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April 24, 2018

Via Electronic Filing

Public Utility Commission of Oregon
Attn: Filing Center
201 High St. SE, Suite 100
Salem OR 97301

Re: In the Matter of PORTLAND GENERAL ELECTRIC COMPANY,
Draft Storage Potential Evaluation
Docket No. UM 1856

Dear Filing Center:

Please find enclosed the Surrebuttal Testimony and Exhibits of Dr. Benjamin Fitch-Fleischmann (AWEC-NIPPC/300 – 301) and Daniel Crotzer (AWEC-NIPPC/400 – 401) on behalf of the Alliance of Western Energy Consumers and the Northwest & Intermountain Power Producers Coalition in the above-referenced docket.

Thank you for your assistance. If you have any questions, please do not hesitate to call.

Sincerely,

/s/ Jesse O. Gorsuch
Jesse O. Gorsuch

Enclosures

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

UM 1856

In the Matter of)
)
PORTLAND GENERAL ELECTRIC)
COMPANY,)
)
Draft Storage Potential Evaluation.)
_____)

SURREBUTTAL TESTIMONY OF DR. BENJAMIN FITCH-FLEISCHMANN

ON BEHALF OF THE

ALLIANCE OF WESTERN ENERGY CONSUMERS

AND THE

NORTHWEST AND INTERMOUNTAIN POWER PRODUCERS COALITION

April 24, 2018

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THE SURREBUTTAL TESTIMONY OF
DR. BENJAMIN FITCH-FLEISCHMANN**

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AWEC-NIPPC/301 – PGE Responses to Data Requests

1 **I. INTRODUCTION**

2 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

3 A. My name is Benjamin Fitch-Fleischmann. My business address is 121 Hickory Street,
4 Missoula, Montana 59801.

5 **Q. ARE YOU THE SAME BENJAMIN FITCH-FLEISCHMANN WHO FILED DIRECT**
6 **TESTIMONY IN THIS PROCEEDING?**

7 A. Yes.

8 **Q. WHAT IS THE PURPOSE OF THIS TESTIMONY?**

9 A. The purpose of this testimony is to identify three significant shortcomings in Portland General
10 Electric Company's ("PGE") refusal to consider non-utility ownership of the energy storage
11 system ("ESS") that it has proposed to pair with its Coffee Creek Substation. These
12 shortcomings are: (1) the potential risks that PGE cites as reasons against non-utility ownership
13 are overstated, not supported by any evidence offered by PGE, and contradicted by the
14 existence of storage systems that are sited at substations and owned by third-parties; (2) PGE's
15 implication that the potential learnings from this project will be reduced under third-party
16 ownership is incorrect and shortsighted; and (3) the fundamental economic conditions typically
17 used to justify shielding a regulated monopoly from competition are not present in this
18 situation. I do not address PGE's claim that third-party ownership will create cybersecurity
19 risks, which is addressed in testimony provided by Daniel Crotzer of Fractal Energy Storage
20 Consultants.

1 **Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS.**

2 A. I recommend that the Commission require that PGE include in its request for proposals
3 (“RFP”) for the ESS the appropriate terms to allow for third-party ownership of the ESS while
4 still providing PGE with sufficient control of the asset and assigning appropriate liabilities
5 among PGE and the third-party owner. This should not be too difficult, given that other
6 utilities have been able to reach such agreements for third-party owned ESSs sited at
7 substations. At the very least, the Commission should require that bidders be allowed to
8 propose such terms themselves as part of their bids.

9 Finally, if the Commission agrees with PGE that there is some unique aspect of the
10 Coffee Creek Substation that bars third-party ownership, then I recommend that the
11 Commission reject PGE’s proposed Coffee Creek Substation and require PGE to identify a
12 different location that provides similar benefits, but allows third-party ownership. Coffee
13 Creek is not the only location in which PGE can obtain storage-related learnings and customer
14 benefits. There is no reason that a location should be chosen that bars the option to have third-
15 party ownership and the benefits that provides.

16 **II. RESPONSE TO PGE’S ARGUMENTS AGAINST THIRD-PARTY OWNERSHIP**

17 **Q. WHAT REASONS DOES PGE OFFER AGAINST THIRD-PARTY OWNERSHIP OF**
18 **THE COFFEE CREEK ESS?**

19 A. PGE states that it opposes third-party ownership of an ESS at the Coffee Creek Substation
20 because the proposed ESS would be (1) directly connected to a substation and (2) sited on
21 property that is currently owned by PGE. PGE states that because of these characteristics,
22 third-party ownership in this instance would create safety risks, liability risks, cybersecurity

1 risks, and financial risks. PGE also objects to third-party ownership on the grounds that
2 because PGE owns the site, the development of an appropriate lease and contract structure
3 would be “complex.”^{1/}

4 **Q. HOW DO YOU RESPOND TO PGE’S ARGUMENTS AGAINST THIRD-PARTY**
5 **OWNERSHIP?**

6 A. I believe that PGE has not made a reasonable effort to consider third-party ownership of the
7 proposed ESS. The main reason I believe that PGE’s efforts are insufficient is because
8 utilities, including PGE, regularly design and enact complex contracts to ensure appropriate
9 liability for many types of risk. And other utilities have already found ways to contract with
10 third-party owners of ESSs sited at the utilities’ substation. Furthermore, PGE speculates
11 about various risks it raises as reasons against considering the possibility of third-party
12 ownership, but it does not provide any evidence to support its speculation. Lastly, none of the
13 fundamental economic conditions that would justify prohibiting third-party ownership of the
14 ESS exist in this situation.

15 From the ratepayer perspective, PGE’s refusal to consider third-party ownership is
16 especially troubling in light of the likely cost savings testified to by an independent expert in
17 energy storage (presented in ICNU-NIPPC/200/Crotzer). Additionally, PGE completely
18 overlooks the fact that substation-sited ESSs currently exist under third-party ownership.

^{1/} UM 1856/PGE/300/Murtaugh-Riehl/2:16.

1 Examples include Tesla’s 80 MWh facility sited at Southern California Edison’s Mira Loma
2 Substation^{2/} and Tesla’s 2 MWh facility at the Pacific Gas & Electric Rio Oso Substation.^{3/}

3 **A. The Risks PGE Raises About Third-Party Ownership Are Unsupported**

4 **Q. HOW DO YOU RESPOND TO PGE’S ASSERTION THAT THIRD-PARTY**
5 **OWNERSHIP WOULD CREATE FINANCIAL, SAFETY AND LIABILITY RISKS**
6 **FOR PGE?**

7 A. The risks that PGE raises, while possible, are only speculative at this point. Additionally, PGE
8 has overlooked the possibility that it could specify contractual conditions in the RFP requiring
9 a third-party owner to assume certain risks, and PGE offers no evidence or explanation for how
10 these risks would be reduced via utility ownership. PGE simply states that it has “internal
11 processes in place to mitigate them,”^{4/} yet PGE also acknowledges that “PGE does not have
12 specific internal processes to mitigate risks for an [ESS], which is why the learnings from this
13 pilot project are crucial.”^{5/} Why should PGE’s ratepayers be expected to pay extra for PGE to
14 learn what others already know? Given that other utilities and energy storage providers have
15 already confronted these problems, and learned how to solve them, shouldn’t PGE at least
16 entertain the possibility of a variety of ownership structures to ensure it acquires the least-cost
17 resource?

^{2/} <https://www.pv-magazine.com/2017/02/01/tesla-inaugurates-20-mw-80-mwh-battery-system-in-southern-california/>

^{3/} <https://www.utilitydive.com/news/pge-brings-2-mwh-tesla-battery-storage-unit-online-at-substation/436486/>
^{4/} UM 1856/PGE/300, Murtaugh-Riehl/5:2-3.

^{5/} AWEC-NIPPC/301, Fitch-Fleischmann/5 (PGE Reply to AWEC Data Request 026).

1 Take, for one example, PGE’s “major” concern: “our major concern is that the Coffee
2 Creek ESS is in physical proximity to the substation, and without full control of the asset,
3 poses a safety risk. For example, during the operation and maintenance of adjacent utility-
4 owned assets (e.g., Coffee Creek Substation) if there were an equipment malfunction from the
5 third-party asset, PGE personnel would be at risk.”^{6/} However, PGE admits that it has not
6 conducted and is not aware of any studies or analyses that identify risks related to the physical
7 proximity of an ESS to a substation.^{7/} And of course, any such risk would exist regardless of
8 who owns the ESS. In fact, it is difficult to see how the risk of an ESS equipment malfunction
9 would be *reduced* if the ESS were owned by an entity so inexperienced with operating ESSs,
10 such as PGE, that a major component of the very argument for procuring the asset is the need
11 for PGE to learn how to operate it. Moreover, PGE already has arrangements to allow
12 contractors to work on PGE-owned facilities and locations, including 40 percent of its labor
13 budget for construction work on substations.^{8/}

14 Regarding financial risk, PGE raises the concern that the bankruptcy of the third party
15 may leave PGE with disposal or remediation costs. PGE fails to consider simple solutions,
16 such as taking over construction itself, or finding another contractor, or simply requiring a
17 bond up front to cover potential decommissioning costs. As discussed below, PGE has
18 contractually protected itself against environmental and other risks to its satisfaction in other
19 circumstances, so there is no reason to believe it could not do the same here. At the very least,

^{6/} UM 1856/PGE/300, Murtaugh-Riehl/3:15-19.

^{7/} AWEC-NIPPC/301, Fitch-Fleischmann/2 (PGE Reply to AWEC Data Request 019).

^{8/} Id. at 1 (PGE Reply to AWEC Data Request 018).

1 the Commission should require that PGE allow third parties to propose arrangements that
2 would allow PGE sufficient control of the asset while assigning appropriate liabilities among
3 PGE and the third-party owner.

4 **Q. DO YOU AGREE THAT THE CONTRACT NECESSARY TO PERMIT THIRD-**
5 **PARTY OWNERSHIP OF THE COFFEE CREEK ESS WOULD BE SO COMPLEX**
6 **THAT PGE SHOULD NOT CONSIDER IT?**

7 A. While I am not a lawyer, I do not believe that such a contract would be so complex that PGE
8 should rule out the possibility of non-utility ownership. Utilities regularly engage in complex
9 contractual arrangements with third parties to purchase energy and capacity, or to construct or
10 perform maintenance on complex industrial facilities like power plants, among other things.
11 PGE's recent proposal in UE 308 to become an owner of natural gas reserves is a particularly
12 revealing example. In that case, PGE proposed an arrangement in which it would become the
13 joint owner, with a non-working interest, of natural gas reserves via a contractual relationship
14 with an affiliated interest and a third party.

15 Parties to UE 308 raised a number of questions about financial, environmental, and
16 other risks associated with owning natural gas reserves but PGE dismissed these concerns as
17 irrelevant by citing the protections it incorporated into what was undoubtedly a complex
18 contractual arrangement.^{9/} If PGE is comfortable with the contractual complexity required to

^{9/} UE 308/PGE/800, Sims-Faist-Tooman/20-31; see also, UE/308/CUB/100, Jenks-Hanhan/9-14 (noting the complexity of the issues in the proceeding and the limited time to review).

1 become an owner of natural gas reserves—an arrangement that included requirements for
2 insurance to cover general/excess liability and pollution legal liability as well as the inclusion
3 of “prudent environmental costs as part of the cost-of-service rate”^{10/} that PGE would be
4 charged—then it stands to reason that the contractual arrangements necessary to allow non-
5 utility ownership of an ESS on land currently owned by PGE are not so complex that PGE
6 should be permitted to rule out that possibility without providing any analyses or evidence that
7 such an action would be in the public interest. Moreover, unlike in UE 308, the venture PGE is
8 proposing here – an energy storage system – is fully within the scope of its operations as an
9 electric utility and the types of complexity that PGE says would need to be addressed—
10 property lease/use, interconnection, and operations and services^{11/}—are not new to the electric
11 industry. Conversely, in UE 308, PGE was proposing a speculative venture in an entirely
12 different business. Thus, the “risks” associated with third-party ownership of an ESS at a
13 PGE-owned substation should be both more manageable and more familiar to PGE than those
14 presented by its proposed joint venture in natural gas wells.

15 PGE also states that the “learnings from Coffee Creek...will inform future contract
16 structures...to ensure the best value and application to PGE’s system.”^{12/} Does this mean that
17 if PGE has not previously engaged in a particular type of contracting arrangement, then it is
18 unable to do so in a way that will provide the best value to customers? If true, PGE should not
19 be allowed to do anything new. Hopefully this is not the case. Following PGE’s logic, in this

^{10/} UE 308/PGE/300, Russell-Tooman/11-12.

^{11/} AWEC-NIPPC/301, Fitch-Fleischmann/3 (PGE Reply to AWEC Data Request 025).

^{12/} UM 1856/PGE/300, Murtaugh-Riehl/3:6-8.

1 case PGE’s proposal would only teach it about contracting for utility-owned resources, despite
2 the fact that other utilities have already contracted for third-party ownership of substation-sited
3 ESSs. I am not a lawyer or a real estate expert, but I struggle to see how it could be such a
4 complicated matter for PGE to simply subdivide the lot proposed for the Coffee Creek ESS and
5 make it available for sale or lease to potential third-party owners of the proposed ESS. As
6 noted above, other utilities have managed to allow for third-party ownership of ESSs at
7 substations and PGE should, at the very least, be required to consider this as an option.

8 **Q. DOES THE SIZE OF THE PROPOSED SITE CREATE UNIQUE CHALLENGES IN**
9 **THIS PARTICULAR SITUATION?**

10 A. I do not believe it does. In fact, it appears that the site provides considerable flexibility due to
11 its size. PGE states that “one of the main benefits of this site is the space that is available.”^{13/}
12 The proposed lot totals 8.33 acres and the Coffee Creek Substation occupies only 1.25 acres of
13 the total.^{14/} This appears to leave plenty of space to facilitate third-party ownership of the
14 proposed ESS. Mr. Crotzer estimates that PGE’s proposed project would require
15 approximately 1 acre of land, including space for parking, access, and setbacks.^{15/} Similarly
16 sized ESS projects elsewhere, such as SDG&E’s 30 MW Escondido storage facility, which is
17 adjacent to an SDG&E substation (separated by a buffer of approximately 200 feet), take up
18 approximately 1 acre. It stands to reason, therefore, that the Coffee Creek Substation lot has
19 ample room to accommodate any buffers required to ensure physical safety for any workers—

^{13/} UM 1856/PGE/101, Riehl-Brown/71.

^{14/} Id. at 69, 71.

^{15/} ICNU-NIPPC/200, Crotzer/7.

1 whether contractors, PGE employees, or employees of a third-party—regardless of who
2 ultimately owns the ESS.

3 **B. Potential Learnings Will Not Be Reduced Under Third-Party Ownership**

4 **Q. DOES PGE CLAIM THAT THE EDUCATIONAL VALUE OF ITS EXPERIENCE**
5 **WITH THE PROPOSED ESS WILL BE GREATER IF PGE OWNS IT?**

6 A. PGE does not make this claim directly; however, PGE makes multiple statements that carry
7 this implication. For example, immediately following its objection to AWEC’s and NIPPC’s
8 proposal to allow third-party ownership, PGE states that “we envision that the learnings
9 derived from our proposal [for a utility-owned ESS] will help drive the ESS market forward”
10 and that “our knowledge of our transmission and distribution system needs, paired with the
11 learnings on how an ESS operates on our system, will allow us to proactively identify areas
12 where ESSs can be of most value to customers” and thus allow PGE to be a “better partner
13 with ESS providers to bring storage onto our system.”^{16/} Given that the proposed ESS
14 represents at most only 3.3 percent of the 700-plus MW of utility-scale battery storage installed
15 in the US,^{17/} it is difficult to give any credence to PGE’s claim that it will “drive the ESS
16 market.”

17 I see no reason why PGE can only learn these lessons if it owns and operates the Coffee
18 Creek ESS itself. In fact, PGE’s acknowledgement of its unfamiliarity with energy storage
19 weighs in favor of third-party ownership: there are already many firms that specialize in energy

^{16/} UM 1856/PGE/300, Murtaugh-Riehl/2:7-8.

^{17/} According to the US Energy Information Administration, as of January 2018 there is just over 720 MW of battery storage capacity installed in the US: <https://www.eia.gov/electricity/data/eia860M/>

1 storage, and PGE could capitalize on their knowledge if it were willing to allow third-party
2 ownership. Rather than arguing for utility-ownership, PGE could instead be offering to make
3 detailed information about its transmission and distribution system available to the energy
4 storage experts who already exist (subject to the types of protections Mr. Crotzer identifies)
5 and thus take advantage of already existing expertise. As new technologies continue to
6 develop and distributed energy resources become more and more common, PGE should be
7 embracing opportunities to improve its ability to allow third-party experts to bring new
8 technologies onto PGE's system, rather than slowing down this process by insisting on utility-
9 only ownership of resources.

10 **Q. SHOULD THE COMMISSION VIEW THIS PROPOSED ACQUISITION AS SIMPLY**
11 **A TRIAL RUN FOR EDUCATIONAL PURPOSES?**

12 A. No. The Commission should anticipate that issues about access to utility-controlled
13 information will only become more frequent in the coming years. The Commission should
14 also anticipate that regulated monopolies will consistently put forth arguments to shield
15 themselves from exposure to competitive pressures because they wish to earn returns on capital
16 expenditures. As technological progress continues to erode the historic economic
17 characteristics of the electric industry—namely, economies of scale—it will be rational for
18 utilities to increasingly turn to arguments of security and cyber security, based on access to
19 information, to protect themselves from competitive pressures. Exclusive access to
20 information shields the utility from competitive pressures and therefore this exclusivity should
21 only be allowed when necessary. The Commission has the obligation to serve in place of the
22 competitive pressures that are present in competitive industries and thereby pressure the utility

1 to honestly determine, without dragging its feet, what information it can safely share with third
2 parties in order to allow access to cost-saving and emissions-reducing technologies at an
3 appropriate pace. There is an inherent connection—and, therefore, balance that the
4 Commission must strike—between the pace of change, economic costs and environmental
5 benefits, and the exposure to security risks. The novelty of security risks and the current pace
6 of change are certainly reasons to proceed with caution, but they should not be unduly
7 influenced by the utilities’ (rational) pursuit of profits according to the incentives it faces.

8 For both PGE and the Commission, the potential to learn from direct experience
9 incorporating an ESS owned by a third-party onto its system should not be seen as any less
10 valuable than the technological learnings—which other utilities already have—that PGE may
11 gain from this experiment. In my opinion, the policies going forward that determine the
12 ownership of and access to this information will be a key feature in determining how quickly
13 electrical systems are able to incorporate the wide range of distributed energy resources
14 anticipated to come onto the system in the near future. In this case, PGE is operating under the
15 assumption that its currently exclusive access to this information is immutable; therefore, PGE
16 argues, it must gain the expertise necessary to bring new technologies onto its system. While
17 there may be security concerns related to access to certain types of information about a utility’s
18 system, PGE and the Commission should confront this issue head-on and not look the other
19 way because of its novelty or complexity. Utilities should not expect by default to have a first
20 shot at every new technology simply because they need to pursue “learnings” or because of
21 cybersecurity concerns. They should instead be expected to present a reasoned and detailed
22 consideration of the situation and proceed accordingly. Given that other utilities have found

1 ways to contract for substation-sited ESSs owned by third parties, the Commission should
2 require that PGE consider the same.

3 **C. The Economic Conditions Do Not Justify Excluding Third-Party Ownership**

4 **Q. WHY DO YOU SAY THAT THE ECONOMIC CONDITIONS DO NOT JUSTIFY**
5 **EXCLUDING THIRD-PARTY OWNERSHIP?**

6 A. The most common reason, by far, for shielding a utility from third-party competition is the
7 existence of economies of scale. If economies of scale exist, then average costs fall as the
8 service provider increases its output and customers are therefore expected to benefit when a
9 single service provider is endowed with the exclusive right to serve customers. Economies of
10 scale are typically thought to exist for transmission and distribution services, but they do not
11 exist for the procurement of a single energy storage resource such as the one proposed.

12 Other economic reasons for shielding a utility from third-party competition include
13 situations in which administrative or transaction costs associated with third-party ownership
14 are expected to be high, or if there are information asymmetries (i.e., the utility has essential
15 information that it cannot share because of security or complexity) that allow the utility to
16 provide the service or resource in question at lower cost. In this case, PGE alludes to high
17 administrative costs by raising various potential risks that it claims exist for third-party
18 ownership. PGE also alludes to high transaction costs by claiming that the contract required to
19 allow third-party ownership would be overly complex. As explained above, other utilities have
20 not found these to be too challenging to overcome. The Commission should not hold PGE to a
21 lower standard.

1 Commission have received extensive discussion and were derived from numerous workshops
2 and rounds of feedback from stakeholders and utilities.

3 The Commission also adopted competitive bidding requirements specific to the energy
4 storage procurements resulting from House Bill 2193 (i.e., the projects in PGE and
5 PacifiCorp’s energy storage proposals).^{20/} However, these guidelines did not contemplate the
6 potential acquisition of an ESS in excess of the size threshold proposed in Order No. 18-127 to
7 trigger the full competitive bidding rules, likely because parties and the Commission did not
8 anticipate such a large acquisition. PGE was also supposed to consider different ownership
9 structures as part of its storage potential evaluation,^{21/} but its first evaluation was rejected by the
10 Commission^{22/} and Staff states that it “cannot recommend Commission approval” of PGE’s
11 second attempt.^{23/} PGE should not be permitted to exclude third-party ownership options for
12 the Coffee Creek ESS given that it has not yet properly evaluated ownership options when
13 evaluating its overall storage potential.

14 **IV. CONCLUSION**

15 **Q. WHAT DO YOU RECOMMEND?**

16 A. I recommend that the Commission require PGE to allow parties to submit bids for the proposed
17 Coffee Creek ESS that include third-party ownership of the ESS. Additionally, the
18 Commission should require that PGE set forth in the RFP the contractual terms it believes are

^{20/} These requirements were adopted in Order No. 16-504.

^{21/} Order No. 17-118, Appendix A at 5-6, 25-27

^{22/} Order No. 17-375

^{23/} UM 1856/Staff/100, Wiggins/2:18.

1 necessary to facilitate such an arrangement. Given that other utilities have managed to pull this
2 off, the Commission should hold PGE to similar standards. Allowing such bids is actually very
3 likely to enhance PGE's learnings – not only would it learn lessons regarding contracting for
4 and constructing utility-scale storage, it would develop a better understanding of procuring
5 energy storage systems owned by third parties.

6 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

7 A. Yes.

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

UM 1856

In the Matter of)
)
PORTLAND GENERAL ELECTRIC)
COMPANY,)
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EXHIBIT AWEC-NIPPC/301

PGE RESPONSES TO DATA REQUESTS

April 19, 2018

TO: Haley M. Thomas
Davison Van Cleve, P.C.

FROM: Robert Macfarlane
Interim Manager, Pricing and Tariffs

**PORTLAND GENERAL ELECTRIC
UM 1856
PGE Response to AWEC Data Request No. 018
Dated April 12, 2018**

Request:

Does PGE ever allow non-PGE employees, such as contractors, to work on PGE-owned facilities or locations? If so, please provide information about the frequency with which this occurs.

Response:

Yes, PGE sometimes allows contractors to work on PGE-owned facilities and locations. The frequency with which this occurs varies based on the type of work, type of facility to be worked on, and the availability of internal labor resources to perform the work.

PGE is bound by several Labor Agreements with IBEW Local 125. PGE represented employees typically have first rights to perform the work, as defined by the scope of their classifications/work in T&D and generation facilities. However, select contracting is possible for that work when there is an internal labor shortage. It has also been our practice to generally utilize a union contractor when contracting out such work. Contractors working on PGE's T&D system typically are supervised by a Qualified Safety Watch (e.g., a journeyman of that trade). All equipment connected to PGE's T&D systems must be functionally tested; testing must be performed by PGE represented employees or approved contractors with appropriate oversight. Approximately 40% of the current substation construction labor budget is allocated for contractors, but all of the testing is performed by PGE represented employees.

April 19, 2018

TO: Haley M. Thomas
Davison Van Cleve, P.C.

FROM: Robert Macfarlane
Interim Manager, Pricing and Tariffs

**PORTLAND GENERAL ELECTRIC
UM 1856
PGE Response to AWEC Data Request No. 019
Dated April 12, 2018**

Request:

Please provide any studies or other analyses that PGE has conducted or of which PGE is aware that identify, analyze, or discuss any risks related to the physical proximity of a substation to a storage facility similar in size to that which PGE has proposed for Coffee Creek.

Response:

No. One of the learnings PGE hopes to achieve through this pilot project is an awareness of how storage facilities, in proximity to PGE's substation, may introduce various risks and what appropriate risk reduction measures should be employed.

April 19, 2018

TO: Haley M. Thomas
Davison Van Cleve, P.C.

FROM: Robert Macfarlane
Interim Manager, Pricing and Tariffs

**PORTLAND GENERAL ELECTRIC
UM 1856
PGE Response to AWEC Data Request No. 025
Dated April 12, 2018**

Request:

Reference UM 1856/PGE/300, Murtaugh-Riehl/2 at 16. PGE states that “the development of an appropriate lease and contract structure would be complex due to the proposed site location (on PGE property) while reserving operational control for PGE.” Please identify what “complexity,” if any, PGE feels that it does not have the capacity to address by specifying in the RFP any contract terms that PGE considers to be necessary both in general and specifically to reserve operational control for PGE of the proposed storage asset, should it be owned by a third party.

Response:

PGE objects to this request to the extent it calls for a legal conclusion or legal opinion. Subject to and without waiving its objection, PGE responds as follows:

The contract structure is not straightforward. PGE foresees needing several contracts to address different concerns and to define the relationship for the parties involved, taking up time and resources. At a minimum, the following would be required:

- Property Lease/Use Agreement – This agreement would address items such as terms of rent, lease dates and termination, use, renewal, repairs and damages, alterations to the property, right of entry, security, assignment, indemnification, insurance, payment of taxes, default, etc.
- Interconnection Agreement – This agreement would address items such as responsibilities of the parties, operation and maintenance obligations, metering and monitoring, power quality, term, rights to disconnect, costs for modifications to PGE’s T&D system, assignment, indemnification,, consequential damages?, force majeure, insurance, etc.
- Operations and Services Agreement – This agreement would cover PGE’s use of the equipment and include term, pilot use, pilot data, service, maintenance, repairs, fees, removal, etc.

As stated in PGE Exhibit 300, the learnings from the Coffee Creek ESS, and the other ESS proposals, will inform future contract structures, terms, and price(s) to provideprovideensure the best value and application to PGE's system.

April 23, 2018

TO: Haley M. Thomas
Davison Van Cleve, P.C.

FROM: Robert Macfarlane
Interim Manager, Pricing and Tariffs

PORTLAND GENERAL ELECTRIC
UM 1856
PGE Response to AWEC Data Request No. 026
Dated April 12, 2018

Request:

Reference UM 1856/PGE/300/Murtaugh-Riehl/5 at 2. Please identify or provide documents describing the “internal processes in place to mitigate” the specific potential risks that PGE claims would exist with third party ownership of an ESS at Coffee Creek (safety and liability risks, cybersecurity risks, financials risks).

Response:

Based on an April 19, 2018 conversation with AWEC, this data request is clarified to ask for PGE to describe how we mitigate the referenced risks for PGE-owned assets. Thus, PGE responds as follows:

PGE objects to this request as overly and unduly burdensome. Without waiving its objection, PGE responds as follows:

PGE does not have specific internal processes to mitigate risks for an energy storage system (ESS), which is why the learnings from this pilot project are crucial. PGE, however, does have internal processes to mitigate these risks with PGE-owned assets interconnected on our system. Specifically for substations, these internal processes are as follows:

- PGE mitigates liability and safety risk by designing substation facilities in accordance with industry best practices and operating these facilities in accordance with national and local compliance requirements. Key standards and guidelines that are used to ensure our electric supply stations are constructed and maintained properly include the following:
 - IEEE 80 Guide for Safety in Alternating Current (AC) Substation Grounding
 - Provides guidelines to keep employees and members of the public safe from an electric shock in, and around, substation facilities.
 - 2017 National Electrical Safety Code
 - Provides requirements for construction, maintenance, and inspection of electric supply stations.
 - Oregon OSHA, Division 2 (General Occupational Safety and Health), Section RR (Electrical Power Generation, Transmission, and Distribution)

- Utility focused requirements to keep employees and members of the public safe in, and around, substation facilities
- PGE also mitigates liability, including financial, risks similarly through contractual risk allocation with counter parties, appropriate insurance coverage requirements, utilizing utility best practices, safety standards (as stated above), implementing policies, etc. For example, PGE may be liable for environmental loss or damage arising from the ownership and/or operations of utility assets. To mitigate environmental risk in substations, PGE's electrical equipment is highly monitored, due to our need to maintain reliability and critical customer service. Automatic systems are in place 24 hours-a-day to immediately notify the PGE System Control Center, which allows PGE to rapidly respond to equipment malfunctions or failures. PGE has trained crews on call to both isolate the failed equipment and remediate any releases. The remediation team is trained in the handling and management of PCBs and is made up of a dedicated spill team that responds to routine and major spills. Also, all of the members of PGE's Civil Substation Construction team are also trained in PCB management and are on call to assist with oil spills.

Some substations are designed with secondary containment systems. These systems are installed voluntarily by PGE. Typically factors that are evaluated for installation are proximity to a waterway and distance from response team. The substation spill containment systems are designed for the purpose of containing the mineral oil in the largest oil filled unit. They are designed to keep the oil separated from storm water in the event of a spill or equipment failure.

- PGE mitigates cyber security risks by using various internal processes designed to comply with NERC Critical Infrastructure Protection (CIP) rules, used to ensure substation security, regarding the following:
 - Personnel authorization and access control;
 - Electronic Access controls;
 - Physical Access Control;
 - Systems Security Management;
 - Incident Response Management;
 - Incident Recovery Management;
 - Change Management; and
 - Information Protection.

PGE has a department dedicated to managing these internal processes by maintaining the design master, a standard network architecture drawing, and performing the design review process of specific substation designs ensuring security requirements are met. Further, PGE has awareness training, to ensure PGE personnel are updated on new or revised policies and rules, and processes to help identify malpractice of PGE personnel of these rules.

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

UM 1856

In the Matter of)
)
PORTLAND GENERAL ELECTRIC)
COMPANY,)
)
Draft Storage Potential Evaluation.)
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SURREBUTTAL TESTIMONY OF DANIEL CROTZER

ON BEHALF OF

NORTHWEST AND INTERMOUNTAIN POWER PRODUCERS COALITION

AND

ALLIANCE OF WESTERN ENERGY CONSUMERS

April 24, 2018

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Daniel Crotzer with Fractal Energy Storage Consultants. My business address is 8305 W Highway 71, Suite 255, Austin, TX 78735.

Q. ARE YOU THE SAME DANIEL CROTZER WHO PREVIOUSLY FILED TESTIMONY IN THIS PROCEEDING?

A. Yes.

Q. WHAT IS THE PURPOSE OF THIS TESTIMONY?

A. The purpose of this testimony is to address cybersecurity, which is of the utmost importance when evaluating the benefits and risks of any new grid asset. The harm caused by malicious acts can have far reaching effects and the Oregon Public Utility Commission (the “Commission”) should carefully consider its role in deterring cyber-attacks. But, Portland General Electric Company (“PGE”) already has well established cybersecurity guidelines that will, and should, continue to evolve as PGE introduces more energy storage system (“ESS”) projects to its system. PGE should be looking for new opportunities to learn more about cybersecurity with trusted partners that have more experience with storage projects. PGE has not adequately explained why a non-PGE owned ESS asset would not be able to fully integrate onto its Supervisory Control and Data Acquisition (“SCADA”) system. This appears to be inconsistent with PGE’s own claims in this proceeding and has not deterred other similarly situated utilities. PGE should not be allowed to use generalized cybersecurity threats to shield itself from competition. In light of this, Fractal offers examples and best practices learned from its experience in procuring, installing and operating ESS projects to guide the Commission’s decision.

1 **Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS.**

2 A. I continue to recommend that the Commission require PGE to allow third-party ownership
3 options in its upcoming request for proposal to acquire energy storage projects. This will
4 afford PGE the opportunity for additional learnings about constructing and contracting for
5 utility-scale storage projects. It would also help PGE develop a better understanding of
6 procuring ESS projects owned by third parties, including how to improve cybersecurity and
7 protect its systems from cyber-attacks more generally. PGE's cybersecurity claims are
8 inconsistent with current industry practices and the Commission should encourage PGE to
9 learn more about cybersecurity as it relates to ESS.

10 **II. RESPONSE**

11 **Q. DO YOU AGREE WITH PGE'S CLAIMS REGARDING CYBERSECURITY?**

12 A. No. PGE's testimony suggests allowing third-party ownership options for an ESS at the
13 Coffee Creek Substation could somehow increase the likelihood of a cyber-attack. PGE
14 claims:

15 Access to the substation SCADA system would give the ESS owner/operator the
16 ability to manipulate PGE substation assets and data streams, potentially affecting
17 power quality and service reliability.^{1/}
18

19 **Q. HOW DO YOU RESPOND?**

20 A. PGE does not explain how an ESS owner/operator might be able to manipulate PGE substation
21 assets or affect power quality and service reliability, but the implication is that the connection
22 would somehow make PGE's system more vulnerable. This is incorrect because most ESS
23 control software can securely connect with utility SCADA systems. It is important to note that

^{1/} PGE's Rebuttal Testimony at PGE/300, Murtaugh-Riehl/4.

1 whether the storage system is owned by PGE or a third party, the software controls and
2 communications will be provided by a third party. Thus, PGE will need to adhere to the same
3 cybersecurity guidelines regardless of ownership.

4 Additionally, as PGE points out, it is not generally opposed to third-party ownership
5 and already allows other third parties to interconnect ESS to its system. By PGE’s own
6 account, “[i]n the future, we anticipate that an array of ESS options will be available to meet
7 specific system needs, which includes third-party ownership of ESSs.”^{2/} PGE does not explain
8 why this is consistent with the cybersecurity concerns it raises, or why the substation
9 component makes any meaningful difference in PGE’s view. Because PGE is not planning to
10 own all of the ESS projects connected to its grid, its pilot programs should include different
11 ownership options so it can learn about those opportunities too.

12 **Q. CAN THE CYBERSECURITY RISKS REFERENCED BY PGE BE MITIGATED?**

13 A. Yes. Our experience in the industry is that cybersecurity risks are routinely addressed during
14 procurement.

15 **Q. HOW IS THE RISK OF SUBSTATION MANIPULATION MITIGATED IN OTHER**
16 **THIRD-PARTY OWNED BATTERY SYSTEMS?**

17 A. To begin with, a third-party owned project should never be granted “blanket” network access
18 to PGE’s system simply because there is a need to connect certain components of the SCADA
19 system. This is inconsistent with the way energy storage systems typically interact with utility
20 systems. PGE suggests that it “would need ... two-way communication (full integration) to
21 capture the substation-specific learnings” but fails to explain why more limited access is
22 insufficient to provide “full real-time operational control of the ESS” or to allow PGE to “gain

^{2/} Id. at 3.

1 the [full] operational learnings.”^{3/} In Fractal’s experience, similar substation-sited projects
2 have been given “read-only” access using a predetermined SCADA points list. This gives
3 utilities operational control and mitigates using the ESS as a “back door” into the utility’s
4 system.

5 **Q. WHAT KIND OF STEPS CAN BE TAKEN TO MITIGATE A MALICIOUS**
6 **TAKEOVER OF THE BATTERY SYSTEM?**

7 Since a SCADA network is only as secure as its weakest connection, it is essential to mitigate
8 the chance of an “inside” attack. The following tools are used by most ESS control software:

- 9 • Using substation hardened Cisco-type switches to connect to utility networks
- 10 • Including a firewall at the edge
- 11 • Utilizing Lightweight Directory Access Protocol (“LDAP”) authentication functionality
- 12 • Requiring 2-factor RSA tokens
- 13 • Implementing intrusion detection systems (“IDSs”)
- 14 • Sending CSRF tokens with forms
- 15 • Logging any user activities
- 16 • Connecting via a VPN tunnel using pre-approved IP addresses
- 17 • Using encryption and Key Management, PKI, hashing, etc.
- 18 • Assigning access levels such as: admin, operator, technician or viewer

19 In layperson speak, these tools restrict unauthorized access that could lead to malicious attacks.

20 For malicious attempts like SQL injection and cross-site scripting, control software often uses
21 IDS and packet inspection on firewalls. In addition, if there is a connection between a utility
22 and an external system, utilities have required that the interface be documented to include the
23 interface characteristics, security requirements, and the nature of communicated information
24 via an Interconnection Security Agreement.^{4/}

^{3/} AWEC-NIPPC/401, Crotzer/2 (PGE Response to AWEC Data Request No. 024).

^{4/} National Institute Standards and Technology, National Vulnerability Database Special Publication 800-53 CA-3, Security Controls and Assessment Procedures for Federal Information Systems and Organizations, available at <https://nvd.nist.gov/800-53/Rev4/control/CA-3>

1 **Q. HOW WOULD CONNECTING THE ESS TO A CENTRALIZED CONTROL**
2 **SYSTEM, WITH NO PHYSICAL CONNECTION TO THE LOCALIZED**
3 **SUBSTATION SCADA, AFFECT OPERATIONS?**

4 A. Whether or not PGE owns the ESS, a Remote Terminal Unit (“RTU”) will be installed to relay
5 commands from the ESS to PGE’s system. As far as coordinating with volt/VAR equipment
6 (e.g., capacitor banks and transformer load-tap changers), ESS control software is
7 programmable and can control voltage using droop curves or custom algorithms. If the
8 SCADA architecture introduces significant latency, then the ESS can be programmed to react
9 in concert with substation equipment using the onboard sensors. This means that third-party
10 ownership would not affect operations.

11 **Q. DO YOU AGREE WITH PGE’S CLAIM THAT A CENTRALIZED CONTROL**
12 **SYSTEM WOULD MEAN THE SYSTEM WOULD BE SUBJECT TO SERVICE**
13 **INTERRUPTIONS?**

14 A. No. As described above, PGE’s suggestion that the only way to protect from cyber-attacks
15 would affect voltage optimization or cause service interruptions is incorrect. PGE itself admits
16 in the attached discovery responses that it has not completed any studies on the cybersecurity
17 risk associated with siting an ESS adjacent to a substation and is not aware of any such
18 studies.^{5/} In our experience, service interruptions have not been a problem for other utilities
19 that have been able to provide secure access. We see no reason why a secure connection
20 would limit substation-specific learnings.

21 Additionally, PGE is planning to develop a new centralized control system. It stands to
22 reason that because PGE is building its own software system to manage all of the various ESS
23 software systems, PGE will find a way (as other utilities have) to provide access to the
24 substation SCADA system.

^{5/} AWEC-NIPPC/401, Crotzer/1 (PGE Response to AWEC Data Request No. 023).

1 **Q. WHAT OTHER GENERAL THOUGHTS ARE RELEVANT TO CYBERSECURITY?**

2 A. It is recommended that any ESS vendor prepare a plan and section drawings for the SCADA
3 integration showing the location and functionality of all equipment. The vendor should
4 provide complete testing procedures for the ESS equipment and control system, including the
5 commissioning of the SCADA system. Whether owned by PGE or a third party, the SCADA
6 specifications should be approved by appropriate PGE personnel.

7 **III. CONCLUSION**

8 **Q. WHAT DO YOU RECOMMEND?**

9 A. I recommend that the Commission require PGE to allow third-party ownership options in its
10 upcoming request for proposal to acquire energy storage projects. This will afford PGE the
11 opportunity for additional learnings about constructing and contracting for utility-scale storage
12 projects.

13 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

14 A. Yes.

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EXHIBIT AWEC-NIPPC/401

PGE RESPONSES TO DATA REQUESTS

April 19, 2018

TO: Haley M. Thomas
Davison Van Cleve, P.C.

FROM: Robert Macfarlane
Interim Manager, Pricing and Tariffs

**PORTLAND GENERAL ELECTRIC
UM 1856
PGE Response to AWEC Data Request No. 023
Dated April 12, 2018**

Request:

Please provide any analyses that PGE has or is aware of that address cyber security risks associated with the siting of a storage asset adjacent to a substation.

Response:

PGE is in the process of performing these analyses and plans to incorporate the operational learnings and experiences gained from this ESS during the pilot program. PGE will report the results with the other portfolio learnings in our update to the Commission.

April 19, 2018

TO: Haley M. Thomas
Davison Van Cleve, P.C.

FROM: Robert Macfarlane
Interim Manager, Pricing and Tariffs

**PORTLAND GENERAL ELECTRIC
UM 1856
PGE Response to AWEC Data Request No. 024
Dated April 12, 2018**

Request:

Reference UM 1856/PGE/300, Murtaugh-Riehl/2 at 9. Please identify which if any of the referenced “learnings on how an ESS operates on our system” would be precluded under third-party ownership of the proposed ESS at Coffee Creek and explain with specificity why each identified learning would be precluded.

Response:

The referenced “learnings” would be obtained through PGE operation of the ESS on our system. Learnings that would be precluded, due to third-party ownership of Coffee Creek, would be substation-specific learnings as PGE would be unable to fully integrate due to cyber security risks. If PGE does not fully integrate the ESS into the substation control, it would forego the opportunity to learn how best to optimize the comprehensive substation control package to leverage additional value from the ESS. As stated in PGE Exhibit 300/4, lines 5-16, cyber security risks exist when connecting with a third-party storage system as there would need to be two-way communication (full integration) to capture the substation-specific learnings. In addition, PGE would need full real-time operational control of the ESS to gain the operational learnings. ESS operation and associated learnings will be dependant on real-time system conditions, day-ahead planning, and dispatch test plans for specific use cases.

As stated in PGE Exhibit 300, the Coffee Creek ESS intends to give us insights to risks that exist in ownership and operation. These lessons may be used to develop contracts with third-party ESS vendors in the future. Also in PGE’s Response to AWEC Data Request No, 023, the learnings gained from this project will include identifying cyber security risks and how to mitigate them.