



**Portland General Electric Company**  
*Legal Department*  
121 SW Salmon Street • Portland, Oregon 97204  
503-464-7822 • Facsimile 503-464-2200

**Loretta I. Mabinton**  
*Associate General Counsel*

March 27, 2018

***Via Electronic Filing***

Oregon Public Utility Commission  
Attention: Filing Center  
PO Box 1088  
Salem OR 97308-1088

**Re: LC 66 – Portland General Electric 2016 Integrated Resource Plan**

Attention Filing Center:

Enclosed for filing please find PGE's Compliance with Order 18-044 with Appendix A for Portland General Electric Company's ("PGE") 2016 Integrated Resource Plan filed on March 8, 2018 in Docket LC 66.

If you have any questions regarding this filing, please contact me at (503) 464-7822 or Jimmy Lindsay at (503) 464-8311. Thank you for your assistance in this matter.

Sincerely,

A handwritten signature in blue ink that reads "Loretta Mabinton". The signature is written in a cursive style with a large initial "L" and "M".

Loretta Mabinton  
Associate General Counsel

LM:sj

Enclosure

## **PGE's Compliance with Order 18-044**

### **Introduction:**

PGE is providing updates to its energy, capacity, and Renewable Portfolio Standard (RPS) needs as required by the Oregon Public Utility Commission (OPUC) Order 18-044. Order 18-044 includes the following condition:

“PGE will provide updates to its energy, capacity, and Renewable Portfolio Standard (RPS) needs within the RFP docket. PGE will update assumptions for qualifying facilities (QF) completion rates and unbundled Renewable Energy Credits (RECs) and incorporate those assumptions in the RFP analysis as sensitivities.”

On March 8<sup>th</sup>, 2018 PGE filed with the Commission the Company's 2016 IRP Update. That Update included PGE's updates on its energy, capacity, and RPS needs. The Update also included several sensitivities on QF completion rates. In this compliance filing, PGE includes the same updates to the Company's energy, capacity and RPS needs as well as the sensitivities on QF completion rates. In addition, PGE also includes in this compliance filing a sensitivity regarding PGE's RPS need assuming the purchase of unbundled RECs to meet 20% of PGE's long-term RPS compliance requirements. All updates and sensitivities (including the unbundled REC sensitivity) were presented and shared with the Commission and Commission Staff at the March 13<sup>th</sup> 2018 Public Meeting and are attached to this filing as Appendix A.

### **Capacity and Energy Updates and Sensitivities:**

Table 1 identifies PGE's updated capacity and energy needs in 2021. Also included in Table 1 are results of sensitivities on the capacity need, energy need, and capacity contribution values for additional renewable resources. Energy need is examined in terms of the energy availability as calculated for the energy load-resource balance (LRB). The capacity contribution values (ELCC) are based on independently adding 100 MW of incremental Solar and PNW Wind resources.

The three QF sensitivities show a wide range of potential impacts on PGE's capacity and energy needs. These cases also show significant impacts on the incremental solar capacity contribution (4.2% to 28.1%). The PNW Wind capacity contribution value decreased significantly under the Renewables RFP sensitivity as the test resource added was also PNW Wind. The Expanded Energy Efficiency and Zero Load Growth scenarios produced similar impacts on the remaining capacity need and minor impacts on the energy need.

Table 1: Sensitivity Impacts on Capacity, Energy, and Capacity Contribution

Sensitivity	2021 Capacity Need MW	2021 Energy Need MWa	Solar ELCC	PNW Wind ELCC
Reference	112	4	14.4%	16.7%
QF Executed 75%	150	44	20.3%	15.3%
QF Executed 50%	197	83	28.1%	14.5%
QF Proposed 50%	32	(131)	4.2%	19.7%
Renewables RFP	73	(96)	16.5%	9.5%
Energy Storage	70	4	15.3%	17.2%
Expanded Energy Efficiency	96	(9)	15.1%	17.2%
Zero Load Growth	96	6	14.2%	17.2%
<b>Notes:</b>				
1. Negative Energy Need values indicate an energy-long position from the perspective of the energy availability calculation in the Energy LRB (not based on economic dispatch).				

### **RPS Need Sensitivities:**

The impact of the sensitivities on the RPS need was examined with respect to: 1) the 2025 physical RPS shortage (i.e., the shortage in 2025 if PGE does not rely on its REC bank); 2) the first year in which PGE would run out of RECs and would be unable to comply if it were to rely on its REC bank, or the REC deficit year; and 3) the remaining RPS shortage in the following year should no incremental action be taken. Table 2 provides a summary of the results across each of the sensitivities.

The QF completion cases show that PGE’s near-term physical RPS shortage is highly sensitive to the assumed QF completion rate, as a large quantity of QFs have contractually committed to come online and to produce RECs in the early 2020s. The analysis also found that PGE’s longer term RPS needs are less sensitive to the QF completion rate assumption, due largely to the scale of the increase in RPS obligations over time and the expiration of QF contracts.<sup>1</sup>

PGE also tested the impact of the potential procurement of 100 MWa of RPS-eligible resources in the Renewable RFP on its forecast RPS position. This analysis considered two scenarios, one in which PGE retains the RECs from the procured resources for RPS compliance in all years, and a second in which PGE utilizes the RECs generated prior to 2025 by any procured RPS resources to return value to customers in those years. Retention of the near-term RECs for RPS compliance pushes out the REC deficit year by one year relative to the case in which these RECs are otherwise utilized, but does not significantly impact forecast long-term REC needs due to the steep increase in RPS obligations in 2035.

---

<sup>1</sup> In the 2016 IRP and the IRP Update, PGE does not assume that expired QF contracts are renewed. PGE also assumes that no additional QF contracts are executed (with the exception of the sensitivity examining a 50% completion rate for currently proposed QF projects).

PGE’s forecast RPS needs under the Zero Load Growth sensitivity pushes the REC deficit year out by one year compared to the reference case. The RPS shortage in the following year (2035) is substantial (509 MWh) due to the increase in the RPS requirement as a percentage of retail sales in that year. The Expanded Energy Efficiency sensitivity does not change the REC deficit year relative to the reference case, but does reduce the REC deficit in the following year (2034) by 13 MWh. The differences in the 2025 physical RPS shortage between the reference case and the Zero Load Growth and Expanded EE sensitivities are relatively small, 16 MWh and 7 MWh, respectively.

PGE’s forecast of RPS needs in the 20% Unbundled RECs sensitivity assumes that PGE procures unbundled RECs on a forward going basis to meet 20% of PGE’s RPS compliance requirement. The sensitivity only measures potential impact on PGE’s RPS need without evaluating the feasibility of cost-effective acquiring unbundled RECs at the volumes necessary to support 20% RPS compliance. The sensitivity shows that RPS deficit year extended by several years, followed by a substantial RPS shortage.

Table 2: RPS Need Across Sensitivities

Case	Physical shortage in 2025 (MWh)	REC deficit year	RPS shortage in following year (MWh)
Reference	53	2033	373
QF Executed 75%	91	2032	381
QF Executed 50%	129	2031	387
QF Proposed 50%	None	2036	660
Renewables RFP (RECs retained in all years)	None	2036	612
Renewables RFP (2021-2024 RECs otherwise used)	None	2035	589
Expanded Energy Efficiency	46	2033	360
Zero Load Growth	37	2034	509
20% Unbundled RECs	None	2037	518

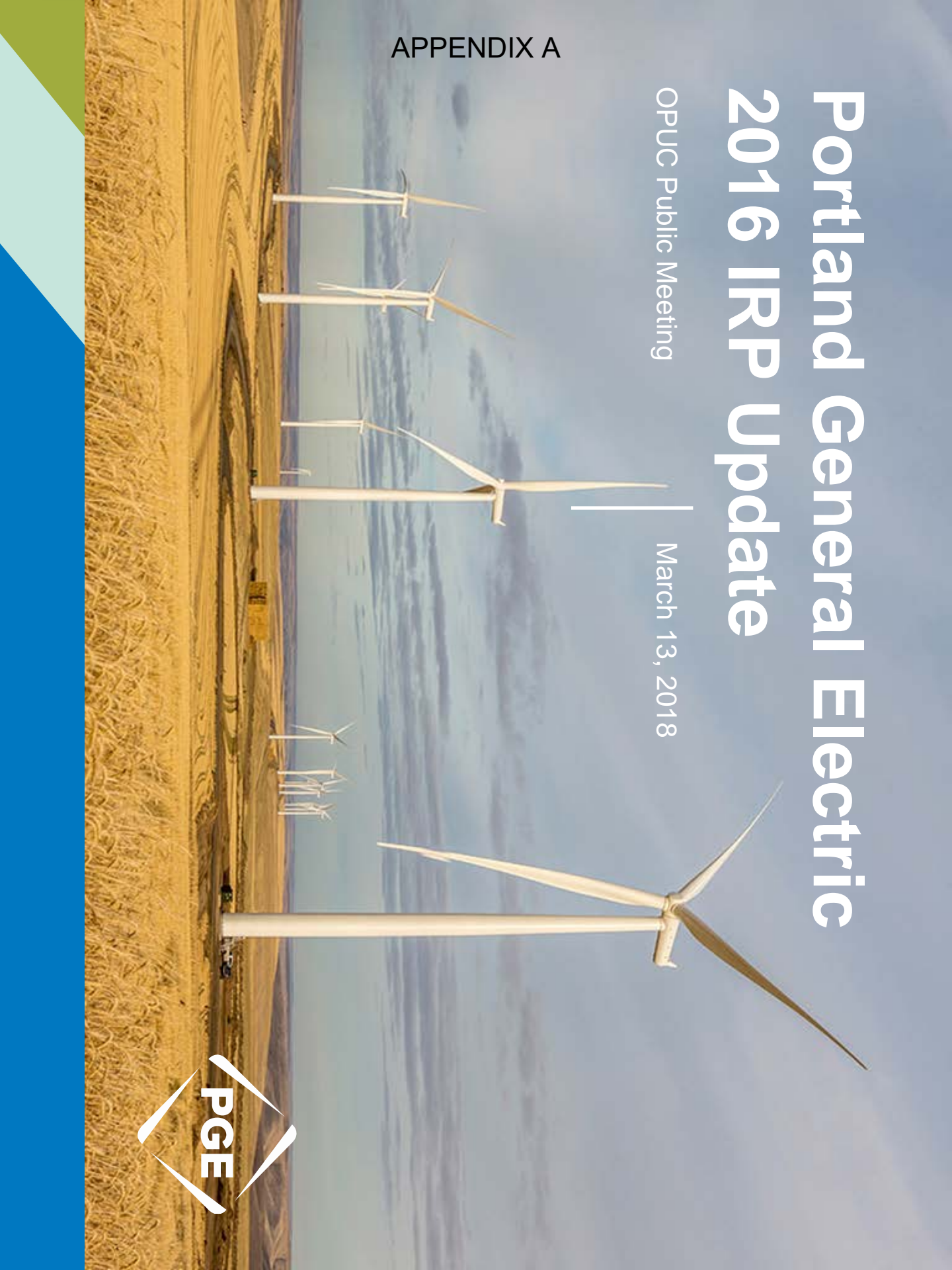
**Incorporation into RFP Analysis:**

PGE will incorporate the results of select sensitivities into the RFP Portfolio Analysis. PGE finds that PGE’s RPS need sensitivities continue to demonstrate the significant long-term RPS needs that PGE faces under all futures. Within its portfolio analysis PGE will consider how portfolio results are affected by modest procurement target sensitivities. The QF completion sensitivities demonstrate the impact of QF completion forecasts on the assumed capacity contribution of additional renewable resources. For that reason, PGE will review its portfolio results under sensitivity runs that identify how portfolios are affected by the QF Executed 50% and QF Proposed 50% sensitivities. PGE’s portfolio analysis and sensitivity stress testing is further described in Appendix H of PGE’s 2018 Renewable RFP.

# Portland General Electric 2016 IRP Update

OPUC Public Meeting

March 13, 2018



# Agenda

---

## APPENDIX A

- Acknowledged Actions
- Need Assessment
- Supply Side Resources
- Gas & Power Prices
- Acknowledgment & Schedule



# Smart Energy Use

## Energy Efficiency

- 135 MWA  
(176 MW)

## Demand

## Response

- Minimum:  
77 MW (winter)  
69 MW (summer)

- Stretch:  
191 MW (winter)  
162 MW (summer)

## CVR

- 1 MWA

### Energy Efficiency

- PGE anticipates meeting or exceeding the energy efficiency action target

### CVR

- PGE anticipates meeting the 1 MWA 2020 Conservation Voltage Reduction (CVR) target

### Demand Response

- PGE is seeking to acquire new demand response resources while working to meet the stretch targets
- Reached out to potential members of the Demand Response Review Committee (DRRC)
- Demand Response Test Beds
  - ✓ Initiated process to identify sites
  - ✓ Will submit a proposal to the OPUC consistent with the timeline outlined in the Order



# Supply Side and Integration Actions

**PGE is on-track  
to meet the  
acknowledged  
2016 IRP supply  
side resource  
actions**

APPENDIX A

## Capacity Action

- PGE has completed the acknowledged bilateral capacity procurement with the execution of 300 MW of contracts
- These contracts also serve to meet the remaining acknowledged need for dispatchable capacity

## Renewables Action

- Draft Renewables RFP posted February 28
- Workshops held March 2
- Draft RFP filed March 9

## Integration Action

- Proposal submitted for approximately 39 MW of energy storage



# Enabling Studies

PGE has made substantial progress in performing the enabling studies and activities

Enabling Studies	Progress
Customer Insights	Complete; Presented at RT 18-1
Decarbonization	Draft Complete; Presented at RT 18-1
Assessing Montana Resources	Planning workshop
Market Capacity	Scoping
Flexibility Analysis	Scoping
Direct Access	Scoping
Load Forecasting Improvements	Ongoing
Distribution System Planning	Ongoing

# Need Assessments

- Refreshed inputs in the 2016 IRP Update
  - ✓ The December 2017 load forecast
  - ✓ Bilateral contracts
  - ✓ An updated contract snapshot
  - ✓ The final 2016 REC inventory

Area	Need
Capacity Need in 2021	112 MW
Energy Need in 2021 <sup>1</sup>	4 MWh
RPS Physical Shortage in 2025	53 MWh
REC Deficit Year <sup>2</sup>	2033 yr
RPS Shortage in 2034	373 MWh

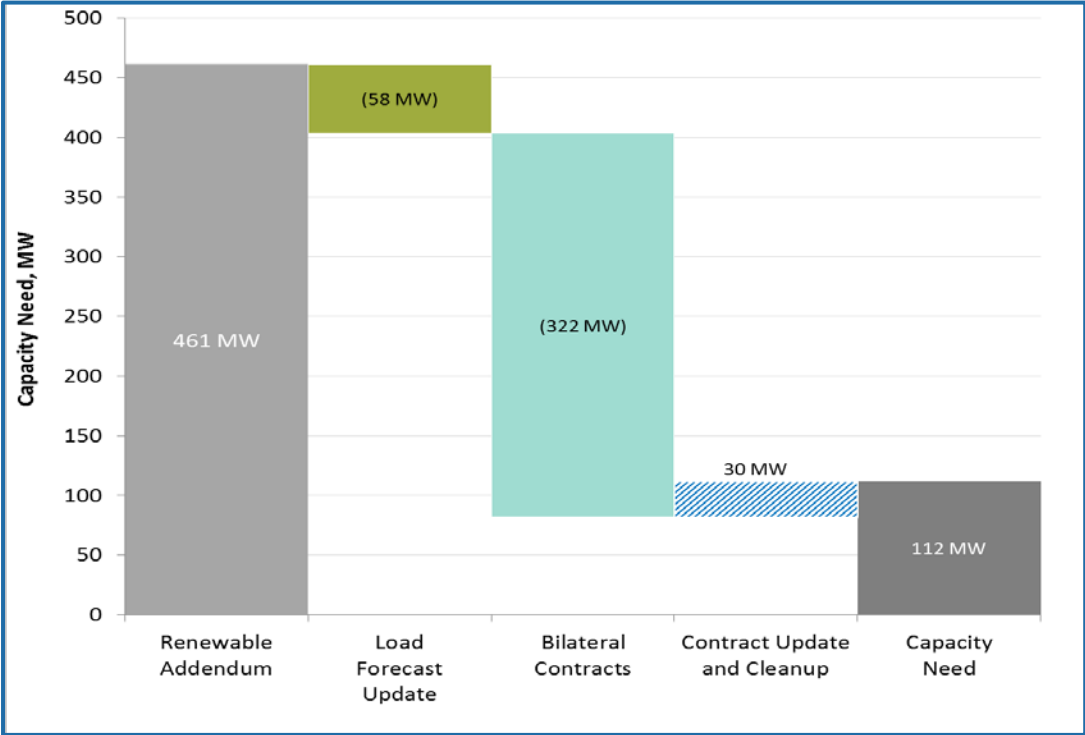
1. Based on energy availability from PGE's load-resource balance, not economic dispatch.
2. The year in which non-compliance begins under a scenario of full utilization of the REC bank for RPS compliance.

Need  
assessment  
uses 2016 IRP  
methodology  
with refreshed  
inputs

APPENDIX A

# Capacity Need

- PGE refreshed the capacity need assessment to include the recent snapshot of executed contracts.



**PGE has secured contracts for 300 MW (322MW ELCC) of capacity**

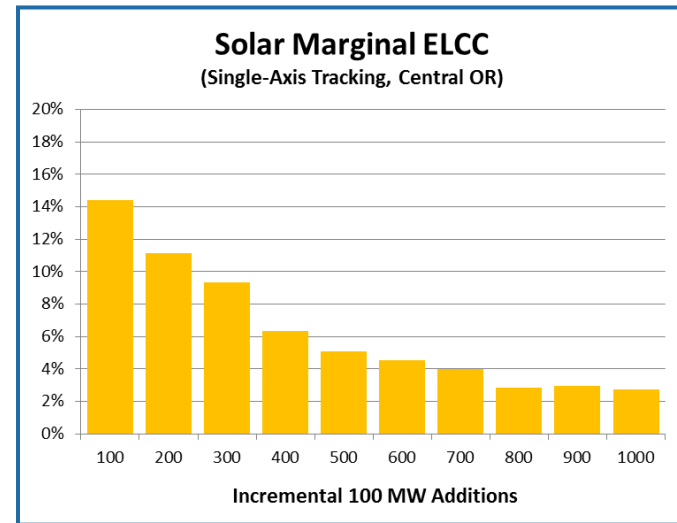
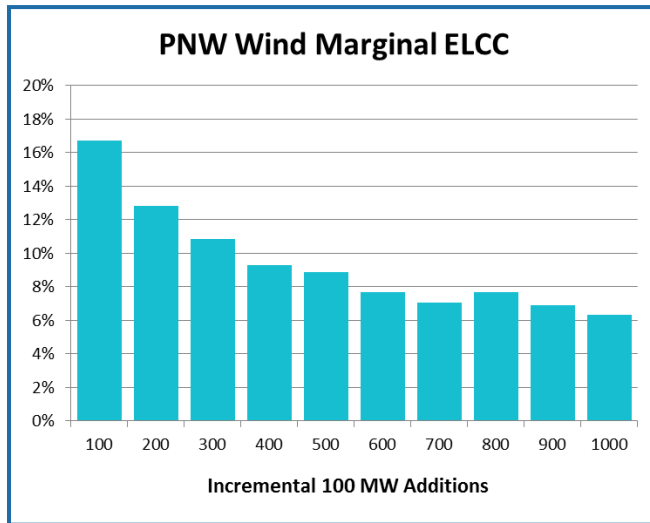
APPENDIX A

ELCC: Effective Load Carrying Contribution

# Wind and Solar Capacity Contributions

- The capacity contribution values (or ELCC, effective load carrying contribution) for incremental wind and solar resources were updated based on the refreshed RECAP model used for the capacity need assessment.

APPENDIX A



# Supply Side Resources

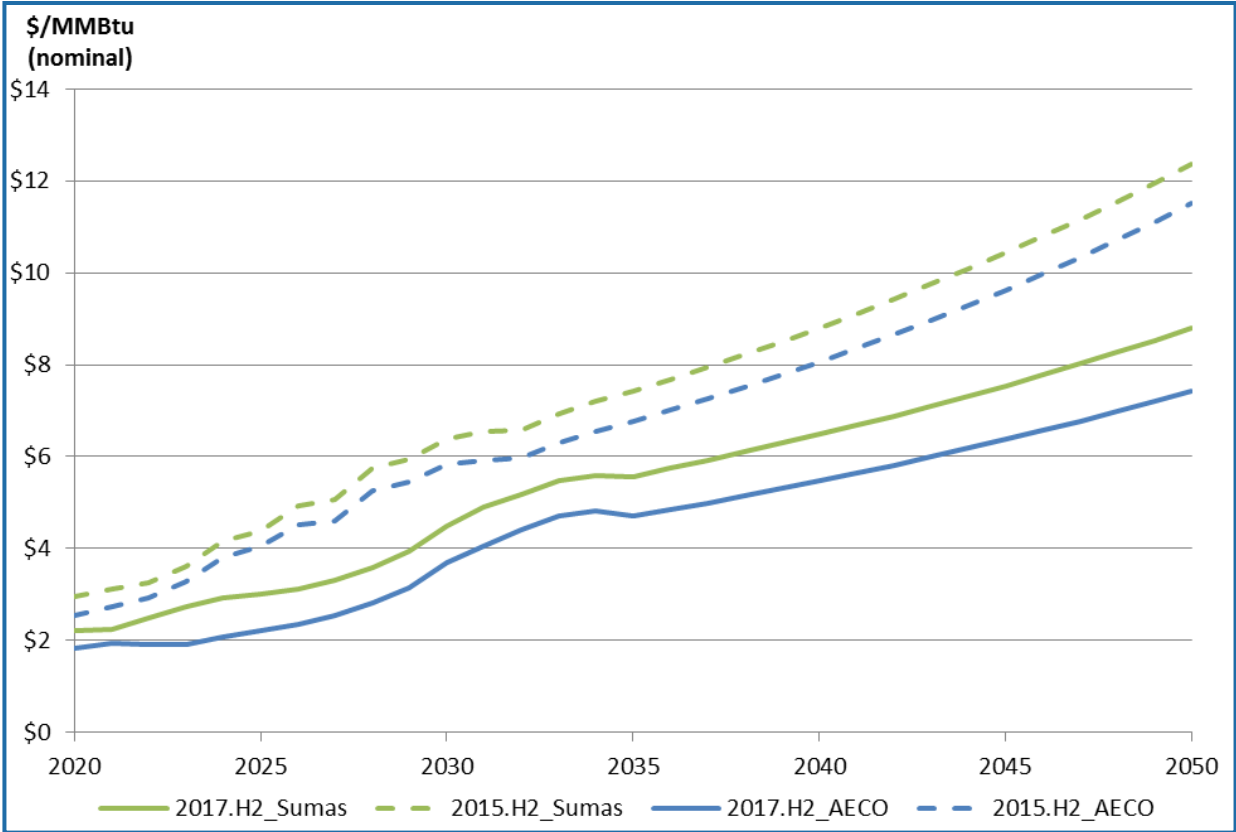
- Refreshed consultant studies
- Updated carbon offset payments
- Updated financial parameters

## APPENDIX A

Change in Real-Levelized Fixed Cost Compared to 2016 IRP (2021 COD)	
Single-Axis Tracking Solar PV	-13%
PNW Wind	-15%
Montana Wind	-16%
Natural Gas Combined Cycle – H Class	+5%
Wärtsilä Reciprocating Engine	-9%
Natural Gas Simple Cycle – 7F	-1%

# Natural Gas Prices

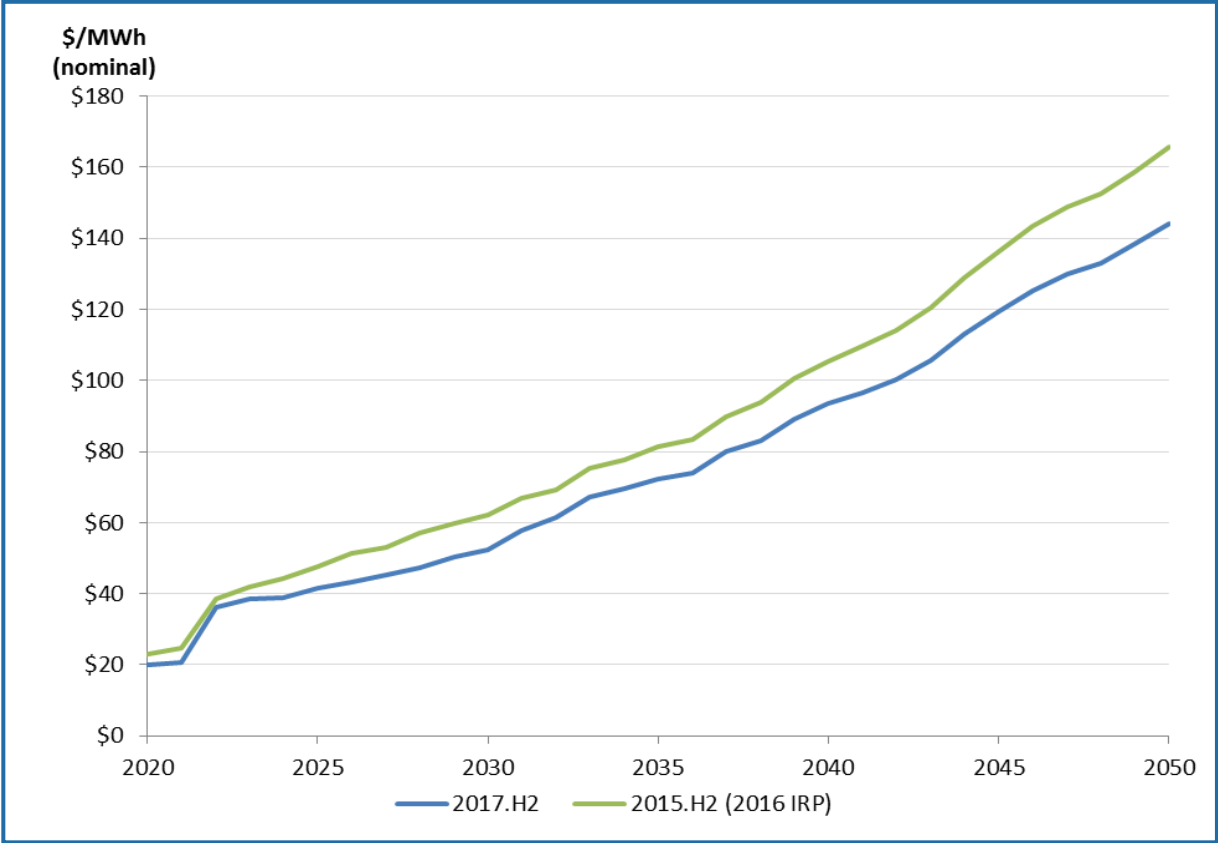
APPENDIX A  
Natural gas prices have declined since the forecast included in the 2016 IRP



# Wholesale Market Prices

Wholesale market prices have declined since the 2016 IRP due to the lower natural gas prices

APPENDIX A





# Acknowledgment Request

PGE requests acknowledgment of the 2016 IRP Update in order to update IRP inputs in the May 1 avoided cost update filing.

## Items for May 1 Update

1. Supply Side Resource Costs and Parameters
  - a. Consultant Studies
  - b. Carbon Offset Payments
  - c. Financial Parameters
2. Capacity Contribution Values

*The IRP Update does not propose any changes to the acknowledged 2016 IRP actions.*

APPENDIX A  
OPUC  
Decision at  
Regular Public  
Meeting

April 24

# 2016 IRP Update Schedule

Date	Item
March 8	PGE filed IRP Update
March 13	PGE presents IRP Update at Regular Public Meeting
March 29	Stakeholder Comments Due
April 6	PGE Reply Comments Due
April 17	Staff Report Posted
April 24	Commission Decision at Regular Public Meeting

**Thank you**  
to OPUC,  
Staff, and  
stakeholders  
for support of  
the schedule  
and process

APPENDIX A

# Resource Procurement Updates

OPUC Public Meeting

March 13, 2018



# Agenda

---

- Bilateral Capacity Procurement
- PGE's 2018 Renewable RFP – Informational Update

APPENDIX A



# Bilateral Capacity Procurement

Per the direction of the Commission, PGE solicited bilateral capacity offers to meet PGE's 2021 capacity deficit.

PGE's solicitation evaluated offers from operators of existing capacity resources inclusive of multiple fuel types and commercial structures.

PGE has completed its bilateral solicitation and has executed three power purchase agreements that satisfy most of PGE's 2021 capacity deficit.

PGE will not pursue an additional All-Source RFP to procure additional capacity resources for PGE's 2021 capacity needs.

# Competitive Bidding Guidelines Waived

Order No. 17-494 granted PGE's request to waive competitive bidding guidelines to facilitate procurement of top-performing bilateral capacity offers identified in PGE's application.

The Order required that:

- PGE seek additional guidance from the Commission, before procuring resources not identified in the top five ranked offers
- PGE provide an update to Staff and the Commission upon the completion of bilateral procurement.

Following the receipt of the waiver, PGE has actively continued bilateral negotiations and as of the end of February, had entered into effective agreements with two counterparties for three power purchase agreements identified in the top five ranked offers.

# Bilateral Agreements Executed

PGE has entered into three power purchase agreements.

- I. 100 MW Seasonal Capacity Contract with Avangrid Renewables. Five year contract term beginning July 2019.
- II. 100 MW Annual Capacity Contract with Bonneville Power Administration. Five year contract term beginning January 2021.
- III. 100 MW Annual Capacity Contract with Bonneville Power Administration. Five year contract term beginning January 2021.



# 2021 Capacity Adequacy

As studied in the 2016 IRP Update, the bilateral agreements and load forecast update contribute to reducing PGE's 2021 capacity deficit by 380 MW.

PGE forecasts a remaining 2021 capacity deficit of 112 MW.

PGE will not issue an All-Source RFP to procure additional capacity resources to meet the 2021 need.

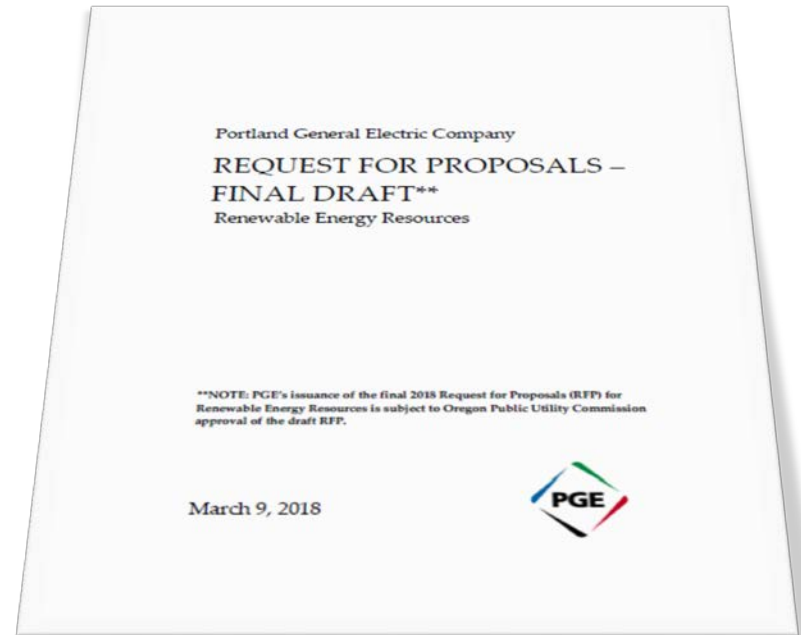
PGE expects that the anticipated procurement of near-term renewable resources and energy storage resources associated with HB 2193 will contribute to closing PGE's forecasted capacity deficit.

# 2018 Renewable RFP

PGE submitted its final draft 2018 Renewable RFP to the Commission Friday March 9<sup>th</sup>.

APPENDIX A Today, PGE provides an informational update summarizing elements of the solicitation.

PGE looks forward to a substantive RFP approval process.



# Renewable RFP Background

## 2018 Renewable RFP implements action items from PGE's 2016 IRP Addendum

- PGE's 2016 IRP Addendum recognized the value of near-term renewable resource procurement to support cost effective compliance with PGE's long-term RPS compliance obligations.
- As acknowledged in Order No. 18-044, PGE's near-term procurement aligns with diverse glide paths and procurement sensitivities. Furthermore, the near-term addition will support 2021 capacity adequacy.
- Order No. 18-044 included three RFP related conditions:

Informational  
Sensitivities

Remote  
Renewable  
Discussion

Cost  
Containment  
Screen

# RFP Overview

PGE seeks long-term renewable resources to take advantage of expiring tax credits

- Offers may include all RPS eligible renewable technologies
- PGE targets 100 Megawatt-average (MWa)
- Offers must generate energy and include all bundled Renewable Energy Credits

PGE will accept diverse commercial structures and transactions including power purchase agreements (PPAs) and utility ownership in existing or proposed resources.

RFP will be conducted in accordance with the OPUC Competitive Bidding Guidelines.

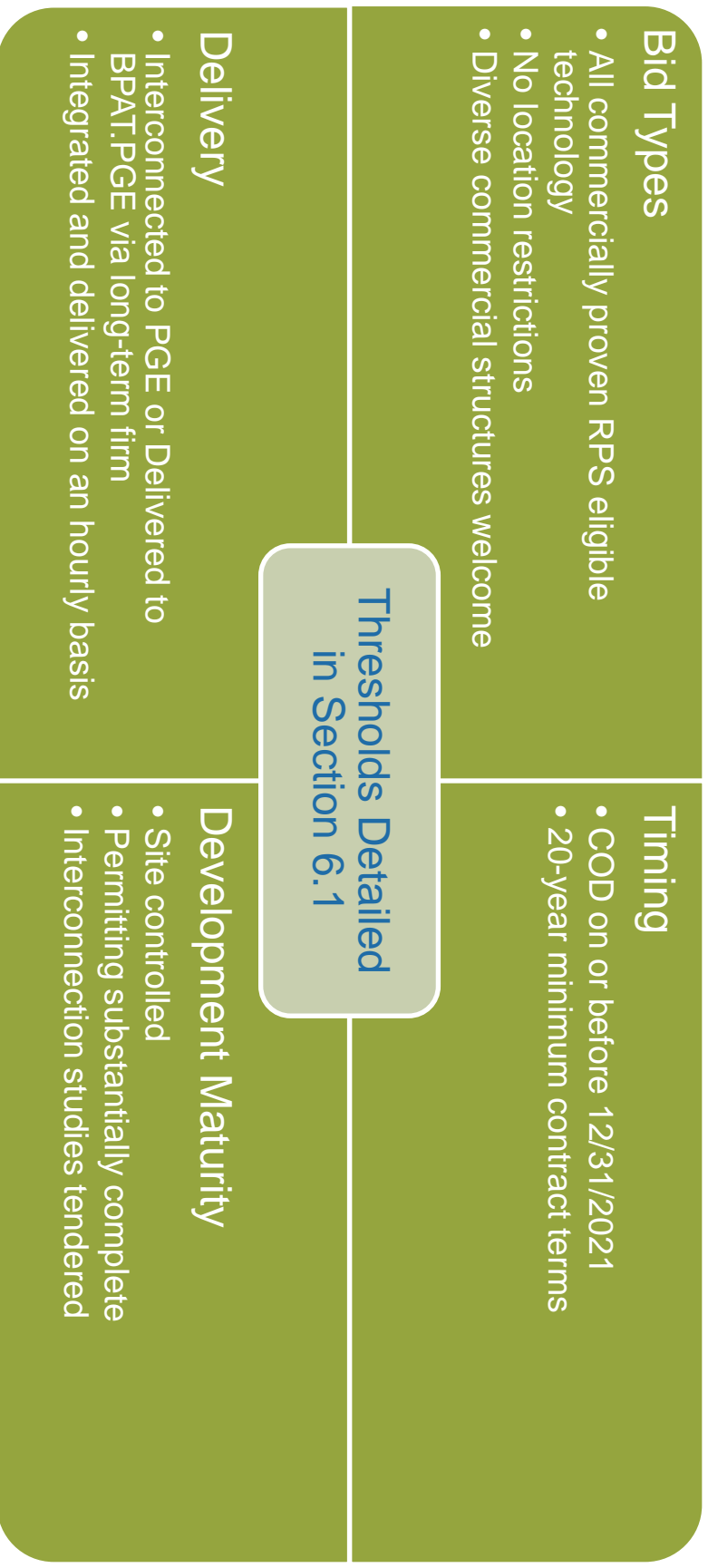
PGE intends to submit a Benchmark Bid for an Eastern Oregon wind resource.

## APPENDIX A

# RFP Requirements

Final Draft RFP proposes eligibility requirements to allow wide bidder participation

## APPENDIX A



# Informational Sensitivities

2016 IRP Update includes sensitivities requested by Commission

Multiple sensitivities confirm reasonableness of near-term procurement of 100 MWa.

- 100 MWa just 16% of 2040 RPS deficit

Across all sensitivities evaluated, mid 2030s renewable requirement many times greater than proposed near-term action.

Case	Physical shortage in 2025 (MWa)	REC deficit year	RPS shortage in following year (MWa)
Reference	53	2033	373
QF Executed 50%	129	2031	387
QF Proposed 50%	None	2036	660
Renewables RFP (2021-2024 RECs Returned)	None	2035	589
Zero Load Growth	37	2034	509
Unlimited Unbundled REC Purchasing*	None	2037	518

\* Sensitivity not included in IRP Update

# Remote Resource Discussion

2018 Renewable RFP thresholds encourages participation from diverse renewable resources

All offers will be recognized for their delivered energy and capacity value

- Wind, solar, and geothermal resources provide diverse energy and capacity profiles
- Locational differences (i.e., Montana and SE Oregon) may deliver enhanced energy and capacity values

## APPENDIX A

Participation and competition is enhanced through transmission requirements

- Offers not required to have acquired firm transmission rights to participate in the solicitation
- Bidders are required to have a reasonable and achievable plan to obtain annual long-term transmission rights to support Commercial Operation (see RFP Section 6 and Appendix H)



# Cost Containment Screen

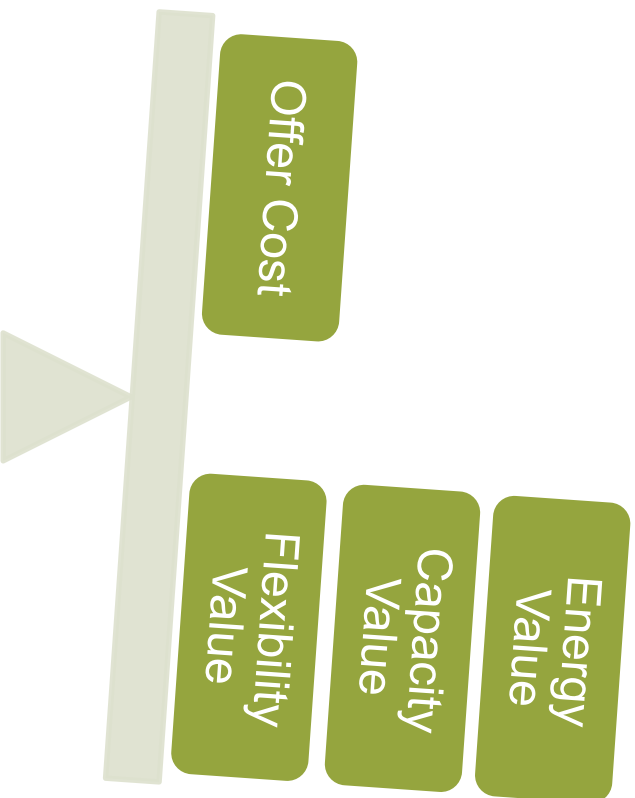
Offers must pass cost-containment screen to be considered for short list

Levelized Offer Cost

Levelized Offer Value

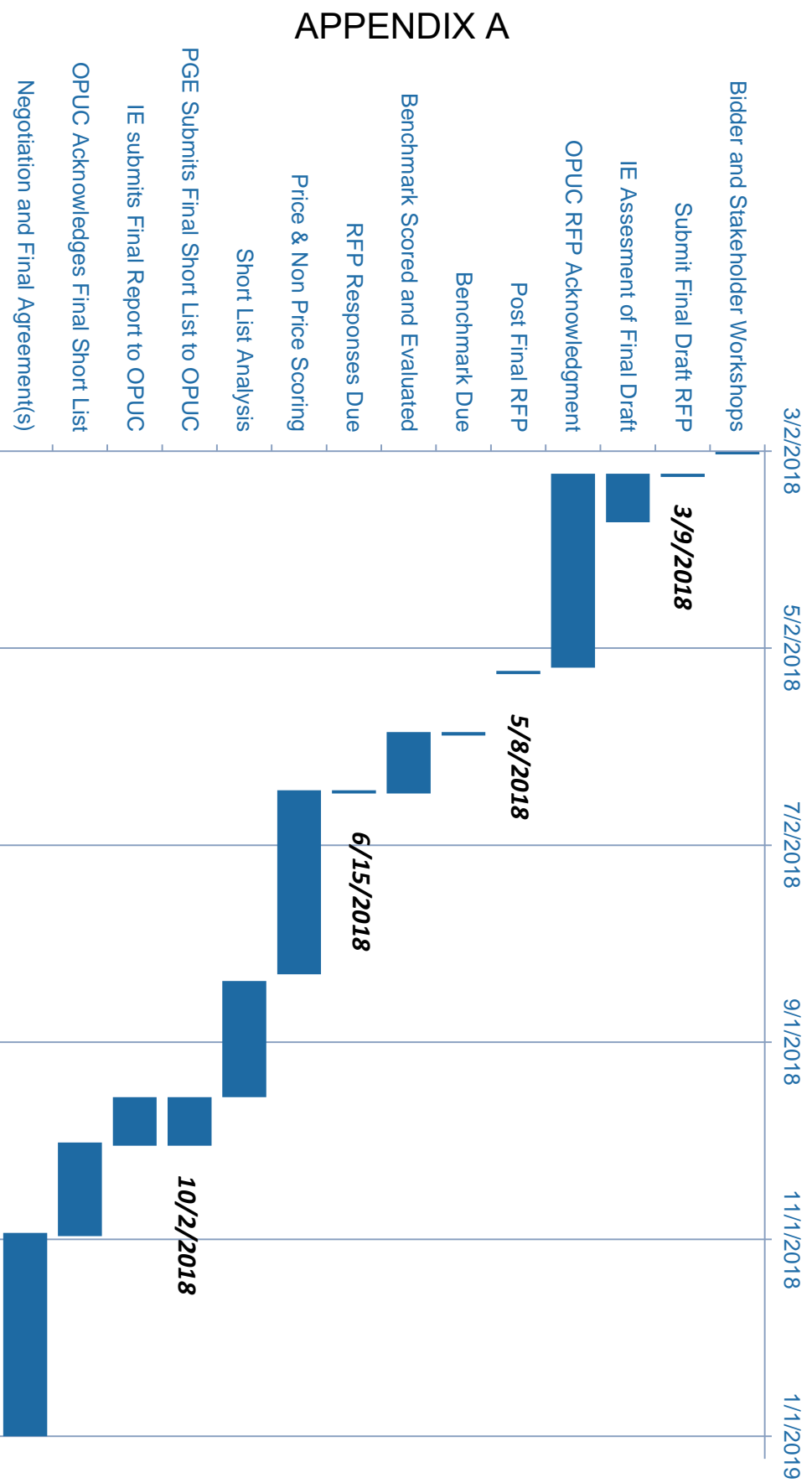
For all shortlisted resources, levelized forecasted offer costs must be less than levelized forecasted benefits as described below.

## APPENDIX A



Category	Description
Offer Cost	Inclusive of all project fixed and variable costs
Energy Value	Based on the offer's unique 12x24 average energy forecast
Capacity Value	Based on the offer's unique historical data
Flexibility Value	Based on the offer's unique flexible range

# RFP Timeline

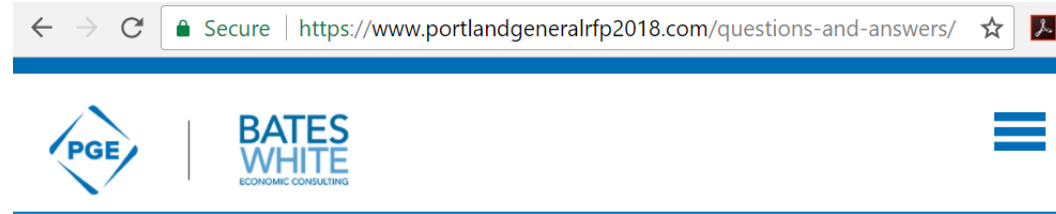


## APPENDIX A

# Questions?

PGE's procurement website posts answers to all bidder questions received

APPENDIX A [www.PortlandGeneralRFP2018.com](http://www.PortlandGeneralRFP2018.com)



Bidder Questions and Answers

Submit a Question

Please [login](#) or [register](#) to submit a question.

+ Regarding Section 4.3 in the RFP Main Document, please elaborate on "phase four (Record of Decision issued) of the TSR Study 15 and Expansion Process (TSEP)4". What is "phase four"?