

**BEFORE THE PUBLIC UTILITY COMMISSION
OF THE STATE OF OREGON**

UM 1854

**Application to Lower the Standard
Price and Standard Contract
Eligibility Cap for Solar Qualifying
Facilities (QFs)**

PORTLAND GENERAL ELECTRIC COMPANY

Supplemental Testimony and Exhibits of

Brett Sims
Robert Macfarlane

August 3, 2017

Supplemental Testimony

1 **Q. Please state your names and positions.**

2 A. My name is Brett Sims. I am the Director of Structuring, Origination, and Resource
3 Strategy at PGE.

4 My name is Robert Macfarlane. I am a senior analyst in Pricing and Tariffs at PGE.

5 Our qualifications are included in PGE Exhibit 100.

6 **Q. What is the purpose of your testimony?**

7 A. The purpose of our testimony is to provide an update to and additional support for PGE's
8 Application to Lower the Standard Price and Standard Contract Eligibility Cap for Solar
9 Qualifying Facilities or QFs (Application) and PGE's Motion for Interim Relief seeking the
10 same relief on an interim basis as the permanent relief in our Application.

11 **Q. Is PGE's request the same as that provided in your direct testimony?**

12 A. Yes. As requested in PGE's Application and Motion for Interim Relief, and in our direct
13 testimony, PGE respectfully requests that the Public Utility Commission of Oregon
14 (Commission):

15 (1) lower the standard pricing eligibility cap from the current 10 MW to 3 MW for solar
16 QFs, similar to the treatment granted to Idaho Power in Order No. 16-129 and PacifiCorp in
17 Order No. 16-130;

18 (2) declare that a solar QF project larger than 100 kW must negotiate a contract,
19 including a project-specific avoided cost price, if any owner (including developer) of the
20 project has requested or obtained standard prices from PGE for more than 10 MW of
21 aggregate solar QF capacity.

1 In the alternative, PGE requests that the Commission lower the standard pricing
2 eligibility cap from the current 10 MW to 2 MW for solar QFs.

3 In addition, PGE requests that the Commission issue an order granting PGE immediate
4 temporary relief with the same changes indicated above while the Commission considers
5 PGE's Application. PGE requests that this immediate temporary relief apply to all request
6 for contract that did not achieve a legally enforceable obligation before June 30, 2017.

7 **Q. Please provide an update of the total QF activity PGE is facing.**

8 A. When the Commission issued Order No. 14-058, PGE had only 19 QFs under contract
9 (including both those producing and those with future commercial operation dates) with
10 combined nameplate capacity of 68 MW. As of July 28, 2017, PGE has 469.5 MW of
11 executed QF power purchase agreements (PPA) under PURPA from 78 QF projects and
12 686.1 MW of proposed PPAs from 69 proposed QF projects, for a total of 1,155.6 MW of
13 nameplate capacity from 147 projects.¹ That figure will increase as seven additional
14 proposed QF projects have not provided the nameplate capacity or expected energy for their
15 projects.

16 The percentage of solar QFs has also grown, with 88% of the 1,155.6 MW of nameplate
17 capacity, represented by 125 solar QF projects, with 1,017.0 MW of nameplate capacity. Of
18 this 1,017.0 MW of solar QF capacity, 3.2 MW are online, 406.1 MW are under contract but
19 not yet online, and 607.8 MW are proposed.

20 Table 1 below summarizes the QF projects, by nameplate capacity and QF type, that
21 have requested or executed PPAs under Schedule 201 and Schedule 202, and demonstrates
22 PGE's significant increase in QF activity.

¹ Additionally, on August 2, PGE received 11 proposed solar QF projects, all sized at either 3 or 4 MW, totaling 37 MW from a single developer.

Table 1

As of July 28, 2017

Contracted and Proposed QF Projects	Number of Projects	Nameplate Capacity (MW)
Bio	11	93.9
Geothermal	2	27.0
Hydro	8	6.4
Wind	2	11.3
Solar	131	1,017.0
Total	154	1,155.6

1 As described in our direct testimony, this is in stark contrast to the QF PPAs that were
2 contracted when Order No. 14-058 was issued on February 24, 2014. See Table 2 below.

Table 2

As of Order No. 14-058: February 24, 2014

Contracted QF Projects	Number of Projects	Nameplate Capacity (MW)
Bio	5	21.5
Geothermal	0	0.0
Hydro	6	6.8
Wind	3	29.0
Solar	5	10.7
Total	19	68.0

3 **Q. Please summarize your exhibits.**

4 A. Nine exhibits accompany this testimony. The first seven are updated versions of PGE
5 Exhibits 101-107 presented in direct testimony. PGE Exhibit 201 provides a list of QF
6 projects and includes both QF projects that have signed PPAs and proposed QF projects. It
7 provides a unique identifier for each QF project, the developer, the status, the resource type,
8 the nameplate capacity, whether the QF is on PGE's system or off PGE's system, the date

1 the PPA was executed, the expected or actual commercial operation date, and whether the
2 PPA was executed before or after the Commission issued Order No. 14-058. If the status is
3 “online,” then PGE has a PPA with the QF and the QF has reached commercial operation. If
4 the status is “contracted,” then the PGE has a PPA with the QF and the QF has not yet
5 reached commercial operation. If the status is “proposed,” then the QF has requested a PPA
6 with PGE.

7 PGE Exhibit 202 summarizes the QFs by resource type and separates them into four
8 groups: online, contracted, proposed, and total.

9 PGE Exhibit 203 summarizes solar QFs by whether they are on PGE’s system or off
10 PGE’s system and separates them into four groups: online, contracted, proposed, and total.

11 PGE Exhibit 204 summarizes solar QFs by developer. It also provides a summary of
12 developers with multiple QF projects and developers with only one QF project. It provides
13 these summaries for (1) solar QFs that have executed PPAs, and (2) solar QFs that have
14 requested a PPA.

15 PGE Exhibit 205 summarizes estimated payments to QFs by year and resource type. It
16 does this for QFs for both executed and proposed PPAs, as well as separating the two.

17 PGE Exhibit 206 compares estimated payments to all contracted and proposed QFs
18 using currently available prices and market forward prices.

19 PGE Exhibit 207 compares estimated payments to proposed solar QFs using currently
20 available prices and market forward prices.

21 PGE Exhibit 208 compares estimated payments to proposed solar QFs over 2 MW up to
22 3 MW using currently available prices and market forward prices.

1 PGE Exhibit 209 compares estimated payments to all contracted and proposed QFs
2 using currently available prices and potential prices that could come as the result of a
3 Commission order in LC 66, PGE's 2016 IRP, which is on the agenda for the Commission's
4 August 8, 2017 Public Meeting.

5 **Q. Has PGE received additional solar QF standard contract requests since the June 5,**
6 **2017 snapshot used in your direct testimony?**

7 A. Yes. As of July 28, 2017, PGE has 19 more solar QF standard contract proposals than it had
8 on June 5, 2017, the date of the snapshot used in our initial filing; these 19 additional solar
9 QF standard contract proposals provide an additional 78.8 MW of combined nameplate
10 capacity. Combined with negotiated contract proposals, PGE has 26 more solar QF proposal
11 that it had on June 5, 2017, providing an additional 190.6 MW of solar nameplate
12 capacity.

13 PGE has a total of 114 requests for standard contracts from solar QFs, representing
14 660.1 MW of nameplate capacity.

15 **Q. Have additional developers proposed solar QF projects to PGE for fixed prices under**
16 **PGE's Schedule 201?**

17 A. Yes, three additional developers have proposed solar QF projects for fixed prices under
18 schedule 201 since the June 5, 2017 snapshot used in PGE's direct testimony. Two
19 developers have proposed multiple solar QF projects; one developer proposed a single 10
20 MW nameplate capacity solar QF project, and the other developer proposed a single solar
21 QF project of unknown size. As shown in PGE Exhibit 204, 15 developers proposing
22 multiple solar QF projects have contracted for or proposed 109 projects for 610.1 MW of
23 nameplate capacity.

1 **Q. How does PGE’s revised level of solar QF activity compare to that of Idaho Power and**
2 **PacifiCorp when they filed for relief in UM 1725 and UM 1734, respectively?**

3 A. As of July 28, 2017, PGE has 6.3 times as many megawatts of QF output under contract and
4 148% more megawatts of QF output seeking solar QF contracts than did Idaho Power when
5 it sought interim relief in UM 1725.

6 When compared with PacifiCorp’s QF volume at the time it sought interim relief, PGE
7 has 85% more megawatts of QF output under contract and 154% more megawatts of QF
8 output seeking PURPA contracts than PacifiCorp. However, a more relevant point is that
9 when PacifiCorp filed for interim relief, it had 5 proposed solar QF projects that had
10 requested *standard contracts* (49.8 MW). PGE now has 55 proposed solar QFs that have
11 requested *standard contracts* (298.8 MW) or **six times** as many megawatts of QF output
12 seeking standard PURPA contracts than PacifiCorp did when it sought interim relief in UM
13 1734.

14 After adjusting for the relative size of PacifiCorp using the energy using energy sales
15 (increasing PacifiCorp’s 49.8 MW by 48%² to 73.7 MW), PGE has four times as many
16 megawatts of QF output seeking *standard* PURPA contracts than PacifiCorp did when it
17 sought interim relief in UM 1734.

18 **Q. Considering the additional proposed QFs since June 5, 2017, how do the expected**
19 **payments from proposed solar QFs priced at current avoided cost prices compare to**
20 **market?**

21 A. In our direct testimony, we estimated the expected payments at current fixed prices to total
22 about \$941 million over 15 years, \$396 million priced at market, for payments in excess of

² PGE’s 2015 energy sales were 48% higher than PacifiCorp’s 2015 energy sales in Oregon.

1 market around \$545 million. With the inundation of additional proposed solar QFs as of
2 July 28, 2017, those figures have grown. We estimate the expected payments at current
3 fixed prices to total about \$1,600 million with fixed pricing over 15 years, \$684 million
4 priced at market, for payments in excess of market around \$918 million. PGE Exhibit 207
5 shows the payments to proposed solar QFs under Schedule 201 avoided costs compared to
6 market.

7 **Q. Are there factors, other than additional proposed QFs, impacting the increase in**
8 **payments for proposed solar QFs?**

9 A. Yes, the Commission issued Order No. 17-256 on July 13, 2017 in UM 1805, directing PGE
10 to provide 15 years of fixed payments from commercial operation. PGE previously
11 provided payments based on 15 years of fixed prices from the date of PPA execution. PGE
12 updated the analysis for the exhibits used in this testimony to be consistent with that order.
13 The effect of this order is likely several years of additional payments for many of those
14 proposed QFs.

15 **Q. What is the impact of the Commission granting relief using a 3 MW cap for solar**
16 **standard pricing relative to a 2 MW cap for solar standard pricing?**

17 A. The proposed solar QFs over 2 MW up to 3 MW represent 31.2 MW of nameplate capacity.
18 The difference between providing payments at PGE's current avoided cost prices and a
19 market estimate over 15 years is at least \$32.4 million. The practical impact is considerably
20 higher as more and more solar QFs propose projects over 2 MW up to 3 MW. PGE Exhibit
21 208 provides this comparison.

22 **Q. Will the granting of temporary relief only for requests made after June 30, 2017, the**
23 **date of PGE's initial filing, have a significant impact?**

1 A. No. Relief that applies to requests made after June 30, 2017 will allow all but six of the
2 currently proposed solar QF standard PPAs to be executed.

3 **Q. Has PGE calculated potential avoided cost prices that will come into effect if its 2016**
4 **IRP is acknowledged?**

5 A. The prices consistent with the 2016 IRP depend on the Commission's decisions in LC-66,
6 PGE's docket associated with its 2016 IRP. In preparation for the Commission's ruling,
7 PGE had not completed an analysis of potential prices under an acknowledged 2016 IRP,
8 however, certain intervenors in UM 1854 made assertions regarding the likely impact of the
9 2016 IRP on PGE's standard prices and PGE has estimated that impact in order to reply to
10 those assertions. The calculations are still being reviewed and may change slightly even if
11 the assumptions used are correct. We estimate the impacts using a 2029 deficiency period
12 and assumes the Commission does not acknowledge PGE's renewable action plan,
13 consistent with Staff's recommendation in LC 66. Under this scenario, PGE estimates the
14 standard renewable price for solar QFs will decrease by around \$21.11 on a real levelized
15 basis. Applied to the 607.8 MW of solar capacity currently seeking standard contracts from
16 PGE, this means that PGE's customers could be exposed to about \$380 million more in
17 costs if they are required to pay today's stale standard prices for the output of the solar QF
18 projects currently seeking standard contracts from PGE.

19 **Q. Does this conclude your testimony?**

20 A. Yes.

List of Exhibits

<u>PGE Exhibit</u>	<u>Description</u>
201	QF List
202	QF Summaries by Resource Type
203	Solar QF Summaries
204	Solar QFs by Developer
205	Estimated Payments to QFs
206	QF Payments Compared to Market
207	Proposed Solar QF Payments Compared to Market
208	Proposed Solar QF Payments Compared to Market 2-3 MW
209	Proposed Solar QF Payments Compared to Potential IRP Pricing

EXHIBIT PGE 201

Qualifying Facility (QF) List

**Portland General Electric
Qualifying Facilities as of July 28, 2017
Online, Contracted, and Proposed**

QF	Developer	Status	Resource Type	Nameplate Capacity	On or Off System	Date Executed	COD
1	N/A	Online	Hydro	0.08	On	Apr-13	Dec-85
2	N/A	Online	Wind	9	Off	May-10	Dec-10
3	N/A	Online	Solar	0.025	On	Nov-10	Jan-11
4	N/A	Online	Solar	0.04	On	Oct-11	Dec-11
5	N/A	Online	Bio	5.66	Off	Jun-12	Oct-12
6	N/A	Online	Solar	0.094	On	May-13	Apr-13
7	N/A	Online	Bio	1.6	Off	Dec-11	Oct-13
8	N/A	Online	Bio	0.37	Off	Nov-12	Jan-14
9	N/A	Online	Bio	0.8	Off	Sep-13	Jan-14
10	N/A	Online	Hydro	0.2	On	Feb-14	Feb-14
11	N/A	Online	Hydro	0.2	On	Feb-14	Feb-14
12	N/A	Online	Hydro	0.17	On	Dec-12	Dec-14
13	One Energy	Online	Solar	2.5	On	Feb-14	Dec-15
14	Obsidian Renewables	Contracted	Solar	8	Off	Sep-13	*Nov-14
15	Obsidian Renewables	Contracted	Solar	10	Off	Apr-15	Nov-17
16	PineGate Renewables	Contracted	Solar	2.2	On	Jul-15	Dec-17
17	PineGate Renewables	Contracted	Solar	2.2	On	Jul-15	Dec-17
18	PineGate Renewables	Contracted	Solar	2.2	On	Jul-15	Dec-17
19	PineGate Renewables	Contracted	Solar	2.2	On	Jul-15	Dec-17
20	PineGate Renewables	Contracted	Solar	2.2	On	Jul-15	Dec-17
21	PineGate Renewables	Contracted	Solar	2.2	On	Jul-15	Dec-17
22	PineGate Renewables	Contracted	Solar	2.2	On	Jul-15	Dec-17
23	Obsidian Renewables	Contracted	Solar	10	Off	Jul-15	May-18
24	One Energy	Online	Solar	0.5	On	Nov-15	Dec-16
25	N/A	Contracted	Bio	2.2	On	Nov-15	Oct-18
26	One Energy	Contracted	Solar	10	Off	Jan-16	Oct-18
27	One Energy	Contracted	Solar	5	Off	Jan-16	Dec-17
28	One Energy	Contracted	Solar	10	Off	Jan-16	Sep-18
29	NewSun Energy	Contracted	Solar	10	Off	Jan-16	Jan-19
30	NewSun Energy	Contracted	Solar	10	Off	Jan-16	Jan-19
31	NewSun Energy	Contracted	Solar	10	Off	Jan-16	Jan-19
32	NewSun Energy	Contracted	Solar	10	Off	Jan-16	Jan-19
33	PineGate Renewables	Contracted	Solar	2.2	On	Jan-16	Dec-17
34	PineGate Renewables	Contracted	Solar	2.2	On	Jan-16	Dec-17
35	Pacific Northwest Solar	Contracted	Solar	4	On	Jan-16	Dec-17
36	TLS Capital, Inc	Contracted	Solar	2.2	On	Jan-16	Mar-18
37	TLS Capital, Inc	Contracted	Solar	2.2	On	Jan-16	Mar-18
38	Iberdrola	Contracted	Solar	10	Off	Jan-16	Dec-18
39	One Energy	Contracted	Solar	10	Off	Mar-16	Jun-18
40	NewSun Energy	Contracted	Solar	10	Off	Apr-16	Jan-19
41	NewSun Energy	Contracted	Solar	10	Off	Apr-16	Jan-19
42	TLS Capital, Inc	Contracted	Solar	2.2	On	May-16	Mar-18
43	Pacific Northwest Solar	Contracted	Solar	4	On	May-16	Nov-17
44	Pacific Northwest Solar	Contracted	Solar	10	On	May-16	Nov-17
45	Pacific Northwest Solar	Contracted	Solar	4	On	May-16	Nov-17
46	Pacific Northwest Solar	Contracted	Solar	7	Off	May-16	Nov-17

*COD not yet achieved

QF	Developer	Status	Resource Type	Nameplate Capacity	On or Off System	Date Executed	COD
47	Pacific Northwest Solar	Contracted	Solar	4	On	May-16	Nov-17
48	Pacific Northwest Solar	Contracted	Solar	10	On	May-16	Nov-17
49	TLS Capital, Inc	Contracted	Solar	2.2	On	Jun-16	Mar-18
50	TLS Capital, Inc	Contracted	Solar	2.2	On	Jun-16	Mar-18
51	N/A	Contracted	Geothermal	10	Off	Jun-16	Apr-20
52	TLS Capital, Inc	Contracted	Solar	2.2	On	Jun-16	Apr-18
53	Energy Partners	Contracted	Bio	10	Off	Jun-16	Jun-19
54	Energy Partners	Contracted	Bio	10	Off	Jun-16	Jun-19
55	TLS Capital, Inc	Contracted	Solar	2.2	On	Jun-16	Mar-18
56	NewSun Energy	Contracted	Solar	10	Off	Jun-16	Jan-19
57	NewSun Energy	Contracted	Solar	10	Off	Jun-16	May-19
58	NewSun Energy	Contracted	Solar	10	Off	Jun-16	May-19
59	NewSun Energy	Contracted	Solar	10	Off	Jun-16	May-19
60	Dan Orzech	Contracted	Solar	2.2	On	Jun-16	Oct-17
61	Dan Orzech	Contracted	Solar	2.2	On	Jun-16	Oct-17
62	Pueblo Energy Holdings	Contracted	Solar	10	Off	Jul-16	May-19
63	Pueblo Energy Holdings	Contracted	Solar	10	Off	Jul-16	May-19
64	Pueblo Energy Holdings	Contracted	Solar	10	Off	Jul-16	Jun-19
65	Pueblo Energy Holdings	Contracted	Solar	10	Off	Aug-16	Jul-19
66	Pueblo Energy Holdings	Contracted	Solar	10	Off	Aug-16	Jul-19
67	EDP Renewables	Proposed	Solar	10	Off		Nov-19
68	EDP Renewables	Proposed	Solar	10	Off		Nov-19
69	One Energy	Contracted	Solar	10	Off	Nov-16	Jun-19
70	One Energy	Contracted	Solar	10	Off	Jun-17	Jun-19
71	Obsidian Renewables	Contracted	Solar	47.25	Off	Jan-17	Nov-19
72	RPS Advisors	Proposed	Geothermal	17	Off		Nov-18
73	Wellons	Proposed	Bio	28.25	Off	Jun-17	Jan-20
74	TLS Capital, Inc	Contracted	Solar	2.2	On	Jan-17	Dec-17
75	TLS Capital, Inc	Contracted	Solar	2.2	On	Jan-17	Apr-17
76	SunPower Inc	Contracted	Solar	10	Off	Jun-17	Dec-19
77	Redwood Energy	Proposed	Solar	10	Off		Dec-19
78	Juwi Americas	Contracted	Solar	10	Off	Apr-17	Dec-19
79	Three Sisters Irrigation District	Proposed	hydro	0.35	Off		Jan-20
80	Freres Lumber	Contracted	Bio	10	Off	May-17	Jan-18
81	EDP Renewables	Proposed	Solar	10	Off		Nov-19
82	EDP Renewables	Proposed	Solar	10	Off		Nov-19
83	N/A	Proposed	Hydro	4.6	Off		Dec-18
84	TLS Capital, Inc	Contracted	Solar	2.2	On	May-17	Apr-18
85	EDP Renewables	Proposed	Solar	10	Off		Jan-20
86	TLS Capital, Inc	Contracted	Solar	2.2	On	Jun-17	Mar-18
87	TLS Capital, Inc	Contracted	Solar	2.2	On	Jun-17	Mar-18
88	TLS Capital, Inc	Contracted	Solar	2.2	On	Jun-17	Apr-18
89	TLS Capital, Inc	Proposed	Solar	1.85	On		Nov-17
90	NewSun Energy	Proposed	Solar	20	Off		Jul-20
91	Pueblo Energy Holdings	Proposed	Solar	10	Off		May-20
92	NewSun Energy	Proposed	Solar	35	Off		Jun-20
93	Cypress Creek Renewables	Proposed	Solar	2.2	On		Dec-18
94	Cypress Creek Renewables	Proposed	Solar	2.2	On		Dec-18
95	Cypress Creek Renewables	Proposed	Solar	2.2	On		Dec-18
96	Cypress Creek Renewables	Proposed	Solar	2.2	On		Dec-18
97	Sabal Solar Development	Proposed	Solar	2.2	On		Dec-18
98	Sabal Solar Development	Proposed	Solar	2.2	On		Dec-18
99	Sabal Solar Development	Proposed	Solar	2.2	On		Dec-18

QF	Developer	Status	Resource Type	Nameplate Capacity	On or Off System	Date Executed	COD
100	Ecoplexus Inc.	Proposed	Solar	80	Off		Dec-19
101	PineGate Renewables	Proposed	Solar	2.2	On		Dec-18
102	PineGate Renewables	Proposed	Solar	2.2	On		Dec-18
103	PineGate Renewables	Proposed	Solar	2.2	On		Dec-18
104	Pueblo Energy Holdings	Proposed	Solar	10	Off		Jun-20
105	One Energy	Proposed	Solar	10	Off		Apr-20
106	Strata Solar Development	Proposed	Solar	4	On		Apr-20
107	Strata Solar Development	Proposed	Solar	2	On		Apr-20
108	Juwi Americas	Proposed	Solar	10	Off		Dec-19
109	Juwi Americas	Proposed	Solar	10	Off		Dec-19
110	Juwi Americas	Proposed	Solar	10	Off		Dec-19
111	Juwi Americas	Proposed	Solar	10	Off		Dec-19
112	Juwi Americas	Proposed	Solar	10	Off		Dec-19
113	Pueblo Energy Holdings	Proposed	Solar	10	Off		Jun-20
114	Pueblo Energy Holdings	Proposed	Solar	10	Off		Jul-20
115	N/A	Proposed	Bio	15	On		Sep-19
116	Cypress Creek Renewables	Proposed	Solar	2.25	On		Dec-18
117	Cypress Creek Renewables	Proposed	Solar	2.25	On		Dec-18
118	N/A	Proposed	Bio	10	Off		Jan-20
119	Strata Solar Development	Proposed	Solar	2	On		Apr-20
120	Strata Solar Development	Proposed	Solar	2	On		Apr-20
121	Tower Road Solar LLC	Proposed	Solar	60	Off		Jul-20
122	Strata Solar Development	Proposed	Solar	4	On		Apr-20
123	One Energy	Proposed	Solar	10	Off		Apr-20
124	One Energy	Proposed	Solar	10	Off		Apr-20
125	Ecoplexus Inc.	Proposed	Solar	80	Off		Aug-20
126	TLS Capital, Inc	Proposed	Solar	0.75	On		Aug-20
127	TLS Capital, Inc	Proposed	Solar	2.2	On		Aug-20
128	Oregon Energy Green	Proposed	Hydro	0.8	Off		Aug-20
129	Slap Shot Energy Ventures	Proposed	Solar	10	Off		Aug-20
130	Gorge Training Facility LLC	Proposed	Wind	2.3	Off		Aug-20
131	Strata Solar Development	Proposed	Solar	4	On		Aug-20
132	One Energy	Proposed	Solar	10	Off		Aug-20
133	One Energy	Proposed	Solar	10	Off		Aug-20
134	Strata Solar Development	Proposed	Solar	2	On		Aug-20
135	Strata Solar Development	Proposed	Solar	2	On		Aug-20
136	Strata Solar Development	Proposed	Solar	4	On		Aug-20
137	Strata Solar Development	Proposed	Solar	2	On		Aug-20
138	EDF Renewables	Proposed	Solar	34	Off		Aug-20
139	Strata Solar Development	Proposed	Solar	2	On		Aug-20
140	Strata Solar Development	Proposed	Solar	2	On		Aug-20
141	Strata Solar Development	Proposed	Solar	2	On		Aug-20
142	GreenKey Solar 1	Proposed	Solar	2	On		Aug-20
143	GreenKey Solar 1	Proposed	Solar	2	On		Aug-20
144	GreenKey Solar 1	Proposed	Solar	2	On		Aug-20
145	Heelstone Development, LLC	Proposed	Solar	10	On		Aug-20
146	Heelstone Development, LLC	Proposed	Solar	2.5	On		Aug-20
147	Heelstone Development, LLC	Proposed	Solar	5	On		Aug-20
148	TLS Capital, Inc	Proposed	Solar				
149	TLS Capital, Inc	Proposed	Solar				
150	White Water Green Energy	Proposed	Hydro				
151	BNRG Renewables	Proposed	Solar				
152	TLS Capital, Inc	Proposed	Solar				

QF	Developer	Status	Resource Type	Nameplate Capacity	On or Off System	Date Executed	COD
153	TLS Capital, Inc	Proposed	Solar				
154	TLS Capital, Inc	Proposed	Solar				

EXHIBIT PGE 202

Qualifying Facility Summaries by Resource Type

Portland General Electric
Qualifying Facilities as of July 28, 2017
Online, Contracted, and Proposed by Resource Type

Online QF Projects	Number of Projects	Nameplate Capacity (MW)
Bio	4	8.4
Geothermal	0	0.0
Hydro	4	0.7
Wind	1	9.0
Solar	5	3.2
Total	14	21.2

Contracted QF Projects Not Yet Online	Number of Projects	Nameplate Capacity (MW)
Bio	4	32.2
Geothermal	1	10.0
Hydro	0	0.0
Wind	0	0.0
Solar	59	406.1
Total	64	448.3

Proposed QF Projects	Number of Projects	Nameplate Capacity (MW)
Bio	3	53.3
Geothermal	1	17.0
Hydro	4	5.8
Wind	1	2.3
Solar	67	607.8
Total	76	686.1

All QF Projects	Number of Projects	Nameplate Capacity (MW)
Bio	11	93.9
Geothermal	2	27.0
Hydro	8	6.4
Wind	2	11.3
Solar	131	1,017.0
Total	154	1,155.6

EXHIBIT PGE 203

Solar Qualifying Facility (QF) Summaries

Portland General Electric
Solar Qualifying Facilities as of July 28, 2017
Online, Contracted, and Proposed - On System and Off System

Online Solar QFs	Number of Projects	Nameplate Capacity (MW)	
On System	5	3.2	100.0%
Off System	0	0.0	0.0%
Total	5	3.2	

Contracted Solar QFs Not Yet Online	Number of Projects	Nameplate Capacity (MW)	
On System	30	88.8	21.9%
Off System	29	317.3	78.1%
Total	59	406.1	

Proposed Solar QFs	Number of Projects	Nameplate Capacity (MW)	
On System	34	88.8	14.6%
Off System	27	519.0	85.4%
Total	61	607.8	

All Solar QFs	Number of Projects	Nameplate Capacity (MW)	
On System	69	180.8	17.8%
Off System	56	836.3	82.2%
Total	125	1,017.0	

EXHIBIT PGE 204

Solar Qualifying Facilities (QFs) by Developer

Portland General Electric
Solar Qualifying Facilities as of July 28, 2017
Contracted Since Order No. 14-058 with Standard Contracts

Solar QFs - Contracted and Proposed

	Number of Developers	Number of Projects	Total Nameplate Capacity
Developers with multiple projects	15	109	610.1
Developers with 1 project	4	4	40.0

Solar QF Developers with Multiple Projects

Developer	Number of Projects with a Solar QF Contract	Number of Projects Seeking a Solar QF Contract	Total Number of Projects	Average Nameplate Capacity	Nameplate Capacity Seeking a Solar QF Contract	Total Nameplate Capacity
A Cypress Creek Renewables	0	6	6	2.2	13.3	13.3
B Dan Orzech	2	0	2	2.2	0.0	4.4
D EDP Renewables	0	5	5	10.0	50.0	50.0
F Juwi Americas	1	5	6	10.0	50.0	60.0
G NewSun Energy	10	0	10	10.0	0.0	100.0
H Obsidian Renewables	2	0	2	10.0	0.0	20.0
I One Energy	7	5	12	8.8	50.0	105.5
J Pacific Northwest Solar	7	0	7	6.1	0.0	43.0
K PineGate Renewables	9	3	12	2.2	6.6	26.4
L Pueblo Energy Holdings	5	4	9	10.0	40.0	90.0
N Sabal Solar Development	0	3	3	2.2	6.6	6.6
O Strata Solar Development	0	13	13	2.6	34.0	34.0
R TLS Capital, Inc	13	3	16	2.1	4.8	33.4
AA GreenKey Solar 1	0	3	3	2.0	6.0	6.0
AB Heelstone Development, LLC	0	3	3	5.8	17.5	17.5
Total	56	53	109		278.8	610.1

Solar QF Developers with One Project

Developer		Number of Projects with a Solar QF Contract	Number of Projects Seeking a Solar QF Contract	Total Number of Projects	Average Nameplate Capacity	Nameplate Capacity Seeking a Solar QF Contract	Total Nameplate Capacity
E Iberdrola		1	0	1	10.0	0.0	10.0
M Redwood Energy		0	1	1	10.0	10.0	10.0
P SunPower Inc		1	0	1	10.0	0.0	10.0
AD Slap Shot Energy Ventures		0	1	1	10.0	10.0	10.0
Total		2	2	4		20.0	40.0

EXHIBIT PGE 205

Estimated Payments to Qualifying Facilities (QFs)

Portland General Electric

Estimated Payments to Online, Contracted, and Proposed QFs as of July 28, 2017

Online, Contracted, and Proposed QFs

	Total	Bio	Geothermal	Hydro	Wind	Solar
*2017	\$8,979,800	\$4,888,426	\$0	\$125,277	\$2,033,799	\$1,932,298
2018	\$18,739,879	\$6,458,929	\$302,944	\$153,870	\$2,108,535	\$9,715,601
2019	\$36,526,695	\$10,885,077	\$3,867,109	\$436,080	\$2,211,333	\$19,127,096
2020	\$216,193,926	\$63,022,116	\$17,688,337	\$1,197,586	\$2,222,670	\$132,063,216
2021	\$254,709,363	\$64,593,750	\$20,070,523	\$1,322,566	\$2,274,241	\$166,448,283
2022	\$259,796,625	\$66,004,463	\$20,457,858	\$1,351,359	\$2,324,096	\$169,658,849
2023	\$265,119,651	\$67,460,895	\$20,852,746	\$1,382,318	\$2,406,024	\$173,017,668
2024	\$270,222,275	\$68,747,625	\$21,197,182	\$1,407,854	\$2,486,110	\$176,383,505
2025	\$275,131,377	\$70,421,584	\$21,665,329	\$1,441,399	\$882,221	\$180,720,844
2026	\$280,228,684	\$71,702,069	\$22,083,451	\$1,469,573	\$0	\$184,973,590
2027	\$281,955,884	\$69,261,258	\$22,509,730	\$1,491,716	\$0	\$188,693,180
2028	\$282,740,423	\$67,054,191	\$22,881,410	\$1,344,310	\$0	\$191,460,512
2029	\$288,651,403	\$68,503,597	\$23,387,042	\$1,367,578	\$0	\$195,393,185
2030	\$290,443,096	\$69,598,215	\$23,838,326	\$1,393,964	\$0	\$195,612,591
2031	\$234,772,070	\$59,096,591	\$19,226,761	\$1,420,869	\$0	\$155,027,849
2032	\$167,399,960	\$31,618,033	\$14,951,002	\$1,444,449	\$0	\$119,386,476
2033	\$143,655,917	\$18,332,873	\$13,966,928	\$1,377,871	\$0	\$109,978,245
2034	\$123,204,822	\$15,263,349	\$0	\$300,947	\$0	\$107,640,526
2035	\$49,245,763	\$0	\$0	\$124,915	\$0	\$49,120,848
Total	\$3,747,717,612	\$892,913,042	\$288,946,677	\$20,554,504	\$18,949,028	\$2,526,354,361

Contracted QFs - Online and Not Online

	Total	Bio	Geothermal	Hydro	Wind	Solar
*2017	\$8,976,883	\$4,888,426	\$0	\$125,277	\$2,033,799	\$1,929,381
2018	\$18,336,625	\$6,458,929	\$0	\$131,209	\$2,108,535	\$9,637,951
2019	\$29,786,544	\$10,032,140	\$0	\$137,168	\$2,211,333	\$17,405,904
2020	\$105,355,378	\$26,995,812	\$5,802,898	\$142,877	\$2,222,670	\$70,191,120
2021	\$109,803,685	\$27,692,859	\$7,922,563	\$148,925	\$2,274,241	\$71,765,098
2022	\$112,097,824	\$28,391,129	\$8,075,469	\$155,069	\$2,324,096	\$73,152,061
2023	\$114,559,524	\$29,121,870	\$8,231,325	\$162,935	\$2,406,024	\$74,637,370
2024	\$116,864,079	\$29,775,587	\$8,367,266	\$168,328	\$2,486,110	\$76,066,789
2025	\$118,122,536	\$30,588,481	\$8,552,120	\$174,503	\$882,221	\$77,925,211
2026	\$119,753,525	\$31,100,121	\$8,717,176	\$178,228	\$0	\$79,758,000
2027	\$118,295,976	\$27,875,964	\$8,885,418	\$175,441	\$0	\$81,359,153
2028	\$116,428,722	\$24,985,029	\$9,032,161	\$6,304	\$0	\$82,405,229
2029	\$117,953,564	\$25,505,045	\$9,231,705	\$0	\$0	\$83,216,815
2030	\$116,204,394	\$25,769,916	\$9,409,877	\$0	\$0	\$81,024,601
2031	\$56,881,912	\$14,422,617	\$4,519,824	\$0	\$0	\$37,939,471

2032	\$7,916,077	\$2,208,653	\$0	\$0	\$0	\$5,707,424
2033	\$0	\$0	\$0	\$0	\$0	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$1,387,337,250	\$345,812,577	\$96,747,801	\$1,706,265	\$18,949,028	\$924,121,578

Proposed QFs

	Total	Bio	Geothermal	Hydro	Wind	Solar
*2017	\$2,917	\$0	\$0	\$0	\$0	\$2,917
2018	\$403,255	\$0	\$302,944	\$22,661	\$0	\$77,650
2019	\$6,740,150	\$852,937	\$3,867,109	\$298,912	\$0	\$1,721,192
2020	\$110,838,548	\$36,026,304	\$11,885,439	\$1,054,709	\$0	\$61,872,096
2021	\$144,905,677	\$36,900,891	\$12,147,960	\$1,173,641	\$0	\$94,683,185
2022	\$147,698,802	\$37,613,335	\$12,382,390	\$1,196,290	\$0	\$96,506,788
2023	\$150,560,127	\$38,339,025	\$12,621,421	\$1,219,383	\$0	\$98,380,298
2024	\$153,358,196	\$38,972,038	\$12,829,916	\$1,239,526	\$0	\$100,316,716
2025	\$157,008,841	\$39,833,103	\$13,113,209	\$1,266,896	\$0	\$102,795,633
2026	\$160,475,159	\$40,601,948	\$13,366,275	\$1,291,345	\$0	\$105,215,591
2027	\$163,659,908	\$41,385,294	\$13,624,312	\$1,316,275	\$0	\$107,334,027
2028	\$166,311,700	\$42,069,162	\$13,849,249	\$1,338,006	\$0	\$109,055,283
2029	\$170,697,838	\$42,998,552	\$14,155,338	\$1,367,578	\$0	\$112,176,370
2030	\$174,238,701	\$43,828,299	\$14,428,449	\$1,393,964	\$0	\$114,587,989
2031	\$177,890,158	\$44,673,974	\$14,706,937	\$1,420,869	\$0	\$117,088,377
2032	\$159,483,883	\$29,409,380	\$14,951,002	\$1,444,449	\$0	\$113,679,052
2033	\$143,655,917	\$18,332,873	\$13,966,928	\$1,377,871	\$0	\$109,978,245
2034	\$123,204,822	\$15,263,349	\$0	\$300,947	\$0	\$107,640,526
2035	\$49,245,763	\$0	\$0	\$124,915	\$0	\$49,120,848
Total	\$2,360,380,362	\$547,100,465	\$192,198,876	\$18,848,238	\$0	\$1,602,232,783

* Partial year from July 2017 through December 2017

EXHIBIT PGE 206

Qualifying Facilities (QFs) Payments Compared to Market

Portland General Electric
Estimated Payments to QFs as of July 28, 2017
Contract Pricing vs. Forward Market Pricing

Online, Contracted, and Proposed QFs

	Estimated Payments Under Contract or June 1, 2017 Pricing for Proposed	Estimated Payments at Mid-C Forward Pricing	Above Market Value
*2017	\$8,979,800	\$3,418,716	\$5,561,085
2018	\$18,739,879	\$9,806,489	\$8,933,390
2019	\$36,526,695	\$22,936,865	\$13,589,829
2020	\$216,193,926	\$68,059,689	\$148,134,237
2021	\$254,709,363	\$84,324,497	\$170,384,865
2022	\$259,796,625	\$89,825,419	\$169,971,206
2023	\$265,119,651	\$92,121,859	\$172,997,792
2024	\$270,222,275	\$93,029,976	\$177,192,299
2025	\$275,131,377	\$95,091,129	\$180,040,248
2026	\$280,228,684	\$97,914,424	\$182,314,260
2027	\$281,955,884	\$99,321,597	\$182,634,287
2028	\$282,740,423	\$101,251,922	\$181,488,501
2029	\$288,651,403	\$103,206,522	\$185,444,881
2030	\$290,443,096	\$105,023,763	\$185,419,333
2031	\$234,772,070	\$88,616,019	\$146,156,051
2032	\$167,399,960	\$67,941,684	\$99,458,276
2033	\$143,655,917	\$59,982,809	\$83,673,108
2034	\$123,204,822	\$53,264,931	\$69,939,891
2035	\$49,245,763	\$21,951,706	\$27,294,057
Total	\$3,747,717,612	\$1,357,090,015	\$2,390,627,597

* Partial year from July 2017 through December 2017

EXHIBIT PGE 207

Proposed Solar Qualifying Facilities (QFs) Compared to Market

Portland General Electric
Estimated Payments to Proposed Solar QFs as of July 28, 2017
Currently Available Pricing vs. Forward Market Pricing

Proposed Solar QFs

	Estimated Payments at June 1, 2017 Pricing	Estimated Payments at Mid-C Forward Pricing	Above Market Value
*2017	\$2,917	\$3,256	(\$339)
2018	\$77,650	\$75,508	\$2,142
2019	\$1,721,192	\$1,554,448	\$166,744
2020	\$61,872,096	\$24,207,994	\$37,664,102
2021	\$94,683,185	\$37,954,042	\$56,729,143
2022	\$96,506,788	\$40,411,374	\$56,095,414
2023	\$98,380,298	\$41,397,369	\$56,982,929
2024	\$100,316,716	\$41,831,924	\$58,484,793
2025	\$102,795,633	\$42,976,250	\$59,819,384
2026	\$105,215,591	\$44,374,862	\$60,840,729
2027	\$107,334,027	\$45,512,079	\$61,821,948
2028	\$109,055,283	\$46,924,322	\$62,130,961
2029	\$112,176,370	\$48,069,355	\$64,107,015
2030	\$114,587,989	\$49,504,825	\$65,083,164
2031	\$117,088,377	\$50,642,311	\$66,446,066
2032	\$113,679,052	\$50,020,446	\$63,658,605
2033	\$109,978,245	\$48,672,031	\$61,306,214
2034	\$107,640,526	\$48,030,349	\$59,610,178
2035	\$49,120,848	\$21,951,706	\$27,169,142
Total	\$1,602,232,783	\$684,114,448	\$918,118,335

* Partial year from July 2017 through December 2017

	June 1, 2017 Pricing	Mid-C Pricing	Above Market Price	
Levelized Price (\$2017)	57.44	26.65	30.79	\$/MWh

EXHIBIT PGE 208

Proposed Solar Qualifying Facilities (QFs) Compared to Market 2-3 MW

Portland General Electric
Estimated Payments to Proposed Solar QFs as of July 28, 2017
Currently Available Pricing vs. Forward Market Pricing

Proposed Solar QFs Over 2 MW up to 3 MW

	Estimated Payments at June 1, 2017 Pricing	Estimated Payments at Mid-C Forward Pricing	Above Market Value
*2017	\$0	\$0	\$0
2018	\$31,716	\$30,841	\$875
2019	\$1,244,945	\$1,127,578	\$117,367
2020	\$3,185,666	\$1,263,495	\$1,922,171
2021	\$3,557,875	\$1,442,462	\$2,115,414
2022	\$3,626,410	\$1,535,854	\$2,090,556
2023	\$3,696,805	\$1,573,327	\$2,123,478
2024	\$3,769,586	\$1,589,842	\$2,179,744
2025	\$3,862,726	\$1,633,333	\$2,229,393
2026	\$3,953,663	\$1,686,488	\$2,267,175
2027	\$4,033,264	\$1,729,708	\$2,303,555
2028	\$4,097,953	\$1,783,381	\$2,314,572
2029	\$4,215,227	\$1,826,899	\$2,388,329
2030	\$4,305,847	\$1,881,455	\$2,424,392
2031	\$4,399,820	\$1,924,685	\$2,475,134
2032	\$4,472,573	\$1,979,860	\$2,492,713
2033	\$4,138,750	\$1,831,647	\$2,307,103
2034	\$617,548	\$275,556	\$341,991
2035	\$478,462	\$213,821	\$264,641
Total	\$57,688,835	\$25,330,232	\$32,358,602

* Partial year from July 2017 through December 2017

EXHIBIT PGE 209

Proposed Solar Qualifying Facilities (QFs) Compared to Potential IRP Pricing

Portland General Electric
Estimated Payments to Proposed Solar QFs as of July 28, 2017
Currently Available Pricing vs. Potential 2016 IRP Pricing

Proposed Solar QFs

	A	B	A-B
	Estimated Payments at	IRP with 2029	
	June 1, 2017 Pricing	Deficiency Start Date	Difference
*2017	\$2,917	\$2,644	\$273
2018	\$77,650	\$75,460	\$2,190
2019	\$1,721,192	\$1,520,674	\$200,518
2020	\$61,872,096	\$23,604,943	\$38,267,153
2021	\$94,683,185	\$37,384,873	\$57,298,312
2022	\$96,506,788	\$39,571,997	\$56,934,790
2023	\$98,380,298	\$37,547,889	\$60,832,409
2024	\$100,316,716	\$38,702,581	\$61,614,135
2025	\$102,795,633	\$40,685,936	\$62,109,697
2026	\$105,215,591	\$42,818,721	\$62,396,870
2027	\$107,334,027	\$44,340,199	\$62,993,828
2028	\$109,055,283	\$45,033,014	\$64,022,269
2029	\$112,176,370	\$133,536,812	(\$21,360,442)
2030	\$114,587,989	\$136,552,597	(\$21,964,608)
2031	\$117,088,377	\$139,622,721	(\$22,534,344)
2032	\$113,679,052	\$136,647,683	(\$22,968,632)
2033	\$109,978,245	\$133,492,960	(\$23,514,715)
2034	\$107,640,526	\$131,131,656	(\$23,491,130)
2035	\$49,120,848	\$59,998,132	(\$10,877,284)
Total	\$1,602,232,783	\$1,222,271,494	\$379,961,289

* Partial year from July 2017 through December 2017

	A	B	A-B
	Estimated Payments at	IRP with 2029	
	June 1, 2017 Pricing	Deficiency Start Date	Difference
Levelized Price (\$2017)	57.44	\$36.34	21.11 \$/MWh