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May 12, 2017

VIA ELECTRONIC FILING

Oregon Public Utility Commission
Attention: Filing Center
P.O. Box 1088
Salem, OR 97308-1088

Re: In the Matter of Portland General Electric Co. 2016 Integrated Resource Plan – Docket No. LC 66

Dear Filing Center:

Enclosed for filing are the final comments of National Grid USA ("National Grid") in response to Portland General Electric Company's ("PGE's") reply comments filed in the above-referenced docket.

Thank you for your attention to this matter. Please contact the undersigned with any questions or concerns.

Sincerely,

/s/ Stephen C. Hall
Stephen C. Hall

cc: Service List

BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

LC 66

In the Matter of PORTLAND GENERAL ELECTRIC COMPANY, 2016 Integrated Resource Plan.	NATIONAL GRID'S FINAL COMMENTS IN RESPONSE TO PGE'S REPLY COMMENTS

A. Introduction

National Grid USA ("National Grid") is interested in pumped storage projects and the ability of these large-scale energy storage projects to provide energy, capacity, and related services, including supporting the integration of renewable energy resources. National Grid is proud to be involved with the development of the two most promising pumped storage projects in the Pacific Northwest, the Swan Lake North Project in southern Oregon ("Swan Lake"), and the JD Pool Project in southern Washington ("JD Pool"). Swan Lake is being jointly developed by National Grid and Rye Development, LLC. Both projects will utilize environmentally-friendly "closed-loop" technology, are located near high voltage transmission corridors, and will each be capable of providing unmatched flexibility as a resource, capable of serving multiple roles and providing stacked benefits on a utility and/or regional basis.

National Grid hereby submits these final comments ("Final Comments") pursuant to the modified procedural schedule adopted by the administrative law judge in this docket on March 2, 2017.[1] These Final Comments are in response to Portland General Electric Company's ("PGE's") Reply Comments on its 2016 Integrated Resource Plan.[2]

B. Background

National Grid is filing these comments because PGE's Reply Comments[3] raised new issues regarding large-scale energy storage that National Grid feels compelled to address.

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[1] *In the Matter of Portland General Electric Company 2016 Integrated Resource Plan*, Motion to Modify Procedural Schedule Granted, LC 66, March 2, 2017.

[2] *In the Matter of Portland General Electric Company 2016 Integrated Resource Plan*, Portland General Electric Company's Integrated Resource Plan at Chapter 8, LC 66, November 15, 2016 ("IRP").

[3] *In the Matter of Portland General Electric Company 2016 Integrated Resource Plan*, Portland General Electric Company's Reply Comments, LC 66, March 31, 2017 ("Reply Comments").

In its IRP, PGE discussed energy storage, including large-scale options such as pumped storage and battery storage.[4] Although PGE did not provide an extensive analysis of large-scale storage options in its IRP, nothing in the IRP suggested that large-scale storage would be excluded from consideration by PGE in a future request for proposals ("RFP"). However, in its Reply Comments, PGE raised and dismissed the new issue of large-scale energy storage as a potential benchmark bid in a future RFP. Specifically, in its Reply Comments, PGE stated:

> PGE is *no longer considering* the submittal of a large-scale energy storage resource as a benchmark bid. PGE is exploring the possibility of developing a site with technical specifications for energy storage (using battery technology) that the Company could offer to potential bidders in an RFP as a PGE ownership option.[5]

PGE's statement that it is "no longer considering" large-scale energy storage as a benchmark bid is provided without context or explanation, and is the first mention of PGE considering large-scale energy storage as a potential benchmark bid. With this statement, National Grid is concerned that PGE is sending a signal that large-scale energy storage resources will not be considered in any future RFP. National Grid therefore submits these comments to ensure that large-scale energy storage resources are being adequately and appropriately considered by PGE in its IRP analysis, and to ensure that such resources are not foreclosed from participating in upcoming RFPs. Particularly, PGE should provide further explanation for why it outright rejected large-scale energy storage as a potential benchmark bid, and why this issue was addressed for the first time in its Reply Comments.[6]

Additionally, because PGE raised large-scale energy storage as a potential benchmark bid for the first time in its Reply Comments, it is appropriate for PGE and the Oregon Public Utility Commission ("Commission") to consider these Final Comments at this stage in the proceeding.[7]

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4 *See* IRP at Chapter 8.

5 Reply Comments at 13 (emphasis added).

6 National Grid sought additional information on this subject through a series of data requests to PGE. *See National Grid's First Set of Data Requests to PGE,* dated April 25, 2017. However, PGE's response to those data requests leaves open several questions regarding why PGE elected not to pursue a benchmark bid for a large-scale storage resource and whether it intends to foreclose consideration of large-scale storage resources in a future RFP.

7 These comments are unlike past situations where commenters raised new issues beyond the scope of the proceeding, which PGE refused to consider. *See In the Matter of Portland General Electric Company 2009 Integrated Resource Plan*, Pareto Energy Comments Regarding Distributed Energy Resources, LC 48, Sept. 1, 2010; *see also In the Matter of Portland General Electric Company 2009 Integrated Resource Plan*, PGE Reply to Intervenor Response Comments at 14, LC 48, Sept. 27, 2010 (PGE refused to consider recommendations from Pareto Energy—a late intervener and commenter—because they were "beyond the scope of a response to PGE's Reply Comments since PGE's Reply Comments did not address any of the issues raised by Pareto.").

C. Response Comments

1. *A Flexible Procurement Plan Includes Large-Scale Energy Storage Technologies Such As Pumped Storage.*

PGE has stated that its Action Plan is "agnostic regarding technology and supply options, and is open to a variety of diverse resources that can meet customers' future electricity needs."[8] PGE also stated that it "aims to ensure that the Action Plan does not limit the types of resources that could compete" in the RFP.[9]

PGE's IRP identified a need of 375-550 MW of long-term annual dispatchable capacity, which could potentially be provided by a large-scale energy storage resource such as pumped storage.[10] PGE's IRP correctly identified many of the key values that energy storage is capable of providing,[11] including meeting the challenges of integrating increasing levels of renewable resources. The key values identified by PGE include:

- Energy shifting and arbitrage. Energy storage resources are able to shift dispatch from more expensive peaking plants to lower cost thermal plants to reduce fuel use and variable O&M costs.[12]

- Provision of ancillary services. Energy storage resources provide several types of ancillary services, such as regulation up, regulation down, frequency response, and contingency reserves. Higher penetrations of renewable resources may increase the need for ancillary services, which PGE confirmed when it stated, "In addition to [the] increased need for ancillary services, renewables introduce the additional challenge of meeting ancillary service requirements with fewer conventional generators online during hours with high renewable output."[13] Similarly, PGE recognizes the role of energy storage resources in meeting this need. PGE stated, "Providing a portion of these ancillary services with energy storage resources has the potential to reduce power costs."[14] Energy storage resources may also contribute to reducing renewable

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8 Reply Comments at 4.

9 *Id*. at 6.

10 IRP at §§ 5.3 and 13.2.

11 Although the IRP acknowledges the substantial benefits that energy storage resources can provide, it appears to dismiss energy storage for inclusion in the full IRP portfolio analysis, in part, due to the difficulty of modeling these resources. *See id.* at 246 ("In particular, the energy storage evaluation exercise has highlighted the challenge of accurately quantifying the value of highly flexible resources in a planning exercise that spans several years and considers multiple futures."). Difficulties in modeling should not be a basis for PGE to wholly foreclose consideration of a resource that has the greatest potential to meet the largest number of system and operational needs on an environmentally-friendly basis.

12 *Id*. at 232.

13 *Id*.

14 *Id*.

integration costs by "reducing the reliance on thermal plants to accommodate forecast errors and sub-hourly fluctuations."[15]

- Avoided renewable curtailment. Low load conditions, high hydro conditions, flexibility constraints on conventional generators, and the need to make minimum levels of generation available to provide ancillary services often results in the curtailment of high renewable generation output. Energy storage resources solve all of these issues, a fact which PGE itself recognizes. The IRP states, "Energy storage systems have the potential to absorb excess generation during curtailment events, reducing the cost of meeting [PGE's] renewable energy targets."[16]

- System peaking value. As stated by PGE, "Long duration energy storage systems can provide value to a system by dispatching during peak load conditions, reducing the amount of conventional capacity required to meet resource adequacy obligations."[17]

- Locational value. Depending on siting and operational considerations, PGE recognizes the ability of energy storage to provide locational value to its system by deferring investment in transmission or distribution upgrades.[18] Similarly, PGE notes that energy storage systems could further support system reliability.[19]

In its Reply Comments, however, PGE has said it is "no longer considering the submittal of a large-scale energy storage resource as a benchmark bid."[20] Without further context, National Grid is concerned that PGE may have made a preliminary determination to remove large-scale energy storage resources from consideration in the RFP. If so, this determination directly contradicts several of PGE's own statements noted above regarding the benefits of energy storage. Not only would such a preliminary determination be in conflict with PGE's objectives under the Action Plan, but a large-scale energy storage resource, such as closed-loop pumped storage, is uniquely capable of providing cost-effective, carbon-free, flexible, dispatchable capacity to PGE.

For these reasons, large-scale energy storage, such as closed-loop pumped storage, deserves ongoing evaluation in the IRP and full and fair consideration during the RFP process.

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15 *Id*.

16 *Id*. at 233.

17 *Id*.

18 *Id*.

19 *Id*.

20 Reply Comment at 13.

2. *Short- And Medium-Term Resources Are Not A Replacement For Long-Term Resources, But May Be A Bridge To Eventual Acquisition Of Long-Term, Carbon-Free Resources.*

Recent media accounts indicate that PGE is pursuing bilateral negotiations in an effort to meet its immediate capacity deficit through market purchases, rather than construction of a new thermal resource.[21] National Grid supports PGE's decision to defer construction of a new generation unit and, instead, secure capacity through short- and medium-term market purchases; however, short- and medium-term market purchases are not a replacement for long-term resources.

As PGE recognizes, long-term commitments are required to secure sustainable, affordable, and reliable energy.[22] Similarly, PGE notes in its Reply Comments that the Commission and its Staff previously expressed concerns with an over-reliance on short- and medium-term market purchases to meet capacity needs.[23] In particular, Commission Staff expressed concerns with the deliverability of market purchases and costs of those options, which Commission Staff concluded "is not in the best interest of ratepayers."[24] Thus, short- and medium-term resources can be a bridge to longer-term resource acquisition, and may allow PGE the flexibility to wait until the most advantageous opportunities in the market become available, potentially including large-scale energy storage. In any event, these short- and medium-term market purchases are not sufficient to address PGE's long-term needs.

In addition, National Grid emphasizes that any decision to enter into bilateral agreements to meet PGE's short- and medium-term needs should take into account PGE's longer-term objectives.[25] Accordingly, any strategy of pursuing bilateral, short- and medium-term agreements should not foreclose PGE from entering into a longer-term agreement or pursuing a long-term resource, should an advantageous opportunity present itself.

Therefore, National Grid urges PGE and the Commission to ensure that any decision to enter into market purchases from existing resources does not foreclose PGE's ability to contract for or acquire a large-scale energy storage resource, particularly because a resource such as closed-loop pumped storage best meets PGE's desired operational characteristics while also

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21 *See PGE Negotiating with Owners of Existing Plans to Fill Capacity Needs*, SNL Article, April 28, 2017 (summarizing PGE's Q1 earnings call and noting that PGE plans to first complete bilateral negotiations to fill its capacity needs before issuing a RFP for capacity with additional thermal resources); *see also* UBS Securities LLC, Portland General Electric Company Report, May 2, 2017, available at: https://neo.ubs.com/shared/d1P3vUCneB/.

22 *E.g.*, Reply Comment at § 5.3.2.

23 *Id*. at 79.

24 *In the Matter of Portland General Electric Company 2009 Integrated Resource Plan*, Order No. 10-457 at 14 (acknowledging PGE's 2009 IRP and summarizing the concerns of Commission Staff by noting, "Staff agrees with NIPPC and NWEC that power purchases from independent power producers or the wholesale power market could be used to bridge the early energy and capacity deficits associated with these scenarios. Staff concludes, however, that the risk associated with the deliverability and cost of such power is not in the best interest of ratepayers.").

25 *E.g.*, IRP at 50 ("An ongoing objective for PGE is to undertake cost-effective actions that are environmentally responsible, while retaining the right mix of resource diversity.").

satisfying its stated objectives and goals of pursuing environmentally-friendly energy alternatives.[26]

3. *No Long-Term Resource Of Dispatchable Capacity Meets The Needs Of PGE And Its Customers Better Than Pumped Storage.*

In the IRP, PGE expressed a need to add resources from each of the following categories: demand response, renewable resources that satisfy Oregon's 50% RPS requirement, annual dispatchable resources, and annual or seasonal capacity resources.[27] For dispatchable resources, PGE specifically noted that additional flexibility is needed to account for an increase in renewable generation.[28] Through its REFLEX model, PGE analyzed a set of thermal resources necessary to address system conditions such as: meeting load; holding adequate reserves for contingencies, renewable and load forecast errors, and subhourly fluctuations; providing spinning reserves; and providing upward and downward load following and regulation reserves.[29] However, contrary to PGE's assumption that these needs can only be met by a thermal resource,[30] National Grid believes that a large-scale energy storage resource, such as closed-loop pumped storage, *better* meets these system needs, and the needs of PGE's customers, on a more cost-effective and environmentally-friendly basis.

Additionally, of particular significance, PGE's initial analysis of a 50% RPS recognizes that even adding thermal resources will not address the need to curtail renewable generation. Specifically, the IRP states, "[The] the preliminary investigation of the possible flexibility challenges associated with a 50 percent RPS identified the potential for large amounts of renewable curtailment if integration solutions are not pursued. Notably, while the benefits of flexible thermal resources relative to inflexible resources are more apparent at 50% RPS than at 25% RPS, substantial curtailment potential remains at high renewable penetration even with the inclusion of incremental flexible thermal resources."[31]

Although PGE did not consider large-scale energy storage in its portfolio analysis, closed-loop pumped storage has the ability to meet all of PGE's system needs described above, while also likely eliminating the need to curtail renewable generation. Additionally, PGE itself recognizes that energy storage has the potential to offer significant, additional benefits, some of which are not considered as part of its REFLEX model. These benefits, or "five key classes of value streams" as PGE describes them, are identified and described in Section C.1 above.[32]

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[26] For purposes of long-term planning, National Grid is agnostic regarding ownership structure and is willing to consider proposals that allow PGE to participate in either (or both) of National Grid's closed-loop pumped storage projects in a manner that allows PGE to capture the full range of benefits described in these Final Comments.

[27] IRP at 28-30.

[28] *Id*. at 130-32.

[29] *Id*. at 132-33.

[30] *Id*. at 145 (noting that, "Dispatchable resources in this context refer to firm resources that have the characteristics of a CCCT, frame CT, or reciprocating engine.").

[31] *Id*. at 145 (emphasis added).

[32] *Infra* Section C.1; *see also* IRP at 231.

Pumped storage delivers additional benefits not specifically identified by PGE, such as: system production cost minimization, potential deferral/avoidance of new generation asset build, transmission/congestion flow minimization for specific paths/lines, revenue from new flexibility products or system services, and resource startup cost savings. No other resource of dispatchable capacity can provide all of these benefits to PGE, while also providing PGE with at least 400 MW of dispatachable capacity.[33]

In addition to meeting PGE's capacity needs, providing PGE with the system flexibility it needs to incorporate and optimize renewable resources, and providing PGE with substantial other benefits, closed-loop pumped storage, such as JD Pool and Swan Lake, are carbon-free, environmentally-friendly resources with all of the following beneficial characteristics:

- Indifferent to natural gas price spikes,
- Flexible,
- Support renewable energy integration,
- Leverage existing PGE resources,
- Support an "all of the above" energy strategy, and
- Provide PGE with portfolio diversity.

The ability of closed-loop pumped storage to provide all of the above-described benefits, while also being a carbon-free energy solution, makes it an ideal candidate for PGE's portfolio. These resources will assist PGE in meeting its RPS obligations, while also ensuring other renewable resources added to its system are able to operate without experiencing curtailments.

Because of these beneficial attributes, closed-loop pumped storage clearly meets the principles outlined in the Western Public Utility Commissions' Joint Action Framework on Climate Change ("Western States' MOU"). For example, the Western States' MOU focuses on principles and action items such as low-carbon technologies, a strong commitment to renewable energy resources, collaborative development, and use of low-carbon energy to lower costs and improve system reliability, all of which are satisfied by closed-loop pumped storage.[34]

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[33] PGE's REFLEX analysis for the 25% RPS in 2021 scenario assumes PGE will need access to at least 400 MW of flexible capacity. *See* IRP at 145-46. PGE also notes that, "The findings of the flexibility analysis are incorporated into the Action Plan through the requirement that approximately 400 MW of incremental resource procurement be comprised of dispatchable resources." *Id*. However, PGE itself recognizes that energy storage could also meet this capacity requirement. PGE states, "Though not explicitly tested, other dispatchable low variable cost resources, like hydro or energy storage, would likely contribute to meeting this dispatchability requirement if they are available to be called in anticipation of flexibility challenges in the day-ahead and re-dispatched within the day." *Id*. at 146 (emphasis added).

[34] *Western Public Utility Commissions' Joint Action Framework on Climate Change*, available at: https://www.utc.wa.gov/regulatedIndustries/utilities/Documents/2017-03-07%20Western%20States%20MOU%20%28002%29.pdf.

4. *Closed-Loop Pumped Storage Resources Are Uniquely Capable Of Integrating Significant Renewable Resources And Maximizing The Benefits From PGE's Existing Generation Fleet.*

As explained above, closed-loop pumped storage resources could provide greater benefits to PGE and its customers than any other, large-scale, long-term, dispatchable resources currently being considered in this proceeding. Two of the most significant benefits pumped storage can provide—benefits which no other resources can offer—are its ability to integrate large amounts of renewable generation and maximize the output from PGE's existing generation fleet.

No viable resource, other than closed-loop pumped storage, can provide PGE with at least 400 MW of upward *and downward* regulation capacity on a nearly instantaneous basis, every single day of the year. As noted above, PGE itself recognizes that, as its generation fleet evolves to satisfy Oregon's mandate of 50% RPS by 2040, adding additional flexible thermal resources will not solve the problem of substantial renewable generation curtailment.[35] Operationally, fossil-fuel generators are constrained to minimum generation levels if they are to be available to provide upward regulation capacity. However, when those generation resources are already backed down to minimum run levels or are completely idle (often, in the spring runoff season), those resources are incapable of providing any further downward regulation capacity, resulting in the conditions we are currently experiencing in the Northwest—significant renewable generation curtailments due to low load and over-generation caused by simultaneous water runoff and high winds. In contrast, closed-loop pumped storage systems can absorb this over-generation on a year round basis, thereby reducing the need to curtail renewable generation and minimizing PGE's RPS costs, which in turn, maximizes the benefits of PGE's existing renewable resources and provides its customers with the greatest benefit from PGE's existing resources.

Additionally, closed-loop pumped storage facilities are uniquely capable of providing PGE with a "portfolio effect" to maximize the output and value of its existing generation fleet. By absorbing excess generation during periods of over-generation, and later discharging that energy during periods where PGE needs additional energy, closed-loop pumped storage optimizes each of PGE's existing assets, renewable or otherwise, thereby increasing the overall value that PGE's existing resources provide to its customers and improving the economics of its existing generation fleet.

PGE acknowledges this portfolio effect in the modeling it conducted of storage resources in the IRP. PGE notes that it assumed "centralized control of the [energy storage] devices in coordination with the commitment and dispatch of other resources in the PGE fleet in order to maximize the value to the system across all of the benefit streams."[36] Thus, National Grid believes that closed-loop pumped storage facilities are uniquely capable of providing PGE system-wide benefits that will ultimately maximize the use of its existing generation resources for the benefit of PGE's customers.

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[35] *Supra* note 31 ("Notably, while the benefits of flexible thermal resources relative to inflexible resources are more apparent at 50% RPS than at 25% RPS, substantial curtailment potential remains at high renewable penetration even with the inclusion of incremental flexible thermal resources.") (emphasis added).

[36] IRP at 234 (emphasis added).

D. Conclusion

National Grid appreciates the effort PGE expended in its IRP to consider some of the additional benefit streams associated with storage resources. However, National Grid has ongoing concerns with whether PGE intends to foreclose large-scale storage resources from participating in any future RFP. Further, National Grid believes that closed-loop pumped storage is uniquely capable of meeting PGE's demonstrated capacity and system flexibility needs, while maximizing the use of PGE's existing generation fleet and also providing PGE's customers with carbon-free, environmentally-friendly, low-cost renewable energy.

PGE recently expressed an interest in meeting its 2021 capacity needs through short- and medium-term market purchases, and National Grid agrees with PGE that these resources should not replace a longer-term solution. Further, National Grid believes that short- and medium-term market purchases can serve as an effective bridge to an environmentally-friendly, long-term solution that meets all of PGE's demonstrated needs, so long as acquisition of such resources does not foreclose PGE from pursuing any long-term opportunity, such as closed-loop pumped storage.

Dated this 12th day of May, 2017.

Respectfully submitted,

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