Price [REDACTED] that will be indexed to BPA PTP and Ancillary Service Schedules 1 & 2. Rate will be updated on the first day of each new rate period.

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# BPA Day Ahead Capacity: Key risks and benefits

## Risks and mitigations:

Risk	Responsibility	Impact without mitigation	Proposed mitigation
Market exposure to real-time hourly price	PSE	Potentially higher energy costs	Trade floor may manage day ahead position to minimize exposure to real-time prices

## Benefits:

- Very strong counterparty with minimal risk of default
- No development risk
- Low carbon resource, aligns with Washington State’s clean energy goals
  - Energy delivered from BPA’s system will be certified as an Asset Controlling Supplier (ACS) product, typically 95% carbon free\*
- Quantitative analysis demonstrates that BPA Capacity CTA performs well compared to alternatives on a standalone basis and is selected in all optimization portfolios. This product is selected as part of the of the lowest reasonable cost portfolio.

\* As reported to the California Air Resources Board (CARB)



# Recommendation

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Based on the RFP short list approved by the EMC in July 2019 and subsequent analysis in the reevaluation period, between July 2019 and February 2020\*, the RFP has updated the portfolio optimization results in appendix A. The team recommends that the EMC authorize PSE to execute the following contract:

- Bonneville Power Administration Capacity Tolling Agreement, CTA, (counterparty: BPA) 100 MW, 5-year day ahead call PPA.



*\*RFP evaluation results and a recommended short list were presented to the EMC in July 2019, with an updated optimization presented at the Nov. 2019 EMC. The optimization analysis has been updated again on Feb 20th and is provided as Appendix A.*

# APPENDIX

## Optimization analysis results 02/20/2020



# Updated portfolio optimization (final contract prices received 2/20/2020)

(A) (B) (C) (D) (E) (F) (G) (H)

List	Project ID	Resource	Project	Nameplate	Peak Capacity		RECs <sup>1</sup>	Recommended Portfolio: + Renewables	
					Credit	REC			
1	18100	Biomass	SPI	17 MW	16 MW			X	
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW			X	
3	18169	MT Wind						X	
4	18170	Wind	Golden Hills Shaped	200 MW	77 MW			X	
5	xxxx	System PPA	Morgan Stanley Sys PPA	100 MW	79 MW			X	
6	Total Peak Capacity Credits - MWs								
7	Total Annual RECs								
8	Portfolio Benefits - \$M							\$706	
9	Portfolio Benefits w/ Carbon Costs as an Adder - \$M <sup>2,3,4</sup>								\$1,155

## Peak Capacity and REC Need 2022-2025

	2022	2023	2024	2025
Peak Capacity Need	299 MW	292 MW	358 MW	477 MW
Peak Need/(Surplus) after Resources				
REC Need	0	233,449	691,864	700,482
REC Need	-2,189,656	-1,956,207	-1,497,791	-1,489,174

- The annual project RECs in column G does not include 0.2X apprenticeship multiplier.
- Social cost of carbon at \$62/metric ton in 2007 dollars plus escalation is added to total portfolio costs as fixed cost, source UTC docket U-190730, Sept 12, 2019.
- Emission rate of 0.437 metric tons of CO2 / MWh for market purchases is added into social cost of carbon calculation.
- Recommended Portfolio has been updated to reflect final price and the emissions treatment of the MSCG proposal

REDACTED VERSION

REDACTED VERSION

# Portfolio Optimization Summary: as of 11.21.2019

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
List	Project ID	Resource	Project	Nameplate	Peak Capacity	RECs <sup>1</sup>	Recommended Portfolio: Renewables	Backup Portfolio: Renewables	Contingency Portfolio: No MT Wind	Optimized Least Cost Portfolio with NO Carbon Costs Consideration	Optimized Least Cost Portfolio with Carbon Costs Consideration
1	18100	Biomass	SPI	17 MW	16 MW		X	X	X		X
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW		X	X			X
3a.	18169	MT Wind					X			X	
3b.	18169	MT Wind									
4a.	18173	MT Wind						X			
4b.	18173	MT Wind									
5a.	18170	Wind	Golden Hillis Shaped	200 MW	77 MW		X	X			X
5b.	18170	Wind							X		
6	xxxxx	System PPA	Morgan Stanley Sys PPA	100 MW	81 MW		X	X	X		X
7	18132	Wind							X		
8	18179	Wind									
9	18166	Wind									
10	18175	Wind									
11	18125	Solar									
12	18111	Solar									
13	18127	Solar									
14	18135	Solar									
15	18139	Solar							X		X
16	18131	Solar									
17	18114	Solar									
18	18122	Solar									
19	18163	REC-only									
20	18165	REC-only									
21	UP-002	REC-only									
22	18103	Thermal							X		X
23	XXXXX	Thermal									
24	XXXXX	Generic	Generic Peaker	237 MW	224 MW						
25	XXXXX	Generic	Generic Battery	175 MW	66 MW						
26	Total Peak Capacity Credits - MWs						MM	MM	MM	MM	MM
27	Total Annual RECs						2,189,656	1,773,109	1,297,005	1,419,558	2,406,449
28	Portfolio Benefits - \$M						\$679	\$619	\$739	\$926	\$658
29	Portfolio Benefits w/ Carbon Costs as an Adder - \$M <sup>2,3</sup>						\$1,179	\$945	\$827	\$1,046	\$1,206

Peak Capacity and REC Need 2022-2025				
Peak Capacity Need	2022	2023	2024	2025
Peak Capacity Need	299 MW	292 MW	358 MW	477 MW
REC Need	0	233,449	691,864	700,482

1. The annual project RECs in column G do not include 0.2X apprenticeship multiplier.  
 2. The social cost of carbon at \$62/metric ton in 2007 dollars plus escalation is added to the total portfolio costs as a fixed cost. Source: UTC docket U-190730, Sept 12, 2019.  
 3. Emission rate of 0.437 metric tons of CO2/MWh for market purchases is included in social cost of carbon calculation.



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# 2018 All Resources RFP – Morgan Stanley Contract Execution



PUGET  
SOUND  
ENERGY

***EMC Decisional***

February 27, 2020

**Zac Yanez**

*Business Initiatives*

# Recommendation

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Based on the RFP short list approved by the EMC in July 2019 and subsequent analysis in the reevaluation period, between July 2019 and February 2020\*, the RFP has updated the portfolio optimization results in appendix A. The team recommends that the EMC authorize PSE to execute the following contract:

- Morgan Stanley System PPA (counterparty: MSCG) 100 MW, 5-year winter heavy load hour PPA. (Unsolicited Proposal)



*\*RFP evaluation results and a recommended short list were presented to the EMC in July 2019, with an updated optimization presented at the Nov. 2019 EMC. The optimization analysis has been updated again and is provided as Appendix A.*

# Selected proposal: Morgan Stanley System PPA (Unsolicited Proposal)

- Seller:**
- Morgan Stanley Capital Group
- Point of Delivery:**
- BPAT.PSEI or other PSE designated point
- Product:**
- 100 MW of firm heavy load hour (HLH) energy (6 days, 16 hours per day)
  - WSPP Schedule C system purchase
    - Unspecified system purchase\*
  - Fixed Priced PPA \$ [REDACTED] /MWh
  - **Q1 and Q4 deliveries only**
  - 79 MW peak capacity contribution
- Term:**
- Starting 1/1/2022
  - 5 Year

**\*Note:**

Morgan Stanley included the option to purchase a “carbon free” product sourced from their portfolio. The “carbon free” product would not include environmental attributes (RECs) and was deemed to have the same emissions as an unspecified system purchase, based on Washington treatment. The “carbon free” product was priced at \$ [REDACTED] Absent the REC the “carbon free” product has higher cost but the same social cost of carbon as the system purchase. For this reason the system purchase was selected.



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# MSCG System PPA (Unsolicited Proposal): Key risks and benefits

## Risks and mitigations:

Risk	Responsibility	Impact without mitigation	Proposed PSE mitigation
Performance risk	PSE	PSE peak capacity need would be unmet in the short term	Liquidated Damages assessed on counterparty; short-term purchases of market capacity

## Benefits:

- Existing counterparty with good reputation
- Delivered product that provides capacity benefits at relatively low pricing
- Fixed pricing reduces exposure to market price volatility (~ [REDACTED] MWh/year)
- Quantitative analysis demonstrates that MSCG System PPA performs well compared to alternatives and is selected as part of the of the lowest reasonable cost portfolio.

## Consideration:

- Unspecified system purchase, and is deemed to have the market emissions rate



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VERSION

# Recommendation

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Based on the RFP short list approved by the EMC in July 2019 and subsequent analysis in the reevaluation period, between July 2019 and February 2020\*, the RFP has updated the portfolio optimization results in appendix A. The team recommends that the EMC authorize PSE to execute the following contract:

- Morgan Stanley System PPA (counterparty: MSCG) 100 MW, 5-year winter heavy load hour PPA. (Unsolicited Proposal)



*\*RFP evaluation results and a recommended short list were presented to the EMC in July 2019, with an updated optimization presented at the Nov. 2019 EMC. The optimization analysis has been updated again and is provided as Appendix A.*

# APPENDIX

## Optimization analysis results 02/20/2020



# Updated portfolio optimization (final contract prices received 2/20/2020)

(A) (B) (C) (D) (E) (F) (G) (H)

Project List ID	Resource	Project	Nameplate	Peak Capacity		RECs <sup>1</sup>	Recommended Portfolio: Clearwater + Renewables
				Credit	RECs		
1	Biomass	SPI	17 MW	16 MW			X
2	Call Option	BPA Peak Capacity Product	100 MW	53 MW			X
3	MT Wind						X
4	Wind	Golden Hills Shaped	200 MW	77 MW			X
5	System PPA	Morgan Stanley Sys PPA	100 MW	79 MW			X
6	Total Peak Capacity Credits - MWs						
7	Total Annual RECs						
8	Portfolio Benefits - \$M						\$706
9	Portfolio Benefits w/ Carbon Costs as an Adder - \$M <sup>2,3,4</sup>						\$1,155

## Peak Capacity and REC Need 2022-2025

	2022	2023	2024	2025
Peak Capacity Need	299 MW	292 MW	358 MW	477 MW
Peak Need/(Surplus) after Resources	MW	MW	MW	MW
REC Need	0	233,449	691,864	700,482
REC Need	-2,189,656	-1,956,207	-1,497,791	-1,489,174

- The annual project RECs in column G does not include 0.2X apprenticeship multiplier.
- Social cost of carbon at \$62/metric ton in 2007 dollars plus escalation is added to total portfolio costs as fixed cost, source UTC docket U-190730, Sept 12, 2019.
- Emission rate of 0.437 metric tons of CO<sub>2</sub> / MWh for market purchases is added into social cost of carbon calculation.
- Recommended Portfolio has been updated to reflect final price and the emissions treatment of the MSCG proposal

REDACTED VERSION

REDACTED VERSION

# Portfolio Optimization Summary: as of 11.21.2019

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
List	Project ID	Resource	Project	Nameplate	Peak Capacity Credit	RECs <sup>1</sup>	Recommended Portfolio: Renewables	Backup Portfolio: Renewables	Contingency Portfolio: No MT Wind	Optimized Least Cost Portfolio with NO Carbon Costs Consideration	Optimized Least Cost Portfolio with Carbon Costs Consideration
1	18100	Biomass	SPI	17 MW	16 MW		X	X	X		X
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW		X	X	X		X
3a.	18169	MT Wind					X			X	
3b.	18169	MT Wind									
4a.	18173	MT Wind					X				
4b.	18173	MT Wind									
5a.	18170	Wind	Golden Hillis Shaped	200 MW	77 MW		X	X	X		X
5b.	18170	Wind									
6	xxxxx	System PPA	Morgan Stanley Sys PPA	100 MW	81 MW		X	X	X		X
7	18132	Wind									
7	18179	Wind									
8	18166	Wind									
9	18175	Wind									
10	18125	Solar									
11	18111	Solar									
12	18127	Solar									
13	18135	Solar									
14	18139	Solar									
15	18131	Solar							X		X
16	18114	Solar									
17	18122	Solar									
18	18163	REC-only									
19	18165	REC-only									
20	UP-002	REC-only									
21	18103	Thermal							X		X
22	XXXXX	Thermal									
23	XXXXX	Generic	Generic Peaker	237 MW	224 MW						
24	XXXXX	Generic	Generic Battery	175 MW	66 MW						
25											
26							2,189,656	1,773,109	1,297,005	1,419,558	2,406,449
27							\$679	\$619	\$739	\$926	\$658
28							\$1,179	\$945	\$827	\$1,046	\$1,206

CONFIDENTIAL

Peak Capacity and REC Need 2022-2025				
Peak Capacity Need	2022	2023	2024	2025
Peak Capacity Need	299 MW	292 MW	358 MW	477 MW
REC Need	0	233,449	691,864	700,482

1. The annual project RECs in column G do not include 0.2X apprenticeship multiplier.  
 2. The social cost of carbon at \$62/metric ton in 2007 dollars plus escalation is added to the total portfolio costs as a fixed cost. Source: UTC docket U-190730, Sept 12, 2019.  
 3. Emission rate of 0.437 metric tons of CO2/MWh for market purchases is included in social cost of carbon calculation.



REDACTED VERSION

REDACTED VERSION



# 2018 All Resources RFP Golden Hills PPA Execution



## *EMC Decisional*

April 23, 2020

**Cindy Song**

*Manager, Business Initiatives*

**Zac Yanez**

*Commercial Acquisition Manager*

# Decisional

**Decisional:** Based on analysis performed to date for the 2018 RFP, the business initiatives team requests that the EMC authorize PSE to seek board approval at the board meeting on May 7, 2020 to execute the following contract:

- Golden Hills PPA (counterparty: Avangrid Renewables) 200 MW, 20-year PPA from a wind project paired with a shaped product\* to deliver up to [REDACTED] MW capacity during winter peak hours (November – February, [REDACTED] & [REDACTED]).

\*PSE plans to file for determination on compliance with RCW 80.80.40 upon execution of the PPA contract. Depending on the outcome of the determination, PSE may move forward with the unshaped product instead to mitigate compliance risk for emission performance standard RCW 80.80.40 (as indicated on slide #8).



# Golden Hills PPA overview

**Seller:**

- Avangrid Renewables, Inc.

**Product:**

- 200MW Wind + Winter shaped product
- NCF from wind project: [REDACTED]
- Winter shaped product: [REDACTED] MW during [REDACTED] & [REDACTED] for Nov - Feb
- Expected output: ~ [REDACTED] MWh/year
- Expected annual payment: ~\$34M/year

**Term:**

- COD: 12/31/2021
- Term: 20 years

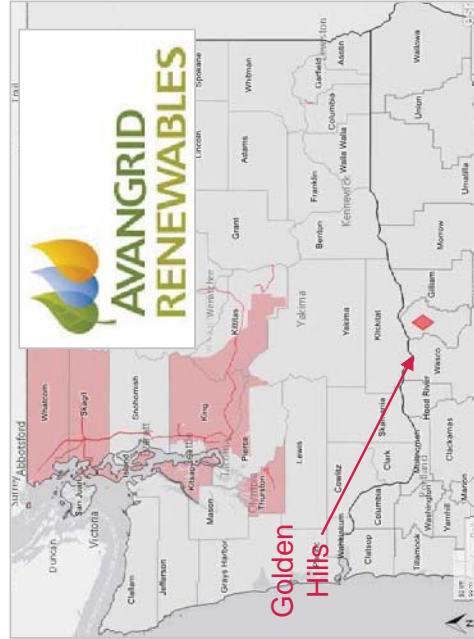
**Point of Delivery:**

- BPAT.PSEI

**Price:**

Calendar Year	Contract Year	PPA	
		Flat Energy Price (\$/MWh)	Expected Energy Output (MWh/year)
2022	1	[REDACTED]	[REDACTED]
2023	2	[REDACTED]	[REDACTED]
2024	3	[REDACTED]	[REDACTED]
2025	4	[REDACTED]	[REDACTED]
2026	5	[REDACTED]	[REDACTED]
2027	6	[REDACTED]	[REDACTED]
2028	7	[REDACTED]	[REDACTED]
2029	8	[REDACTED]	[REDACTED]
2030	9	[REDACTED]	[REDACTED]
2031	10	[REDACTED]	[REDACTED]
2032	11	[REDACTED]	[REDACTED]
2033	12	[REDACTED]	[REDACTED]
2034	13	[REDACTED]	[REDACTED]
2035	14	[REDACTED]	[REDACTED]
2036	15	[REDACTED]	[REDACTED]
2037	16	[REDACTED]	[REDACTED]
2038	17	[REDACTED]	[REDACTED]
2039	18	[REDACTED]	[REDACTED]
2040	19	[REDACTED]	[REDACTED]
2041	20	[REDACTED]	[REDACTED]

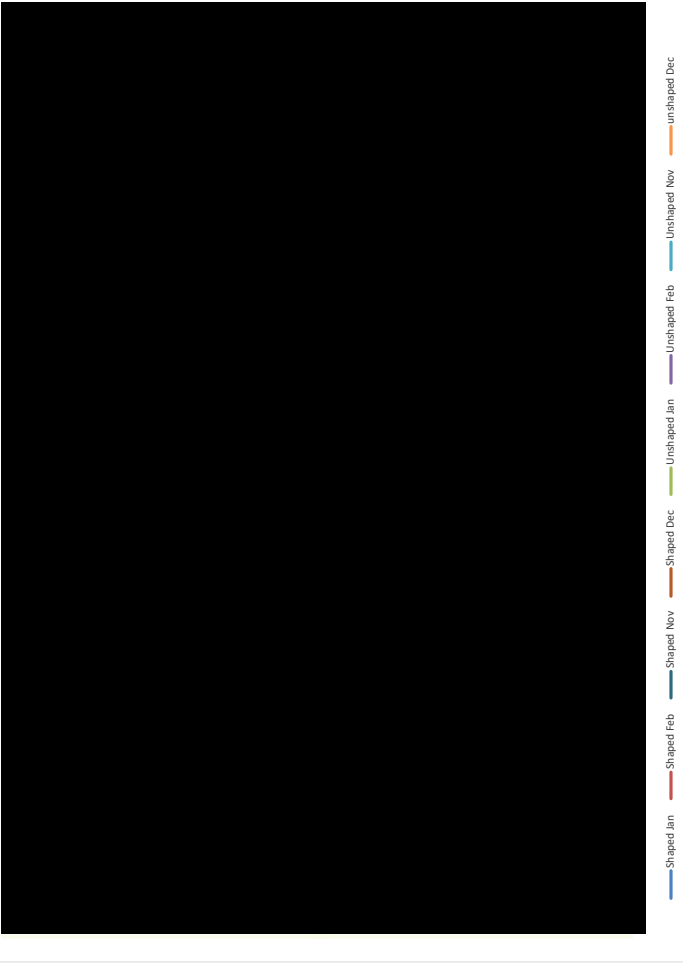
Winter-Peaking Capacity	
Winter Month Capacity Price (\$/kW-mo)	Peak Hour Capacity (MW)
[REDACTED]	[REDACTED]



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# The uniquely shaped product during winter months yields 25 MW higher peak capacity contribution

Avangrid Renewables offered a synthetic peak capacity output profile for winter months (Nov-Feb) that reshapes the wind output in those months to optimize the coincidence to PSE's load profile.



- As generated, Golden Hills Wind has an ELCC of 26%, a peak capacity contribution of 52 MW.
- The reshaped wind product offers an ELCC of 39%, a peak capacity contribution of 77 MW.

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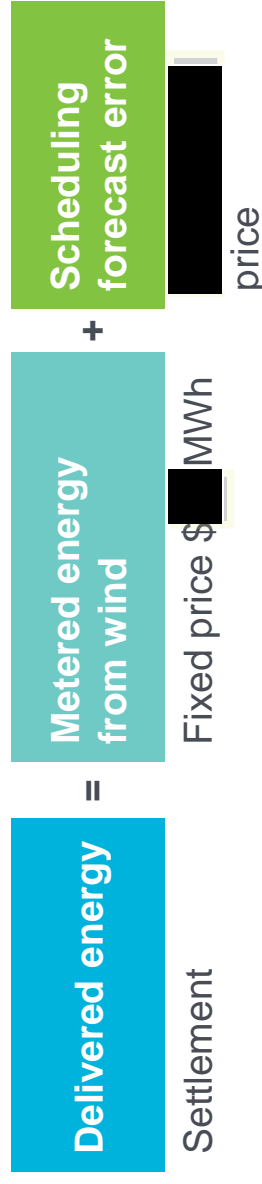


Shaped product introduces exposure to [REDACTED] price due to settlement for energy delivered

**Winter super peak hours – Nov to Feb**



**Non-winter super peak hours**



Forecast error occurs due to intermittent nature of wind and the difference in the forecasted energy at the time of schedule (75 minutes before the hour of flow) and the amount of energy actually metered during the hour.

**Risk exposure due to [REDACTED] pricing currently under analysis.**

# Represented labor and apprenticeship labor

- Avangrid Renewables will require EPC contractor to utilize a Project Labor Agreement or Community Workforce Agreement for major construction activities with LIUNA and IBEW unions at an additional cost of up to \$[REDACTED]/MWh
  - Expect annual payment up to ~\$[REDACTED]/year to use union labor, or \$[REDACTED] NPV over the life of the 20-year PPA
  - Current RFP: Clearwater MT wind PPA will not have the same language due to project location
  - Implications for future RFPs: should we make this a requirement going forward?
- Avangrid Renewables will also use apprenticeship labor
  - Project will qualify for 1.2x REC multiplier for up to \$[REDACTED]/MWh adder
  - Expect annual payment up to ~\$1[REDACTED]/year or \$[REDACTED] NPV over the life of the 20-year PPA

Union Labor	+	Apprenticeship	=	Labor Adder (Total Project Cost)
\$[REDACTED] M		\$[REDACTED] M		\$[REDACTED] M



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# Key risks & mitigation plan

Risk	Responsibility	Impact without mitigation	Proposed PSE mitigation
Commercial operation delay – construction / COVID-19	Avangrid	Capacity deficit	Liquidated Damages assessed on counterparty; manage with short term purchases
Available long-term firm transmission ( [REDACTED] MW) is less than project nameplate capacity (200 MW)	Avangrid	Possible impact to energy delivery in excess of [REDACTED] MW	Excess energy that is not delivered to PSE system will be delivered to Mid-C and priced below market
Shaped product resource pool may not be 100% renewable	PSE	May misalign with CETA requirements	Will require carbon mitigation strategy starting in 2030
Seller may use unspecified marked purchases to resupply shaped winter energy. Coal or other high emission power could mistakenly be delivered to PSE (operational error)	Avangrid	Exposes PSE to CETA fines and to Emissions Performance Standard	Avangrid barred from using coal powered resource for resupply. PSE limited to 12% unspecified source deliveries and may terminate contract.
Mid-C price risk	PSE	<p><b>Winter super peak</b></p> <p>[REDACTED] (Nov – Feb between [REDACTED] &amp; [REDACTED])</p> <ul style="list-style-type: none"> <li>Scheduled &gt; metered: settled at Mid-C monthly average price</li> <li>Scheduled &lt; metered: settled at Mid-C hourly price</li> </ul> <p><b>Non-winter super peak</b></p> <ul style="list-style-type: none"> <li>Forecast error settled at real time hourly Mid-C price</li> </ul>	<p>None. Monthly average Mid-C price provides PSE with hedge against real-time price volatility during highest winter load hours.</p> <p>Risk control team working on risk analysis to quantify PSE's exposure.</p> <p style="text-align: right;">  7</p>

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# Shaped product delivered from unspecified sources

## Emissions Performance Standard and CETA risks and mitigation

Since the shaped product will be delivered from the wind project and other resources from Avangrid's generation assets or market purchases, there are potential EPS and CETA compliance risks:

### **RCW 80.80.40 (EPS)**

#### Risks

- For a contract with multiple sources, each source must pass the EPS (925 lbs/MWh)
- 12% annual limit on unspecified sources

#### Mitigation

- Avangrid will limit market purchases to 12% and supply from existing compliant portfolio.
- Winter shaped product contingent upon EPS compliance determination filing. If the determination ruling is negative, PSE has the option to go with the unshaped product.

### **RCW 19.405 (CETA)**

#### Risks

- No coal fired resources starting in 2026
- Carbon Neutral after 2030
- Uncertainty from current CETA rulemaking

#### Mitigation

- Avangrid is prohibited from supplying coal fired resource, will have to pay penalty if accidental delivery happens.
- PSE can terminate PPA if delivery happens more than 4 times.
- PSE would have to mitigate carbon from resupply starting in 2030.





# Mitigation strategy to manage EPS compliance risk – option to convert to unshaped product

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## Shaped product contingent upon EPS compliance

1. Super peak hours are being supplied by:
  - Golden Hills wind project
  - Avangrid's portfolio of compliant resources including hydro, thermal, and wind resources
  - Other short term purchases from specified compliant resources
  - 12% limit from unspecified resources
  - Prohibit coal resource delivery
2. After review by internal stakeholders there is confidence that proposed contract structure satisfies the EPS.
3. PSE has the option to convert the PPA from a shaped product to an as-generated PPA in the unlikely event there is an unfavorable determination on EPS compliance.
4. Alternatives analysis shows that the unshaped product is the best remaining alternative to meet PSE's peak capacity need.

## Modified terms for unshaped product

- PPA reverts to as-generated resource (wind only)
- ELCC: ~26%
- Term: 20 years
- Point of Delivery: BPAT.PSEI
- Expected Output: ~ [REDACTED] MWh
- **Fixed Price:** \$ [REDACTED] MWh
- Expected Annual Payment: ~ \$31M/ year
- Portfolio effects: Portfolio cost including social cost of carbon increases by about ~\$22M relative to the shaped product
- Still part of the optimal portfolio



# Key benefits

- Incremental wind asset with shaped capacity product provides contribution to both RPS and capacity needs identified in the 2018 RFP
- Avangrid will provide firm transmission delivered to PSE system for up to [REDACTED] MW of the 200 MW project capacity
- Avangrid will balance project through Avangrid balancing authority alleviating need for PSE's resources to provide flexible ramping capacity for wind variability after T-75
- The "as generated" delivery of wind and bundled RECs is consistent with Washington state's clean energy goals
- Winter super peak delivery guarantee provides PSE with hedge against volumetric risk and real-time price volatility during highest winter load hours
- Option to shift winter shape available allowing optimization to demand need
- Quantitative analysis demonstrates that Golden Hills PPA (shaped) performs well compared to alternatives on a standalone basis and is selected in all optimization portfolios, including the lowest reasonable cost solution
- Project is "shovel-ready"
- Strong counterparty with a parent guarantee



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# Permitting status

Status	Permit	Agency	Notes
	Clean Water Act, Section 404	U.S. Army Corps of Engineers	Not required, wetland/streams avoided
	Proposed Construction and Actual Construction	Federal Aviation Administration	DNHs obtained for all turbine locations
	Site Certificate *	Oregon Energy Facilities Siting Council	Complete
	Archaeological Permit	Oregon Department of Parks and Recreation, SHPO	Not required
	Conditional Use Permit	Sherman County	Complete, approval delegated under Site Certificate

Status	Permit	Agency	Est Date	Notes
	Water Right Permit or Water Use Authorization	Oregon Water Resources Department	Jan 2021	O&M will use exempt well. EPC contractor to provide construction water.
	Construction Storm Water Permit 1200-C	Oregon Department of Environmental Quality	Dec 2020	EPC contractor to provide
	Building Permit	Sherman County	Feb 2021	EPC contractor to provide



# Outstanding issues as of April 21

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- Working on finalizing contract terms with Avangrid
- Price negotiation with Avangrid on use of represented labor and apprenticeship labor, currently priced at additional [REDACTED]/MWh and \$[REDACTED]/MWh, respectively
- Obtain detailed project schedule from Avangrid
- Risk analysis to quantify Mid-C price risk exposure

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# Decisional

**Decisional:** Based on analysis performed to date for the 2018 RFP, the business initiatives team requests that the EMC authorize PSE to seek board approval at the board meeting on May 7, 2020 to execute the following contract:

- Golden Hills PPA (counterparty: Avangrid Renewables) 200 MW, 20-year PPA from a wind project paired with a shaped product\* to deliver up to 150 MW capacity during winter peak hours (November – February, [REDACTED] & [REDACTED]).

\*PSE plans to file for determination on compliance with RCW 80.80.40 upon execution of the PPA contract. Depending on the outcome of the determination, PSE may move forward with the unshaped product instead to mitigate compliance risk for emission performance standard RCW 80.80.40 (as indicated on slide #8).



# APPENDIX A

## Updated optimization analysis results



# Portfolio Optimization Results as of 04.23.2020

(A) (B) (C) (D) (E) (F) (G) (H)

List	Project ID	Resource	Project	Nameplate	Peak Capacity Credit		RECs <sup>1</sup>	Portfolio Benefits
					(D)	(E)		
1	18100	Biomass	SPI	17 MW	16 MW			
2	18161	Call Option	BPA Peak Capacity Product	100 MW	53 MW			
3	18169	MT Wind						
4	18170	Wind	Golden Hills Shaped	200 MW	77 MW			
5	xxxxx	System PPA	Morgan Stanley Sys PPA	100 MW	79 MW			
6		Total Peak Capacity Credits - MWs						
7		Total Annual RECs						
8		Portfolio Benefits - \$M						\$703
9		Portfolio Benefits w/ Carbon Costs as an Adder - \$M <sup>2,3,4</sup>						\$1,162

## Peak Capacity and REC Need 2022-2025

	2022	2023	2024	2025
Peak Capacity Need	299 MW	292 MW	358 MW	477 MW
Peak Need/(Surplus) after Resources				
REC Need	0	233,449	691,864	700,482
REC Need	-2,189,656	-1,956,207	-1,497,791	-1,489,174

1. The annual project RECs in column G does include 0.2X apprenticeship multiplier.

2. Social cost of carbon at \$62/metric ton in 2007 dollars plus escalation is added to total portfolio costs as fixed cost, source UTC docket U-190730, Sept 12, 2019.

3. Emission rate of 0.437 metric tons of CO<sub>2</sub> / MWh for market purchases is added into social cost of carbon calculation.

4. Recommended Portfolio has been updated to reflect final price and the emissions treatment of the MSCG proposal

5. Represented labor cost addition of [REDACTED] in 2020 dollars for Golden Hills

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# Alternatives analysis for unshaped Golden Hills project

Peak capacity need								
Line	Units in MW unless if otherwise indicated	2020	2021	2022	2023	2024	2025	2026
1	Peak Need	5,814	5,871	5,908	5,948	6,046	6,121	6,187
2	Resources exclude RFP projects & Colstrip Unit 4 sale	5,845	5,904	5,609	5,656	5,688	5,645	5,062
3	<b>Deficit as shown for 2018 RFP</b>	<b>-32</b>	<b>-33</b>	<b>299</b>	<b>292</b>	<b>358</b>	<b>476</b>	<b>1,125</b>
4								
5	Colstrip 4 sale	-	95	95	95	95	95	-
6	<b>Deficit w/ Colstrip 4 Sale</b>	<b>-32</b>	<b>62</b>	<b>394</b>	<b>387</b>	<b>453</b>	<b>571</b>	<b>1,125</b>
7								
8	2018 RFP Projects without Golden Hills							
9	SPI	-	16	16	16	16	16	16
10	BPA	-	-	54	54	54	54	54
11	Morgan Stanley	-	-	79	79	79	79	79
12								
13	Subtotal	-	16					
14								
15	<b>Deficit w/ RFP Projects without Golden Hills</b>	<b>(32)</b>	<b>46</b>					

## Alternatives analysis for unshaped Golden Hills project

	Net cost	Cost with CO <sup>2</sup> and capacity value
16	\$165.9	(\$20.2)
17	<b>\$150.6</b>	<b>\$2.0</b>
18	\$224.9	\$70.1
19	\$257.6	\$28.9
20	\$141.6	\$23.5
21	\$84.4	\$17.3
22	\$156.7	\$117.1

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# Addendum – April 23, 2020

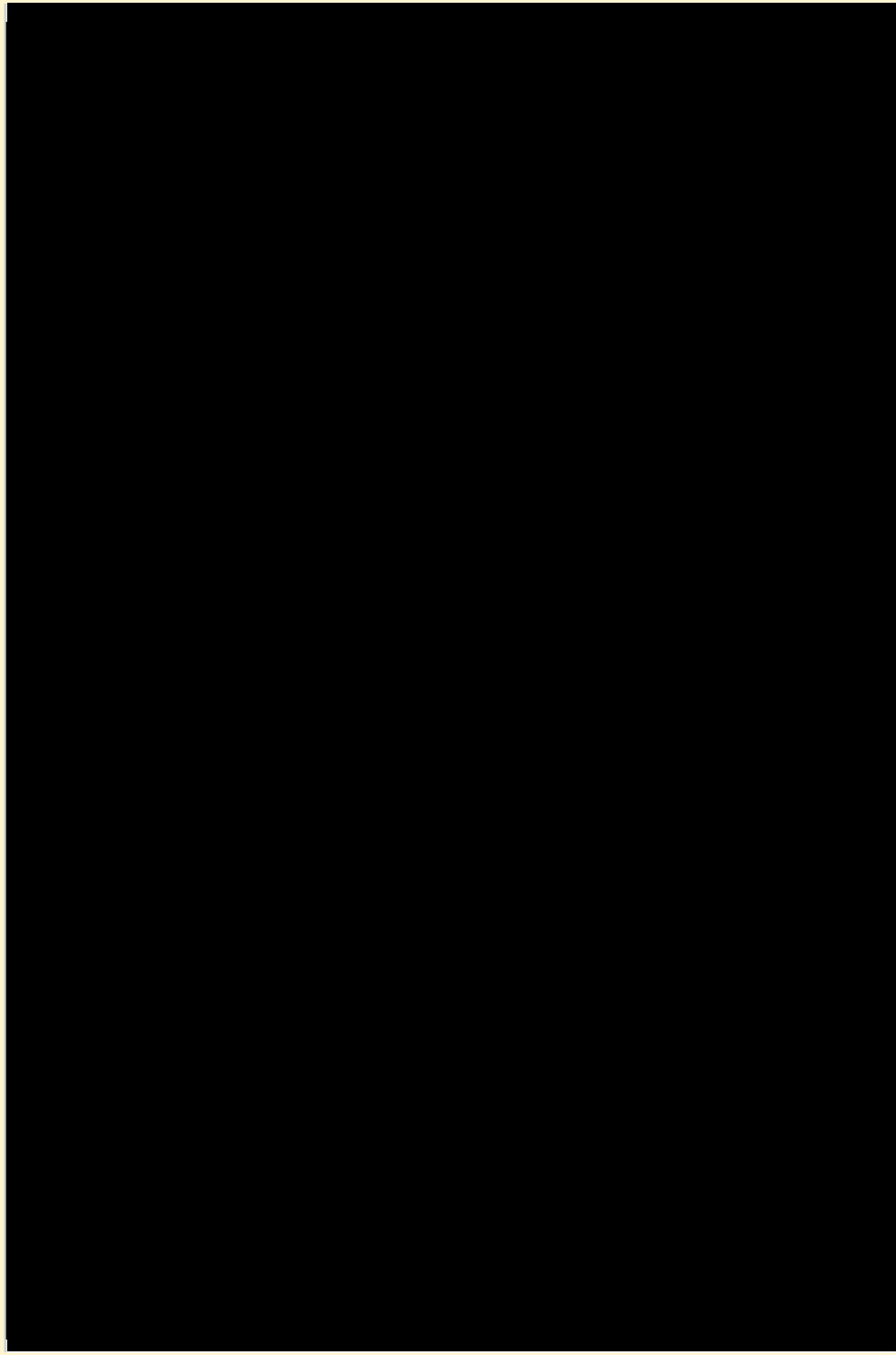
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- Price for use of apprenticeship labor negotiated from \$ [REDACTED] /MWh to \$ [REDACTED] /MWh
- Preliminary risk analysis based on Aurora prices shows that floating price exposure is between -\$1.6M (price  $\uparrow$   $2\sigma$ ) and +\$0.9M (price  $\downarrow$   $2\sigma$ )
- Guaranteed COD shifted 6 months from Dec 2021 to Jun 2022
  - PSE has walk away rights, if
    - Construction has not started by Nov 30, 2020
    - Turbine purchase has not occurred by Apr 1, 2021
    - COD has not occurred by Dec 31, 2022
  - Mitigation plan for capacity shortfall: execute separate WSPP contract under schedule C to provide interim supply to accommodate later COD and protect against construction delays. Interim supply contract terminates at project COD.

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# Project schedule for June 2022 COD



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# Golden Hills Bridge Capacity – Interim Supply



***EMC Decisional***

May 21, 2020

***Zacarias Yanez***

*Commercial Acquisition Manager*

# Recommendation

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**Decisional:** Based on analysis performed to date for the 2018 RFP, and the EMC and Board approval of the Golden Hills PPA, the business initiatives team requests that the EMC authorize PSE to execute the following contract:

- Golden Hills Bridge Capacity contract – Interim Supply (counterparty: Avangrid Renewables) WSPP Schedule C for 150 MW capacity during Heavy Load Hours for the months of January, February, November, and December 2022.



# Golden Hills Bridge Capacity - Terms

**Seller:**

- Avangrid Renewables, Inc.

**Product:**

- **Bridge to accommodate COVID related and other construction delays with the Golden Hills Shaped PPA**

- Term : January, February, November, and December of 2022
  - Bridge terminates when Golden Hills wind project achieves commercial operation, Guarantee COD is June 2022
- Point of Delivery: BPAT.PSEI
- 150 MW per hour delivered during Heavy Load Hours (HE 7:00 – HE 22:00)
- Expected output January and February\*: [REDACTED] MWh
- Expected Payment\*: ~\$5M for January and February

- *Price:*

Month	Price
Jan	\$ [REDACTED] or (MidC Day Ahead * (1+ Loss Load Factor))+\$ [REDACTED]
Feb	\$ [REDACTED] or (MidC Day Ahead * (1+ Loss Load Factor))+\$ [REDACTED]
Nov	(MidC Day Ahead * (1+ Loss Load Factor))+\$ [REDACTED]
Dec	(MidC Day Ahead * (1+ Loss Load Factor))+\$ [REDACTED]

\*Note: November and December will only be active if COD is not met due to continued delays.



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# Golden Hills Bridge Capacity - Need

- Golden Hills Shaped PPA provides 77 MW of capacity and is part of recommend portfolio.
- At the time when the RFP short list was selected, July 2019, Golden Hills was expected to be operational in late 2021 and provide capacity benefits for 2022.
- April of 2020, near the final stages of negotiations, Avangrid requested a change in COD to June of 2022 due to anticipated COVID delays.
- In exchange to agreeing to the 6 month COD delay, PSE asked Avangrid to provide a bridge product for the potential capacity shortfall.
- Bridge agreement provides physical capacity during winter months if Golden Hills is not operational during 2022

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# Golden Hills Bridge Capacity – Fixed versus Index

- For January and February, only, Avangrid offered both a fixed price and index price structure
- Fixed price option is priced closely to current forward marks plus delivery adders
- Business Initiatives recommends fixed price option since it limits market price risk during January and February
- Fixed price option provides price certainty during January and February when the Bridge is likely to be active due to the June COD of Golden Hills
- November and December are only offered as Index pricing but the Bridge still provides physical capacity if Golden Hills is delayed beyond June 2022

Month	Total Index Price*	Fix Price
Jan	\$ [REDACTED]	\$ [REDACTED]
Feb	\$ [REDACTED]	\$ [REDACTED]

\* Note: Index price calculated by taking 05/19/2020 forward quotes of \$ [REDACTED] and \$ [REDACTED] times 1.019 (Loss factor) plus \$ [REDACTED]



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# Key Risks and Mitigations

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**Risk #1:** Market Exposure if Golden Hills Wind project delayed beyond June 2022 and PSE has to accept deliveries under the index price in November and December

- Mitigation: Golden Hills PPA includes damages of \$[REDACTED] per day of delay

**Risk #2:** Golden Hills PPA is operational during a Bridge delivery month

- Mitigation: Bridge agreement terminates when Golden Hills achieves COD

**Risk #3:** Avangrid will supply power that has associated emissions

- Mitigation: None. This is a short-term, one year, product intended to make PSE whole and accommodate construction delays for a new wind development.

**Risk #4:** Avangrid will refresh fixed price option the day of execution to reflect forward marks

- Mitigation: If fixed price refresh is priced at materially different premium than indicative price PSE can execute index price option.

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# Recommendation

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- **Decisional**: Based on analysis performed to date for the 2018 RFP, and the EMC and Board approval of the Golden Hills PPA, the business initiatives team requests that the EMC authorize PSE to execute the following contract:
  - Golden Hills Bridge Capacity PPA – Interim Supply (counterparty: Avangrid Renewables) WSPP Schedule C for 150 MW capacity during Heavy Load Hours during the months of January, February, November, and December 2022.



---

# Appendix



# Pricing Comparison

Fixed price option is priced in a similar range as other RFP selected resources

Resource	Price (\$/MWh)
Golden Hills PPA	\$ [REDACTED]
SPI PPA	\$ [REDACTED]
MSCG PPA	\$ [REDACTED]
Bridge Capacity PPA - Jan	\$ [REDACTED]
Bridge Capacity PPA – Feb	\$ [REDACTED]
Bridge Capacity PPA – Nov	(MidC Day Ahead * (1+ Loss Load Factor))+\$ [REDACTED]
Bridge Capacity PPA – Dec	(MidC Day Ahead * (1+ Loss Load Factor))+\$ [REDACTED]

The costs of the fixed price option are not materially different than the costs of Golden Hills PPA if it could be completed by January 2022

PPA	Month	Price (\$/MWh)	Expected Volume (MWh)	Expected Costs (\$)
Golden Hills	January	[REDACTED]	[REDACTED]	2,099,454
Golden Hills	February	[REDACTED]	[REDACTED]	2,384,256
Total				4,483,710
Bridge Capacity	January	[REDACTED]	[REDACTED]	2,670,000
Bridge Capacity	February	[REDACTED]	[REDACTED]	2,361,600
Total				5,031,600



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To: Energy Management Committee  
From: Zac Yanez  
CC:  
Date: 05/21/2020  
Re: Golden Hills Bridge Capacity - Interim Supply

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### **Background**

PSE issued a 2018 RFP to meet the need for new capacity resources established in its 2017 Integrated Resource Plan. The RFP, which sought resources beginning in 2022, was approved by the Energy Management Committee (EMC) on March 22, 2018, and by the Washington Utilities & Transportation Commission (UTC) on June 28, 2019. Business Initiatives evaluated and selected the Golden Hills Shaped Power Purchase Agreement (PPA) as part of a lowest reasonable cost solution to meet the 2022 resource need.<sup>1</sup> Business Initiatives recommended the Golden Hills Shaped PPA with a December 2021 commercial operation date (“COD”) as part of its RFP short list and the EMC approved the recommendation in July 2019. Late in the negotiation process, in April 2020, the developer requested a modified COD of June 2022 to accommodate potential COVID-related construction delays. PSE agreed to Avangrid’s request for a six month delay and, in exchange, asked Avangrid to make PSE whole with regard to any potential capacity shortfall between the originally proposed COD of December 2021 and December 2022<sup>2</sup>. Avangrid agreed to execute a separate interim supply contract under WSPP Schedule C to serve as a capacity bridge related to potential construction delays.

The Golden Hills Bridge Capacity Interim Supply Agreement (“Bridge”) will provide PSE with 150 MW of capacity per hour during the heavy load hours of January, February, November and December 2022. Avangrid will deliver the energy to PSE’s system and the contract will terminate once the Golden Hills Wind Project is commercially operational or at the end of December 2022, whichever happens first. Unlike the Golden Hills Shaped PPA, the Bridge does not include renewable energy attributes.

The Bridge is contingent on the execution and timing of the 20-year Golden Hills Shaped PPA. On April 23, 2020 the EMC approved the Golden Hills Shaped PPA and authorized Business Initiatives to request Board of Directors’ (BOD) approval to execute the agreement. The BOD authorized

<sup>1</sup> The Golden Hills Shaped PPA with a COD of December 2021 was selected as part of an optimal portfolio to meet the renewable and capacity resource needs defined in the 2018 RFP, as presented in the July 2019 EMC presentation and subsequent updates to the EMC in 2019 and 2020.

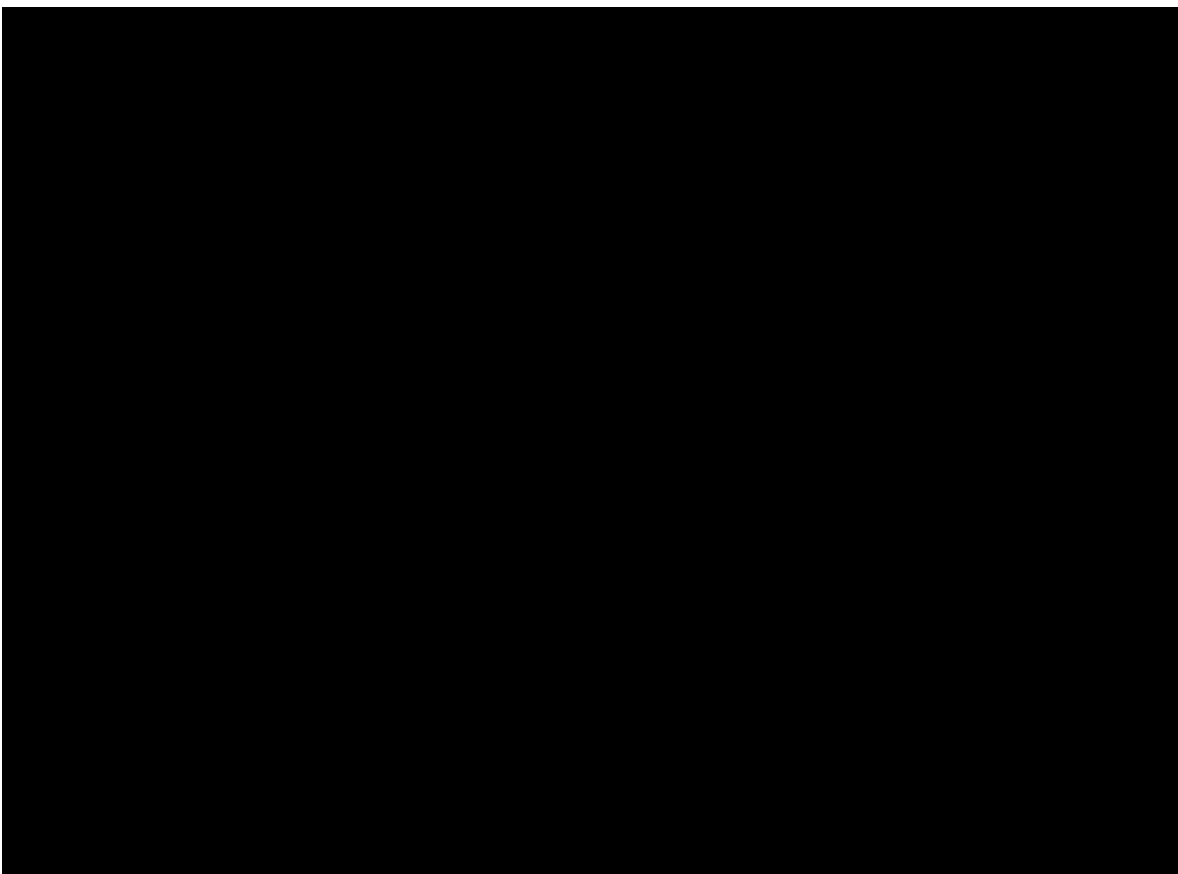
<sup>2</sup> The Bridge Agreement will terminate at the earlier of either the end of December 2022 or Golden Hills COD. December 2022 is consistent with the early termination right in the Golden Hills Shaped PPA. If Avangrid fails to complete the Golden Hills Wind Project by December 2022, PSE can effectively terminate both agreements.

execution of the Golden Hills Shaped PPA on May 7, 2020. Business Initiatives will seek approval of the Bridge as part of the Golden Hills Shaped PPA transaction at the May 21, 2020 EMC meeting.

**Need Determination**

The 2018 RFP sought new resources to meet projected annual electric resource capacity shortfalls starting in 2022. Business Initiatives presented Figure 1 (shown below) to the EMC at the November 21, 2019 meeting, which shows that the Golden Hills Shaped PPA would provide 77 MW of electric capacity to help meet the projected winter peak capacity need starting in 2022.

**Figure 1. PSE electric winter peak capacity need (2020-2025)**



As Figure 1 shows, Golden Hills is a key component to meeting the 2022 resource need. Without the Bridge, Avangrid’s requested change to a June 2022 COD and any potential further delays will negatively impact the capacity benefits of the project. The Bridge would provide interim capacity to PSE during the heavy load hours of the 2022 winter season, if the wind project is not yet completed. The Bridge is not a standalone transaction; it is only intended to “make PSE whole” from an electric capacity perspective until the Golden Hills Wind Project is in service. The Bridge will terminate, along with any financial commitments, when the Golden Hills Wind Project is commercially operational or at the end of December 2022, whichever happens first.

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**Pricing and Analysis**

Avangrid has provided the Bridge with pricing terms that are comparable to both the Golden Hills Shaped PPA as well as to other resources selected in the 2018 RFP. For the months of January and February Avangrid has provided fixed and indexed pricing options, and for the months of November and December Avangrid has provided a market index based price. Table 1 below shows the monthly price of the Bridge and selected other 2018 RFP proposals. The table demonstrates that the Bridge is priced at terms that are consistent with other resources in the 2018 RFP.

**Table 1. Golden Hills Bridge vs. other shortlisted 2018 RFP resources: Pricing Comparison**

Resource	Price (\$/MWh)
Golden Hills Shaped PPA	\$ [REDACTED]
SPI PPA	\$ [REDACTED]
MSCG PPA	\$ [REDACTED]
Bridge Capacity PPA - Jan	\$ [REDACTED] or (MidC Day Ahead * (1+ Loss Load Factor))+\$ [REDACTED]
Bridge Capacity PPA – Feb	\$ [REDACTED] or (MidC Day Ahead * (1+ Loss Load Factor))+\$ [REDACTED]
Bridge Capacity PPA – Nov	(MidC Day Ahead * (1+ Loss Load Factor))+\$ [REDACTED]
Bridge Capacity PPA – Dec	(MidC Day Ahead * (1+ Loss Load Factor))+\$ [REDACTED]

Table 2 compares the fixed and index pricing options of the Bridge, based on forward prices as of May 12, 2020 for January and February 2022. The fixed price option is not significantly higher than the index option and does not carry execution or market risk. The Golden Hills Shaped PPA is scheduled for a June 2022 COD, which means that there is a high likelihood that the Bridge will be active in January and February 2022. Business Initiatives recommends executing the Bridge based on the fixed price option to minimize the price risk associated with first quarter 2022 deliveries.

**Table 2. Golden Hills Bridge: Comparison of Fixed vs. Index Pricing Options**

Month	Forward Mark	Line Loss	Adder	Total Indexed Price	Fixed Price
January 2022	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]
February 2022	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]

Table 3 shows the expected volumes and expected monthly costs of the Golden Hills Shaped PPA if active in the months of January and February 2022 and compares them to the Bridge with a fixed price. The Bridge would provide marginally higher energy and have marginally higher costs; however, these costs do not materially change the results of the optimization analysis presented to the EMC and the BOD. PSE would carry the Mid-C price risk if the Golden Hills Wind Project is delayed beyond the June 2022 COD and the Bridge remains active in November and December

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2022. However, if the project's COD is delayed into November and December, PSE will be able to collect damages pursuant to the terms of the Golden Hills Shaped PPA that would offset the costs associated with the Bridge Capacity PPA. The damages for delaying the COD would be \$ [REDACTED] per day.

**Table 3. Golden Hills Shaped PPA vs. Golden Hills Bridge:  
Comparison of expected volumes and monthly costs**

PPA	Month	Price (\$/MWh)	Expected Volume (MWh)	Expected Costs (\$)
Golden Hills Shaped	January	\$ [REDACTED]	[REDACTED]	[REDACTED]
Golden Hills Shaped	February	\$ [REDACTED]	[REDACTED]	[REDACTED]
Total			[REDACTED]	[REDACTED]
Bridge Capacity	January	\$ [REDACTED]	[REDACTED]	[REDACTED]
Bridge Capacity	February	\$ [REDACTED]	[REDACTED]	[REDACTED]
Total			[REDACTED]	[REDACTED]

**Conclusion**

Executing the Golden Hills Bridge Capacity Interim Supply Agreement would allow PSE to meet the capacity needs identified in its 2018 RFP while accommodating a change requested by Avangrid to the COD of the Golden Hills Shaped PPA. The Bridge will provide energy delivery to PSE's system and guarantee the physical availability of the power during the heavy load hours of the winter months of 2022. The Bridge will terminate when the Golden Hills Shaped PPA becomes commercially operational and includes a fixed price component and an indexed price component. If the Bridge is active during January and February 2022, the volumes and costs will closely match the expected values and costs of the Golden Hills Shaped PPA. If the Golden Hills Wind Project COD is delayed into November and December 2022, the Bridge would remain active and provide capacity and energy to PSE. The November and December components will be indexed; however, PSE's exposure will be limited because it would receive damages pursuant to the terms of the Golden Hills Shaped PPA.

[REDACTED]  
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