BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

LC 73

In the Matter of PORTLAND GENERAL ELECTRIC COMPANY, 2019 Integrated Resource Plan.	OPENING COMMENTS OF SWAN LAKE NORTH HYDRO, LLC

I. INTRODUCTION

Swan Lake North Hydro, LLC ("Swan Lake") hereby submits opening comments to the Oregon Public Utility Commission (the "Commission") addressing the 2019 Draft Integrated Resource Plan ("IRP") filed by Portland General Electric Company ("PGE") on July 19, 2019, including the August 30, 2019 Addendum and September 27, 2019 Errata. Swan Lake urges PGE to modify its procurement strategy for capacity to conduct a single request for proposals ("RFP") in 2020 for both existing and new capacity resources to ensure long-lead time capacity resources, like pumped hydro storage, can be available when PGE plans to rely upon them.

While many aspects of PGE's IRP analysis are commendable, PGE has substantially underestimated the availability of future capacity supply and developed a procurement strategy that does not allow long-lead time resources, like pumped storage, to meaningfully participate. PGE may also be underestimating its own future capacity demand. Taken together, this means that PGE needs capacity and is counting on capacity resources that are not likely to be available unless PGE amends its procurement approach. Swan Lake therefore recommends that either: (1) PGE modify its capacity procurement strategy to allow long lead-time resources to meaningfully participate; or (2) the Commission acknowledge PGE's capacity need and direct

PGE to advance its procurement timeline for new capacity resources. Alternatively, the Commission could consider other options like clarifying that longer-lead time resources like pumped storage are eligible for a waiver of its Competitive Bidding Rules.

II. BACKGROUND

PGE's IRP is one of the first in the region to include pumped storage as a resource in its Preferred Portfolio, with 200 MW of pumped storage added to the Mixed Full Clean Portfolio (the "Preferred Portfolio").[1] Given the unique characteristics and benefits of pumped storage resources, particularly when compared against other types of energy storage, PGE's inclusion of pumped storage in its Preferred Portfolio is prudent and provides PGE's customers with the least cost, most reliable, and safest mix of resources designed to meet PGE's future capacity need, while also satisfying the state's objective to reduce greenhouse gas emissions in the electric sector.

Swan Lake is proud to partner[2] in the development of the two most promising pumped storage projects in the Pacific Northwest: the Swan Lake pumped storage project in southern Oregon (the "Swan Lake Project")[3] and the Goldendale energy storage project in southern Washington.[4] Both of these projects are located near high voltage transmission corridors and

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1 *In the Matter of Portland General Electric Company's 2019 Integrated Resource Plan*, Docket No. LC 73, PGE 2019 Integrated Resource Plan at Table 7-9, filed July 19, 2019 (hereinafter, the "IRP").

2 Swan Lake is a joint venture between an affiliate of National Grid USA ("National Grid") and an affiliate of Rye Development, LLC ("Rye"), which was formed for the joint ownership and development of the Swan Lake Project.

3 The Swan Lake Project is a 393.3 MW, closed-loop pumped storage facility located near the California-Oregon border. Swan Lake recently received its Federal Energy Regulatory Commission license for this project and is proceeding towards development. It is feasible that Swan Lake could be operational as soon as 2025, at a total estimated cost of approximately $800 to $850 million. Swan Lake will have up to 9.5 hours of storage capability.

4 The Goldendale project is expected to be a 1,200 MW, closed-loop pumped storage project located near Goldendale, WA, along the Columbia River at the former Columbia Gorge Aluminum smelter site. National Grid and Rye currently have a Preliminary Permit to develop the Goldendale site, and recently submitted their Pre-Application Document with FERC as they continue to work through the regulatory approval process. National Grid and Rye estimate that Goldendale could be operational by 2028. Goldendale would have up to 12 hours of storage capability in the preferred configuration, although National Grid and Rye have also modeled this project with

will utilize environmentally-friendly, "closed-loop" technology to provide unmatched flexibility as well as stacked energy, capacity, and other reliability and economic benefits to the region.

III. COMMENTS

Swan Lake greatly appreciates PGE's efforts to accurately model the value of pumped storage in its 2019 IRP, which resulted in the inclusion of pumped storage in the Preferred Portfolio. Pumped storage offers a unique value to the region, particularly in terms of reliability and unparalleled flexibility. PGE's resource modeling in this IRP is to be commended, particularly given its attempt to fully capture these unique benefits. Much of PGE's IRP analysis appears accurate and based on sound assumptions that acknowledge the challenge of planning in the face of the many uncertainties that PGE is facing in the next decade. PGE deserves credit for the hard work it performed in preparing such a robust analysis.

Swan Lake also commends PGE on its new modeling approach. PGE has provided an analysis in this IRP that differs slightly from what the Commission is used to seeing, in that the IRP presents a range of potential future capacity needs. This analysis allows the IRP to be flexible enough to provide sufficient capacity options to meet PGE's customers' needs in the event of a host of unpredictable market and load growth scenarios. Some of these scenarios are discussed in more detail below and appear to warrant additional attention from PGE. But because PGE is facing an unprecedented level of uncertainty in the very near term, Swan Lake believes PGE's overall approach of presenting a range of potential capacity needs is meritorious and appropriate, and the Low Need and High Need Futures appear to generally provide a reasonable range of uncertainty around the Reference Case. As further explained below, however, Swan Lake believes the Reference Case appears to be overly conservative,

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storage durations of both 8 hours and 20 hours, as further explained in the documents supporting their Preliminary Permit.

underestimating PGE's future capacity need. Swan Lake also urges PGE to reconsider the availability of capacity in the near to long term.

The Swan Lake Project can play a significant role in meeting PGE's near-term capacity need, but only if PGE's procurement process is modified to provide adequate lead time for this large, capital intensive project to secure financing and be constructed. If unchanged, the 2021 procurement called for in the IRP would delay the Swan Lake Project until *at least* 2026, and perhaps longer, leaving PGE and its customers exposed to significant market risk, with correspondingly severe price impacts.

Swan Lake therefore recommends that PGE conduct a single RFP in 2020 that includes both existing and new capacity resources, rather than the phased approach currently contemplated in the IRP, which is slated to occur over a two-year period. In light of the unprecedented degree of uncertainty regarding PGE's future capacity position, which is discussed in further detail below, a concurrent RFP is the most flexible, fair, and prudent approach to ensure sufficient capacity is available to meet PGE's future needs. It remains unclear why PGE has been reluctant to advance its procurement window for new capacity resources. The company may simply be relying upon guidance it received in its last IRP. While pursing bilateral capacity contracts before issuing an RFP may ensure PGE acquires the maximum amount of *existing* capacity, it will not mitigate risks triggered by a multi-phased RFP, and may ultimately limit bidders once the new capacity RFP is issued. PGE should therefore pursue bilateral negotiations while simultaneously conducting its RFP to evaluate and compare both existing and new resources. This approach provides more flexibility regarding resource adequacy and ensures PGE is acquiring the lowest-cost capacity to meet its operational

requirements. In addition to identifying the truly lowest cost and least-risk resources, this approach could also help PGE meet its corporate sustainability goals.

If PGE remains unwilling to advance its procurement timelines for new capacity resources, or provides sufficient justification to conduct a two-phase procurement, the Commission could also consider alternatives that would allow for earlier procurement of long lead-time resources like pumped storage. This might include things like adding another Action Plan item to PGE's IRP to consider long lead-time resources or clarifying that pumped storage would qualify for a waiver of the Commission's Competitive Bidding Rules.

A. PGE's Current Phased Procurement Approach May Not Be Prudent

In Section 8.4 of its IRP,[5] PGE's capacity Action Plan includes a phased approach where PGE proposes to first pursue cost-competitive capacity from existing resources in the region.[6] PGE then proposes to update the Commission on any remaining capacity need, prior to issuing an RFP for new capacity resources.[7] According to the IRP, only "if capacity needs remain after considering the actions above" would PGE issue an RFP in 2021 for non-emitting resources to meet any remaining capacity need.[8]

This phased procurement approach unreasonably limits PGE's ability to identify the least cost and risk resources available to meet its needs. A concurrent procurement in 2020, which evaluates both existing and proposed resources, would benefit PGE and its customers by putting PGE in a "first mover" position to procure valuable capacity, thus mitigating exposure to short-term market purchases in an ever-tightening market while better meeting PGE's own stated

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5 IRP at § 8.4.

6 *Id.* at § 8.4, Action 3A.

7 *Id.* at § 8.4, Action 3B.

8 *Id.* at § 8.4, Action 3C.

objectives in the IRP. As such, a concurrent procurement will better position PGE to test the market and respond to changing market conditions.

If the procurement window for longer lead-time resources is not advanced to 2020, PGE could be exposed to an over-reliance on shorter lead-time battery capacity and/or capacity market purchases to meet its future capacity needs. Therefore, should PGE decline to advance the procurement timing for new capacity resources, the company should consider alternatives that would allow it to properly consider these longer lead-time resources in time to meet its initial capacity need in 2024-2025.

1. PGE's Two-Phased Procurement Creates Unnecessary Challenges

PGE's proposed procurement approach unnecessarily limits its options, will delay the availability of the pumped storage capacity resources that PGE needs, and may force PGE to over-rely on batteries. While battery energy storage offers shorter development timelines, batteries will not meet the needs of PGE's customers with respect to scale, longevity, and ramp duration.

a. Phased Procurement Unnecessarily Limits PGE's Options

PGE's phased procurement plan will unnecessarily limit its capacity supply options by effectively foreclosing long lead-time resources like pumped storage from meeting PGE's near-term capacity need. If PGE's non-emitting capacity RFP is held in 2021, as is currently proposed, then it is likely that a binding agreement for a portion or all of the supply procured through the RFP would not be entered into until Q1 of 2022. This date for binding procurement would push Swan Lake's commercial operation into at least 2026 or 2027, too late to meet PGE's capacity need in 2024-2025 as contemplated in the IRP. Given the practical reality that new natural gas plants are infeasible, combined with the capacity market constraints described below,

PGE's options to meet its near-term capacity need could be limited to expensive market purchases from emitting capacity, or renewables and batteries, neither of which are well-suited to meet PGE's specific needs or serve PGE's planning goals.

Part of the reason pumped storage is included in PGE's Preferred Portfolio is that it provides long-duration storage capability, which is becoming increasingly important as the Pacific Northwest shifts from dispatchable resources toward intermittent renewable resources. Long-duration storage supports resource adequacy by giving the electrical grid the ability to cope with unexpected swings in intra-day energy output and pumped storage is a clean, grid-scale storage resource that can provide this critical function. However, PGE's phased procurement plan would effectively foreclose long-duration storage projects like pumped storage from being part of PGE's near-term capacity additions.

b. Phased Procurement May Result in an Overreliance on Batteries

If PGE does not alter its procurement strategy, it will be left with little choice but to rely on one of two options: (1) a significant overbuild of renewable resources, possibly accompanied by some battery storage to limit the amount of required overbuild; or (2) a significant over-reliance on batteries. Renewable energy has many benefits, but has a relatively low capacity factor. If renewable energy were the sole resources used to meet PGE's future capacity need, a massive overbuild would be required and the intermittency of these renewable resources could create reliability issues for PGE. For example, given the IRP's assumption that the wind resources considered in the portfolio development process could have capacity factors ranging from 32.7 to 42.9 percent,[9] simple math suggests that meeting PGE's near-term capacity need solely with wind resources would require building 2.5 times as many resources in order to meet PGE's capacity

[9] IRP at Table 5-5.

need. Overbuilding renewables will be far more expensive than relying on cost-effective, economical pumped storage and could also exacerbate transmission issues in the region. Given these realities, and the amount of capacity PGE will need in such a short period of time, Swan Lake believes the latter option—a heavy reliance on batteries—represents the far more likely of these two scenarios.

If new natural gas is not feasible due to factors such as clean energy mandates and political or regulatory hurdles, then the only new capacity resource that can be contracted and constructed in a two- to three-year window is lithium-ion ("Li-ion") batteries. While Li-ion batteries offer some advantages that make them the best choice of energy storage technology for certain applications, they have disadvantages related to cost and lifespan that make them ill-suited to meet PGE's forecasted needs. Batteries currently cannot compete with the longer durations pumped storage offers.

While Swan Lake has some concerns with a procurement strategy that over-relies on batteries, the reality is that pumped storage and batteries are complementary products. A more prudent procurement approach would be to pair the two technologies so that PGE has both very fast ramping and charging resources for one to four hours from batteries, as well as longer duration discharge and capacity resources of eight hours or greater from pumped storage. Such a diversity of discharge times, durations, and available capacity would ensure PGE can reliably meet the needs of its customers.[10]

PGE's phased procurement plan could effectively limit PGE's options for capacity resources to only one of these storage technologies—batteries. Narrowing the field of bidders

[10] Large-scale battery installations are well-suited to meet California's short-duration ramping needs, which arise from the wide-spread dispatch of solar power on their system. The Pacific Northwest, on the other hand, has a regional bulk power system where long ramping needs are quickly emerging. As discussed here, a phased procurement process would likely yield only new battery installations, a resource which, alone, cannot solve PGE's capacity need.

available to PGE in this manner will unduly reduce competition, while undermining a key opportunity to achieve needed system flexibility through the procurement of capacity resources from a well-established, reliable, large-scale technology like pumped storage that is strategically located close to PGE and its customers.

c. Phased Procurement Will Delay the Availability of Pumped Storage Capacity Resources that PGE Needs

PGE's IRP wrongly assumes that pumped storage resources will be available as early as 2024, despite a procurement strategy that makes achieving this date practically impossible. Under PGE's phased procurement plan, an RFP for new capacity resources would be issued sometime in early 2021. In this scenario, the process of submitting and evaluating responses, selecting winning resources, and entering into contracts for the commencement of procurement will likely take up much of 2021, if not longer. As such, construction on any new capacity resource would not start until 2022. In order to meet PGE's capacity need starting in 2024, any resource selected would have to be constructed in a mere two years, effectively limiting the capacity solutions available to PGE and foreclosing the possibility of long lead-time resources like pumped storage.

While Swan Lake continues to support PGE in its efforts to model and include pumped storage as a cost-effective energy and capacity resource in its IRP, it believes—in contrast to what the IRP assumes—that it is highly unlikely *any* pumped storage could be available beginning in 2024 without significant cost increases. In fact, very few pumped storage resources located in the Pacific Northwest are far enough along in the development process to even have a chance at meeting a 2025 commercial operation date.

Swan Lake is one such resource, but its ability to be available in 2025[11] is predicated on having a definitive agreement to purchase at least a share of its capacity by the end of 2020, at the

[11] IRP at Table 7-9.

latest. This is because pumped storage resources like the Swan Lake Project are complex and require more lead time than a natural gas plant or lithium-ion battery storage system.[12] One of the primary reasons for this is that certain components take a very long time to manufacture and deliver. For example, a variable speed reversible pump-turbine, like those Swan Lake expects to use at the Swan Lake Project, takes many years from the date an order is placed with the manufacturer to be delivered to the site.

The current estimate from the manufacture is up to five years to design the pump-turbine generators and place them into service. While Swan Lake has an excellent relationship with its expected turbine manufacturer, and has received numerous assurances regarding timing for delivery of its turbines, these parts are very complex, custom-designed for the site, and take much longer than most other resources to procure, particularly in comparison to wind or solar projects, which rely on more standardized, "off-the-shelf" equipment.

In order to provide the Commission and PGE with a clearer picture of the rationale for advancing the procurement process, Swan Lake has provided a high-level schedule for Swan Lake as Appendix A to these Comments. As shown, to ensure a 2025 commercial operation date for Swan Lake, a definitive power purchase agreement or ownership agreement would have to be finalized by the end of Q3 of 2020, which would allow enough time for Swan Lake to conduct geotechnical investigations, perform preliminary functional design, procure necessary equipment, contract for detailed design engineering, obtain financing, construct the project, and achieve commercial operation in time to meet PGE's 2025 capacity need.[13]

[12] For this reason, pumped storage resources do not easily fit within the Commission's typical IRP/RFP process.

[13] IRP at Table 7-9.

If an agreement is not reached by Q3 of 2020, pumped storage resources like Swan Lake may not be available to contribute to PGE's near-term capacity need, contrary to the IRP's assumptions. Advancing the procurement timeline to 2020 is therefore critical to ensure pumped storage will be available to cost-effectively meet PGE's near-term capacity need.

2. A Concurrent Procurement in 2020 is More Prudent

A more holistic procurement plan that considers both existing and new capacity simultaneously is a more prudent approach than a phased procurement. In recent comments before the Commission, PGE suggested that this alternative approach may be appropriate if "market conditions" warrant it.[14] There are ample market conditions that warrant moving up the non-emitting resource RFP to 2020, including allowing PGE to simultaneously evaluate and consider resources from both new and existing capacity resources—arguably the best way to identify PGE's least cost and risk resource.

A concurrent approach will provide significantly greater benefits to PGE and its customers than PGE's phased procurement approach, primarily by limiting PGE's exposure to all of the market risk factors discussed below. By providing PGE with significantly greater flexibility, a concurrent procurement will better position PGE to respond to changing market conditions, including potential significant load growth scenarios and tightening capacity markets, both of which are further discussed below.

a. Concurrent Procurement Will Provide the Most Accurate and Robust Pricing Data

A major benefit of concurrent procurement is that it ensures PGE has the most accurate and robust pricing data available, from both existing and new capacity resources, when making

[14] *In the Matter of Portland General Electric Company's 2019 Integrated Resource Plan*, Docket No. LC 73, Public Hearing, August 13, 2019 (comments of Brett Simms).

its procurement decisions. There is little question that a more robust procurement process will result in more responses and better pricing information than merely pursuing bilateral negotiations with existing resources. While PGE may assume that existing resources will provide the least-cost proposals, without the benefit of responses from new capacity resources, there is no way to make an apples-to-apples comparison and confirm this assumption. Concurrent procurement also allows for offers from resources that PGE's modeling may have overpriced or may not have considered.

PGE should therefore simultaneously pursue bilateral negotiations with any available capacity resources at the same time it issues the RFP for new capacity resources. Once PGE has responses to the RFP and pricing information from its bilateral negotiations in hand, it could then select the best mix of capacity resources that cost effectively and reliably meets its capacity need. This is generally consistent with PGE's approach of modeling a range of options in the IRP and is the only way to ensure PGE is acquiring the least cost and risk resources.

b. Concurrent Procurement Will Help PGE Maximize the Value of its Participation in the CAISO Energy Imbalance Market ("EIM")

Concurrent procurement would also ensure pumped storage is constructed in time to maximize PGE's participation in the EIM. Pumped storage is uniquely capable of maximizing PGE's use of its valuable transmission rights into and out of California. In part due to the expansion of the EIM, the high voltage transmission interties with California experience more frequent interchanges of energy and capacity between the Pacific Northwest and California, which differs from the operational paradigm in existence when these transmission lines were conceived and constructed. Pumped storage is uniquely suited to provide significant operational flexibility and meet the changing demands brought about by recent market developments, such

as the EIM. Absent advancing the procurement for these resources, pumped storage may not be timely available to maximize the value of PGE's participation in the EIM.

c. Concurrent Procurement Will Give PGE More Flexibility Regarding Colstrip

Another significant benefit of a concurrent procurement is that it could allow for an accelerated closure of Colstrip Units 3 and 4 ("Colstrip"). This is a particularly important benefit to PGE, considering its IRP demonstrates that an early exit of Colstrip is actually more economical for PGE's customers.[15] Because concurrent procurement affords PGE a greater pool of potential resources from which to immediately draw upon, the company would have more flexibility to pursue Colstrip closure options. This may be needed due to changes in law or if other Colstrip owners desiring to close the plant earlier than PGE assumes in its IRP. Advancing the procurement timeline for new capacity resources creates a viable pipeline of resources to meet these kinds of uncertainties regarding PGE's future capacity needs.

d. Concurrent Procurement Better Meets the IRP's Objectives

When discussing its future capacity need, PGE's IRP consistently notes some of the future uncertainties facing the company. For example, PGE explains that the Action Plan must be "flexible enough . . . to respond to evolving conditions and robust enough to provide for significant procurement of new resources should the identified needs persist."[16] This flexibility becomes even more imperative when some of the additional market and/or load growth risks discussed below are factored in to PGE's analysis.

The IRP explains that the potential capacity need in 2025 ranges from 309 MW to 1,065 MW across the various Low Need, Reference, and High Need cases, largely due to factors like

[15] IRP at § 7.4.2 (stating, "The Colstrip sensitivities indicate that the preferred portfolio Reference Case cost may be lowered if Colstrip were to exist PGE's portfolio at the end of 2027 instead of the end of 2034.").

[16] IRP at §§ ES.3, 8.4.

uncertain economic conditions, changes in load forecasts, and unknown adoption rates for distributed energy and/or electric vehicles.[17] As a result, PGE needs flexibility to ensure it has sufficient resources available to meet a wide range of potential future scenarios.[18] As explained below, additional market factors and considerations are likely to push PGE's actual capacity need toward the higher end of this range.

Despite evidence of the need for flexibility and significant benefits to procuring new resources, including PGE's own statements in the IRP, PGE continues to plan on initially limiting its capacity resource options to bilateral negotiations with existing capacity resources in 2020 through the phased procurement approach. In contrast, a concurrent procurement would provide PGE with more capacity resource options in 2020, greater capacity upside flexibility, and insulation from future market risks. This kind of flexibility would ensure PGE is well prepared to weather any unexpectedly large capacity need arising due to any additional risks or market factors addressed below, many of which are currently not well-captured by the IRP. Concurrent procurement is therefore actually better suited to meet PGE's own stated objectives than the phased procurement approach.

3. Alternatives to Concurrent Procurement

If PGE still believes its currently proposed procurement plan is the most prudent after considering these comments, Swan Lake requests PGE, with input from the Commission, consider other alternatives that would allow procurement of long lead-time projects like pumped storage earlier than 2021. Swan Lake proposes two such alternatives. First, adding a specific Action Plan item to the IRP allowing earlier procurement of pumped storage. Second, seeking

[17] *Id.* at § 4.3.2.

[18] *Id.* at § 8.4.

clarification from the Commission as to whether pumped storage may be procured pursuant to a waiver of the Commission's Competitive Bidding Rules.[19]

a. PGE Could Add an Action Plan Item Allowing for Early Procurement of Long Lead-Time Resources

PGE could begin the procurement process for longer lead-time resources, like pumped storage, before 2021 by adding another Action Plan item to the IRP that would allow for early acquisition of these unique resources by commencing a long-lead time resource procurement in 2020. Such an Action Plan item could be for the full amount of pumped storage shown in PGE's IRP, 200 MW, or for a portion thereof, *e.g.*, 100 MW. In the latter scenario, the remainder of the pumped storage capacity could be procured through the more traditional RFP process that PGE currently envisions.

Adding an early-procurement Action Plan item for all, or at least a portion, of the pumped storage capacity shown in PGE's IRP would: (1) capture portfolio diversity benefits that PGE might otherwise miss out on due to timing concerns for pumped storage; (2) ensure PGE has access to a the deepest possible pool of capacity sources when its near-term needs arise; and (3) reduce PGE's exposure to future capacity market risk.

Such a strategy need not exclude other, shorter lead-time resources. Rather, earlier procurement of long lead-time resources could be used to meet a portion of PGE's capacity need and ensure a diverse resource mix is available, resulting in increased reliability of PGE's system. For shorter lead-time capacity resources, PGE's phased procurement approach could remain in place and allow them to participate via PGE's 2021 non-emitting capacity RFP.

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[19] *In the Matter of Rulemaking Regarding Allowances for Diverse Ownership of Renewable Energy Resources*, Docket No. AR 600, Order No. 18-324 (Aug. 30, 2018).

This approach has been used in the past to allow PGE to pursue capacity from existing hydropower resources. Such an approach could easily be used for pumped storage, assuming that the Commission agrees that: (1) longer lead-time resources, such as pumped storage, provide value to PGE and its customers; and (2) these resources cannot be acquired via the Commission's standard IRP and RFP processes, due to the longer procurement window required.

One additional benefit to this alternative is that it would allow the Commission to provide input on the terms under which PGE would be permitted to pursue these longer lead-time resources, which the Commission could use to ensure a fair, robust, and impartial process that is substantially similar to the traditional RFP process. If PGE declines to move up its procurement timeline to allow longer lead-time resources to participate in this IRP, PGE should consider this alternative.

b. PGE Could Seek a Waiver of the Commission's Competitive Bidding Rules for Longer Lead-Time Resources

Another alternative for potentially acquiring longer lead-time resources like pumped storage would be through the Commission's waiver process found at OAR 860-089-0100(3). In relevant part, the Commission's waiver rules provide:

> (3) An electric company is not required to comply with the competitive bidding requirements to acquire a resource otherwise subject to section (1) of this rule when:
>
> . . .
>
> (b) There is a time-limited opportunity to acquire a resource of unique value to the electric company's customers;
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> (c) An alternative acquisition method was proposed by the electric company in the IRP and explicitly acknowledged by the Commission; . . . .[20]

[20] OAR 860-089-0100(3)(b), (c).

Long lead-time resources like pumped storage could fall into either of the above-listed categories for a waiver from the Competitive Bidding Rules, and Swan Lake respectfully requests PGE and/or the Commission clarify whether they believe this is a viable alternative.

Looking first at subpart (b), pumped storage is "a time-limited opportunity to acquire a resource of unique value" to PGE's customers. These resources are time-limited due to their longer lead-time, which means that there is a short window in which they must be placed under contract in order to meet PGE's near-term capacity need. Pumped storage is also "a resource of unique value" due to its long-duration storage capability. The concept of unique value could be studied further, potentially including additional modeling using data provided by PGE in its IRP. Swan Lake is confident that these resources would outperform other storage resources on the basis of cost, reliability, flexibility, storage duration, capacity value, safety, and/or environmental impacts. There is not much time left for PGE to act, however, to ensure pumped hydro's unique value is available when PGE needs it.

Looking back at some of PGE's past waiver requests, in Docket No. UM 1773, PGE filed a limited waiver request to allow for a fast track renewable RFP process. The Commission's Staff explained in its Staff Report that:

> A waiver of the Guidelines should only be granted if the Company can establish a need for the procurement. The need can be clearly demonstrated if a resource allocation is identified in the company's acknowledged IRP. However, there can be other avenues toward establishing a need for the resource, such as compliance with regulatory mandates.[21]

Based on this additional guidance, long lead-time resources, which have difficulty participating in the traditional IRP and RFP processes due to procurement timing, are excellent candidates for the waiver process. Critically, PGE's IRP identifies a resource need of at least

[21] *In re the Matter of Petition for Partial Waiver of Competitive Bidding Guidelines and Approval of Request for Proposals Schedule,* Docket No. UM 1773, Staff Report at 9-10, May 31, 2016 (the "Staff Report").

200 MW of pumped storage starting in 2024. If the IRP is ultimately acknowledged by the Commission, then pumped storage would seemingly fit squarely in the scenario contemplated by Commission Staff.

Given that it appears that long lead-time resources like pumped storage could be candidates for the waiver process, Swan Lake requests that PGE and the Commission provide some additional guidance on whether they believe this is a viable alternative for procuring these types of resources. Without a way to allow for earlier procurement of these longer lead-time resources—whether it be conducting a holistic procurement process in 2020 or pursuing some other Commission-approved alternative—resources like pumped storage simply will not be available to meet PGE's near-term capacity need, despite the IRP's analysis demonstrating both a future capacity need and the ability of these resources to meet that need.

B. PGE's Capacity Estimates Could Threaten Long-Term Resource Adequacy

When planning for capacity shortages, timing is everything and PGE's proposed timing may be off. The IRP Reference Case indicates PGE will have a capacity need of approximately 368 MW in 2024,[22] growing to 685 MW in 2025.[23] While the Reference Case may be a reasonable estimate, Swan Lake believes it likely underestimates PGE's future capacity need due to the forces driving the various need futures. This situation will be compounded by the fact that Western electricity markets will face unprecedented capacity shortages beginning in the mid-2020s. Simply put, the availability of capacity—and more specifically a lack of availability—may lead PGE to increasing capacity deficits over the next decade or more. That is because PGE's IRP does not appear to reflect several capacity market factors likely to result in very tight supply within the next decade. These market factors are further supported by information

[22] IRP at § 8.4.

[23] *Id*.

coming from PGE's own capacity market studies in this IRP, the Bonneville Power Administration ("BPA"), the California Independent System Operator ("CAISO"), and others.

1. The IRP Significantly Underestimates Future Capacity Supply

While PGE's IRP addresses some of the uncertainty surrounding its future capacity need, it does not adequately address recent predictions about the size of the impending regional capacity shortfall. Several market factors point to a looming capacity shortage in the Western energy market in the mid-2020s, which is supported by PGE's own studies.

a. PGE's Own Study Shows Acute Capacity Shortages in Mid-2020s

PGE's own experts suggest little-to-no capacity will be available in the regional capacity market when PGE will need new capacity. This conclusion is directly supported by the Northwest Power and Conservation Council's ("NWPCC") Northwest Power Supply Adequacy Assessment for 2023 (the "NWPCC Power Supply Assessment").[24] As such, pursuing a strategy of first seeking out existing capacity will expose PGE to a situation where it has insufficient, or a sub-optimal, set of new resources under development to meet its near-term capacity need. This situation is likely to result in: (1) PGE relying on capacity markets, which as its own expert notes, will become increasingly constrained and result in drastic price increases and potentially unavailable supply; or (2) as described above, PGE heavily relying on batteries to meet its near-term capacity need, despite the fact that these resources are not best suited to provide PGE the capacity and operational characteristics it needs. In either case, meeting sizeable capacity deficits on short notice is likely to be very expensive, if it is even feasible.

[24] *Pacific Northwest Power Supply Adequacy Assessment for 2023*, Northwest Power and Conservation Council, June 14, 2018, at p. 10, available at: https://www.nwcouncil.org/reports/pacific-northwest-power-supply-adequacy-assessment-2023.

When it acknowledged PGE's 2016 IRP, the Commission directed PGE to "scope and launch a regional [capacity] market study" to provide the Commission with further information on potentially available capacity in the region.[25] In response, PGE hired Energy+Environmental Economics ("E3") to perform a study (the "Northwest Loads and Resource Assessment")[26] for this IRP. In that study, E3 explains:

> The Pacific Northwest has historically been in a surplus condition for capacity. As a result, some utilities in the region have relied on the purchase of surplus capacity from the markets to cost-effectively meet their resource adequacy targets and peak demand needs. However, **a number of recent studies of the capacity availability in the region have shown that the region is expected to be short on capacity in the near-term**. This study examines the expected changes in loads and resources for the region and its implications for PGE's long-term resource planning assumptions with regards to the availability of market purchases of surplus capacity.[27]

After reviewing several capacity studies conducted in the region, and factoring in its own analysis, E3 concludes that, in the Base Case, the region is likely to be at a capacity deficit of several hundred MWs in 2021 for the winter period, and a similar deficit appears in 2026 for the summer period.[28] Even in the best case, "low need" scenario, a winter capacity deficit occurs by 2026.[29] However, despite these capacity deficits as early as 2021, PGE's phased procurement approach continues to assume that capacity will be available after 2021 to meet its near-term capacity need.

While the E3 study considered the NWPCC Power Supply Assessment, it is worth highlighting that the NWPCC projects a capacity shortfall in the Pacific Northwest of 300 MW

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25 *In the Matter of Portland General Electric Company, 2016 Integrated Resource Plan*, Docket No. LC 66, Order No. 17-386 at 18-19 (Oct. 9, 2017).

26 *See External Study E. Market Capacity Study*, IRP, Jan. 2019 ("E3 Study").

27 *Id.* at 1 (emphasis added).

28 *Id.* at Figure 11; Table 8.

29 *Id.* at 33-34, Fig. 12.

in 2021, and an additional 300 to 400 MW in 2022.[30] Looking at the NWPCC's sensitivity analyses, those numbers could rise as high as 1,650 MW in 2023.[31] The NWPCC's data support E3's findings that the region is likely to face a significant capacity shortfall in the very near term—as early as 2021.

Given the impending capacity deficits shown in these studies, a procurement approach that first relies on pursuing capacity from existing resources unnecessarily exposes PGE to the risk that no capacity will be available to meet PGE's near-term need. If no capacity is available from existing resources, PGE will be left in a situation where it hasn't started the procurement process for new resources until at least 2021. Few capacity resources of any significant size could be available a mere three years out, by 2024, to meet PGE's significant, anticipated capacity need. As a result, PGE would be exposed to a tight capacity market while it waits for new capacity resources to be built. This unnecessary risk could be easily mitigated by simply moving up the procurement for both new and existing resources to 2020.

b. BPA is Unlikely to Have Available Capacity in Mid-2020 's

PGE's Phased Procurement approach also assumes that it will be able to renew its existing capacity resource contracts to fulfill a portion of its near-term capacity need. Specifically, the IRP assumes that PGE will be able to acquire up to 300 MW of capacity in 2021 from existing resources to replace contracts that expire in 2024 and 2025.[32] As PGE also indicates, 200 MW of these expiring contracts are currently provided via contracts with BPA. This assumption appears misguided, because BPA is projected to have a large capacity deficit

30 NWPCC Power Supply Assessment at 10.

31 *Id*. at Table 3.

32 IRP at Fig. 7-17.

throughout the 2020 to 2039 timeframe, and is therefore unlikely to have any available capacity when PGE needs it.

BPA's preference customer contracts expire in 2028.[33] BPA has stated it will begin the renewal process several years in advance of the expiration of those contracts. Thus, in order to ensure it has sufficient capacity available to meet its statutory obligation to its preference customers, BPA will likely be unwilling to offer any capacity contract that extends beyond the mid-2020s. This refusal to offer anything resembling a "long-term" capacity contract will likely continue until at least until 2028, which is when BPA will have a definitive picture of its capacity obligations and excess capacity, if any.

Similarly, BPA's own resource projections suggest it will be short on capacity in the near future and that, rather than acquiring new resources, BPA will be a purchaser in the capacity market at the same time PGE is looking for available capacity from existing resources. BPA's projections suggest that it will have a significant energy and capacity deficit throughout the 2020 to 2039 timeframe.[34] BPA's analysis also suggests it isn't planning any new resource additions, but rather, that it will meet its capacity deficit through a combination of energy efficiency, demand response, and market purchases.[35] By 2025, BPA's analysis suggests it could be

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[33] *BPA 2018-2023 Strategic Plan*, January 2018, p. 36, available at: https://www.bpa.gov/StrategicPlan/StrategicPlan/2018-Strategic-Plan.pdf.

[34] *2018 Resource Program*, Bonneville Power Administration, Fig. 2-1, available at: https://www.bpa.gov/p/Power-Contracts/Resource-Program/Documents/2018%20Resource%20Program.pdf (where BPA states, "Following a surplus of 150 average megawatts (aMW) in fiscal year (FY) 2020, the Annual Energy metric becomes increasingly deficit over the remainder of the 20-year study horizon, with the deficits growing to 850 aMW by FY 2039."); *see also id*. at Fig. 2-4 (specifically, BPA states, "Following a surplus of 250 megawatts (MW) in FY 2020, the 18-Hour Capacity metric is deficit in summer for the remainder of the 20-year study horizon. These summer deficits grow from 350 MW in FY 2025 to 550 MW in FY 2039.").

[35] *Id*. at Fig. 5.3 and p. 20 ("The three lowest cost portfolios comprise energy efficiency, market purchases, and demand response.").

purchasing up to 963 MW per month of capacity via the market.[36] The fact that BPA is projecting energy and capacity deficits, and plans to be a net purchaser from the capacity markets, means that: (1) BPA will not have excess capacity available to sell when PGE's existing bilateral contracts expire; and (2) BPA will be competing directly with PGE to acquire additional capacity from existing resources in the market.

Another factor impacting BPA's ability to offer excess capacity in the future is the likely imposition of additional fish constraints on the operation of the federal hydropower facilities from which BPA sells excess capacity. Recent court orders in the ongoing litigation over the dams along the Columbia River require BPA to spill more water for the benefit of fish,[37] which means BPA's available capacity could be further reduced because water that is spilled is not run through the generation turbines, reducing power production. Thus far, BPA and federal resource agencies have been unable to present a fish management plan that is satisfactory to the judge in this ongoing proceeding. Given past rulings, it is reasonable to assume that BPA's spill obligations will increase even further, thereby further reducing the amount of excess capacity BPA has available to sell to the market.

Further compounding the capacity shortfall facing the region is the fact that BPA is not an outlier—most of the utilities in the Pacific Northwest project a capacity shortfall somewhere in the 2020 to 2030 timeframe, a factor that is not well captured or discussed in PGE's IRP or its accompanying studies. For example, Puget Sound Energy is projecting a capacity deficit of 685 MW beginning in 2022[38] and growing to more than 2,122 MW in 2030. This deficit accounts for

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[36] *Id*. at Table 5.1 (showing max monthly market purchases across the three preferred portfolios, which ranges from 882 MW to 963 MW).

[37] *Court Orders More Spill Over Columbia River Dams in 2018*, Oregon Public Broadcast, March 27, 2017, available at: https://www.opb.org/news/article/court-orders-more-spill-over-columbia-river-dams-in-2018/.

[38] *See also 2019 TAG Meeting #5: Resource Adequacy and Gas Planning Standard*, Puget Sound Energy Presentation at slide 39, Feb. 7, 2019, available at: https://pse.com/-/media/PDFs/001-Energy-Supply/001-Resource-

the removal of Colstrip in 2025, Washington's recently passed clean energy legislation, and relies upon 1,500 MW of short-term market purchases.[39] Similarly, Avista Corporation projects a capacity deficit of approximately 300 MW starting in 2027, with an additional 100 MW of capacity needed in 2031.[40] The fact that other Pacific Northwest utilities are forecasting significant capacity deficits during the same time period as PGE suggests that capacity from existing resources is likely to be at a premium during PGE's procurement window.

c. Additional Coal Retirements Will Result in Loss of Capacity

PGE's IRP also underestimates the impact retirements of fossil-fuel generation, primarily coal plants, will have on PGE's ability to secure capacity. It is estimated that as much as 19,000 MW of fossil-fuel generation capacity in the region could come offline by 2030.[41] Such a large amount of retiring fossil fuel capacity is due, in part, to recent clean energy laws in the region. For example, Washington State's recently passed clean energy legislation phases out coal from utilities' resource portfolios by 2025.[42] As a result of this legislation, there is a real risk that Colstrip will retire by 2025, rather than in 2027 as contemplated in PGE's Colstrip sensitivities.[43]

Planning/02-IRP-02-07-19-TAG-Meeting-5-Slide-Deck-FINAL.pdf (showing Puget's draft electric peak capacity resource need).

[39] *2019 TAG Meeting #8: Overview of gas modeling process, scenario electric power price forecast, overview of electric modeling process*, Sept. 19, 2019, at slide 37, available at: https://oohpseirp.blob.core.windows.net/media/Default/19_Sept_TAG_8/02_IRP_TAG_Meeting_8_Slide_Deck_FINAL.pdf.

[40] *2020 Electric IRP: Technical Advisory Committee Meeting No. 4 Presentation*, Aug. 6, 2019, at p. 137, available at: https://www.myavista.com/-/media/myavista/content-documents/about-us/our-company/irp-documents/2020-irp-tac-4-presentations.pdf?la=en.

[41] IRP at § 2.4.2.

[42] *Inslee Signs 100% Clean Energy Bill in Midst of 2020 White House Bid*, Utility Dive, updated May 8, 2019, available at: https://www.utilitydive.com/news/washington-100-clean-energy-law-only-a-signature-from-inslee-away/552627/.

[43] Because both Puget Sound Energy, Inc. ("Puget") and Avista Corporation ("Avista"), which are co-owners of Colstrip with PGE, will be prohibited by state law from including their share of the Colstrip capacity in their rate base after 2025, there appears to be a very real possibility that Colstrip will be closed earlier than the 2034 date PGE uses in the Reference Case of its IRP. For example, at Puget's IRP stakeholder meeting in January 2019, Puget conducted a straw poll of its stakeholders regarding the most important issues for their upcoming IRP. Among the

It does not appear from the IRP that PGE has considered a future without Colstrip as early as 2025, and should conduct this sensitivity analysis and include it in its responsive comments. Based on the results of the Colstrip sensitivity showing a 280 MW increase in capacity need with a 2027 retirement,[44] there is little question that moving the Colstrip retirement up to 2025 would only further increase PGE's capacity need in the mid-2020 timeframe.

Similarly, Idaho Power Company and NV Energy have announced that they will fully retire the North Valmy Generating Station by 2025, including retirement of Unit 1 as early as 2021, which is four years earlier than originally planned.[45] Despite this announcement, PGE has not yet included the North Valmy Generating Station in its list of retiring assets in the IRP and, therefore, incorrectly assumes that capacity will be available from this resource to meet some of the region's capacity need.[46]

Thus, even without *any* load growth in PGE's service territory, the risk of relying on existing capacity markets for supply grows exponentially over the next decade, particularly after 2025 when so much coal capacity will be disappearing from the market. Furthermore, these retirements are only the currently announced or very likely ones. Other coal plants could be

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most important issues for Puget's stakeholders was a strong desire for closure of Colstrip Units 3 and 4 by 2025. *See 2019 TAG Meeting #4: System Planning (Transmission and Distribution), Portfolio Sensitivities, and Load Forecast*, Puget Sound Energy Presentation at slide 37, Jan. 9, 2019, available at: https://www.pse.com/-/media/PDFs/001-Energy-Supply/001-Resource-Planning/03_IRP_01_09_19_TAG_Meeting_4_Slide_Deck_FINAL.pdf. Similarly, in separate materials handed out at this meeting, Colstrip retirement by 2025 was the second most important issue to Puget's stakeholders, when the votes were weighted by importance. *See Sensitivity Ranking by Weighting Ranked Votes*, available at: https://www.pse.com/-/media/PDFs/001-Energy-Supply/001-Resource-Planning/04_Sensitivity_Ranking_Handout_for_TAG_4.pdf.

[44] IRP at § 7.4.2.

[45] *NV Energy to Close Coal Plant, Adds Solar*, Nevada Current, Dec. 21, 2018, available at: https://www.nevadacurrent.com/2018/12/21/nv-energy-to-close-coal-plant-add-solar/.

[46] *See* IRP at Table 2-1.

closed early, like Jim Bridger,[47] which would further exacerbate the capacity deficit in the mid-2020 timeframe. The clear market trend suggests that earlier-than-anticipated retirement should be carefully considered, if not expected. The early closure of the North Valmy Generating Station should serve as a warning for PGE regarding its assumptions for the continued operation of Colstrip.

Many of these retirements are driven at least in part by state clean energy legislation. In Oregon, it remains unclear whether the state will move to a 100 percent renewable portfolio standard in the near future, or if the recent cap and trade efforts will result in state legislation making emitting resources more expensive. In either scenario, there is a risk of sooner-than-anticipated closure of generating resources that produce significant emissions, or that these resources will at least become more expensive to operate. PGE may soon need to find additional or more economic capacity to replace these resources. This uncertainty is not well-captured in the IRP, nor is it shown as a "capacity need" in the IRP modeling.

d. CAISO Forecasts Capacity Deficits and Possible Increased Demand

An additional market risk that is not adequately captured in PGE's IRP, but that will have a significant impact on the Pacific Northwest capacity market, is the impending capacity deficit in the California energy markets. CAISO recently filed comments stating that it will need several *thousand* MWs, as early as 2020, in order to meet its resource adequacy and reliability obligations. Specifically, CAISO states:

> CAISO refined its operational analysis presented in opening comments. These refinements indicate a greater operational **deficiency reaching maximums of 2,300 MW, 4,400 MW, and 4,700 MW in 2020, 2021, and 2022, respectively**.

[47] A recent presentation by PacifiCorp suggests that early closure of Jim Bridger (and other coal plants) could save PacifiCorp and its customers millions of dollars. *See PacifiCorp: Early Closure of Wyo Coal Plants Saves $599 Million*, WyoFile, Sept. 10, 2019, available at: https://www.wyofile.com/pacificorp-early-closure-of-wyoming-plants-saves-599-million/.

> The CAISO recommends that the [California Public Utilities Commission] take immediate action on the basis of these deficiencies to ensure short-term resource adequacy sufficiency.[48]

Furthermore, in its comments, CAISO goes on to note that these numbers may still be overly conservative. Specifically, CAISO explains that its analysis does not account for the wide range of wind generation actually observed during the hours in which it will be capacity short and also assumes any new resources will be online by their stated in-service dates, *i.e.*, that there will not be any project delays during development.[49] Both of these assumptions are questionable, meaning CAISO's capacity need could be even higher than those noted in its comments.

Assuming California begins immediately purchasing any non-emitting capacity available in the Western Interconnection to meet its 2,000+ MW capacity need in 2020, the Pacific Northwest capacity markets may be short on capacity as early as next year. Given this likely scenario, CAISO's comments paint a bleak picture for the Pacific Northwest capacity market, particularly given the fact that PGE's own E3 Study and the NWPCC Power Supply Assessment indicate that the Pacific Northwest will be short on capacity in the mid-2020s, without accounting for these additional California purchases. As such, the impending capacity shortfall in the Pacific Northwest is worse than is being currently forecasted by PGE.

A related market risk that is not well accounted for in PGE's analysis is recent changes to California's IRP rules that are likely to require Community Choice Aggregators ("CCAs") to begin purchasing additional capacity in the near future. When the rule changes are finalized regarding

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[48] *In the Matter of Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Planning Requirements*, R.16-02-007, Reply Comments of the California Independent System Operator Corporation at p. 2, filed Aug. 12, 2019, available at: http://www.caiso.com/Documents/Aug12-2019-ReplyComments-PotentialReliabilityIssues-IRP-R16-02-007.pdf (emphasis added).

[49] *Id*. at p. 11.

resource adequacy obligations of CCAs, CCAs will likely need to acquire significant, additional, clean capacity throughout the Western Interconnection. Given that the CCAs now represent approximately 44,000 GWh of annual load, which is approximately one quarter of the total load in California,[50] this is a hugely significant change that would dramatically increase the demand for capacity from existing non-emitting resources in the region.

2. The IRP May Also Underestimate PGE's Future Capacity Demand

At the same time that capacity markets are tightening, PGE is facing significant potential load growth within its service territory. While the IRP models some future load growth scenarios, many of the assumptions are overly conservative and do not adequately anticipate the amount of future load growth likely in PGE's service territory. This growth further emphasizes the need for a procurement strategy that provides both flexibility and a large pool of resources in various stages of development in order to ensure significant, additional capacity can be obtained quickly and cost-effectively, as needed.

a. Technology Manufacturing and Data Center Expansion Will Impact PGE's Capacity Need

One example of load growth coming to PGE's service territory is Intel Corporation's ("Intel") significant expansion of its Hillsboro facility. Intel's expansion will dramatically increase load on PGE's system.[51] The permitting documents for this facility suggest it could increase the size of the existing facility by up to 60 percent and that it plans to be in operation by as early as 2021.[52] More importantly for PGE, it appears that this expansion will come with a significant increase in power demand, because Intel plans to adopt new chipmaking technology

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50 *See* California CCA Website, available at: https://cal-cca.org/cca-impact/ (containing table showing total annual load, map with current or planned CCAs, etc.).

51 *Intel Says Huge New Oregon Factory Will Add 1,750 Jobs*, The Oregonian, Feb. 7, 2019, available at: https://www.oregonlive.com/silicon-forest/2019/02/intel-says-huge-new-oregon-factory-will-add-1750-jobs.html.

52 *Id*.

that uses 200-300 percent more energy than current methods.[53] The IRP does not provide any detail regarding PGE's assumptions for Intel load growth, however, so it is unclear whether the PGE is capturing this significant source of additional load.

In addition to the Intel expansion, several other data center developers are planning, or have begun constructing, large new facilities in Hillsboro, each of which will require significant amounts of additional power from PGE. For example, QTS Realty Trust, Inc., a firm that operates data centers, is developing a facility in Hillsboro that is likely to come online with a 108 MW load in the near future.[54] Each additional data center constructed in PGE's service territory contributes to load growth for PGE. Considering the typical construction timeline for these facilities is a mere 18 to 24 months, PGE's capacity need in the near term is very likely to grow rapidly.[55] Because the IRP lacks detail on what assumptions PGE's is using for data center-related load growth, Swan Lake is unable to determine whether PGE's assumptions are reasonable.

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[53] It has been reported that Intel is planning to commercialize extreme ultraviolet lithography technology within the next few years, which is a breakthrough in computer chip manufacturing that will allow for significant leaps in both performance and efficiency of computer chips. However, it appears this new technology would require upwards of 200-300% more energy than the technologies currently employed today. *See Intel Preparing to Spend Billions on New Oregon Factory*, The Oregonian, Jan. 21, 2019, available at: https://www.oregonlive.com/silicon-forest/2019/01/intel-preparing-to-spend-billions-on-new-oregon-factory.html; *Lasers, Molten Tin and Ultraviolet Light Chart a Path for Chipmakers*, The Oregonian, Nov. 26, 2017, available at: https://www.oregonlive.com/silicon-forest/2017/11/asml_euv_lithography_intel_hil.html; *ASML Claims Major EUV Lithography Milestone*, ExtremeTech, July 20, 2017, available at: https://www.extremetech.com/computing/252773-asml-claims-major-euv-lithography-milestone-introduction-dates-still-uncertain (containing a graph showing that EUV technology would require upwards of a 250W power source, whereas existing technology uses anywhere from 80 to 125W); *see also Extreme Ultraviolet Lithography*, Wikipedia, a§ 3.2, available at: https://en.wikipedia.org/wiki/Extreme_ultraviolet_lithography (stating, "The power target for EUV lithography is at least 250W, while for other conventional lithography sources, it is much less. For example, immersion lithography light sources target 90W, dry ArF sources 45W, and KrF sources 40W.").

[54] *Data Center Plans Huge 92-Acre Project in Hillsboro*, The Oregonian, May 28, 2018, available at: https://www.oregonlive.com/silicon-forest/2018/05/data_center_plans_massive_92-a.html; *see also* QTS Website, available at: https://www.qtsdatacenters.com/data-centers/hillsboro.

[55] *Data Centers: Jobs and Opportunities in Communities Nationwide*, U.S. Chamber of Commerce – Technology and Engagement Center, p. 6, June 15, 2017, available at: https://www.uschamber.com/report/data-centers-jobs-opportunities-communities-nationwide.

b. Vehicle Electrification is Likely to Increase PGE's Load Growth

Another factor that will likely impact PGE's future load growth is vehicle electrification. PGE's service territory has seen the highest proportion of plug-in and all-electric vehicles in Oregon. In its most recent session, Oregon's legislature passed SB 1044 to accelerate the adoption of zero-emission vehicles.[56] This legislation set various targets for increasing zero-emission vehicles, including 250,000 registered zero-emission vehicles by 2025. PGE assessed potential load impacts of zero-emission vehicles in its IRP, but its Reference Case forecast of less than 50 MW by 2025 appears overly conservative. Even its high case scenario of around 100 MW by 2025 may be conservative based on the vehicle targets in SB 1044.

For comparison, California has a goal of 1.5 million zero-emission vehicles on the road by 2025. The California Energy Commission ("CEC") has estimated that could result in as much as 1,000 MW of added demand on the system by that time.[57] While similar load impact analysis of Oregon's 250,000 vehicle target has not yet been carried out, extrapolating the CEC numbers to the Oregon target could result in as much as 166 MW of added load to Oregon demand, and, based on current vehicle registration of electric vehicles, the vast majority, and very likely more than 100 MW of that load, will occur in the PGE service territory in the Portland metropolitan region.

Thus, while the IRP discusses vehicle electrification,[58] PGE's assumptions appear overly conservative, considering the analysis shows very little electrification occurring by 2025. PGE

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[56] *New Law Will Boost Zero-Emission Vehicles in Oregon, Reducing State's Impact on Climate Change*, PR Newswire, June 19, 2019, available at: https://www.prnewswire.com/news-releases/portland-general-electric-new-law-will-boost-zero-emission-vehicles-in-oregon-reducing-states-impact-on-climate-change-300870960.html.

[57] *CEC: California EV Chargers Will Add 1 GW of Peak Demand by 2025*, Utility Dive, March 20, 2018, available at: https://www.utilitydive.com/news/cec-california-ev-chargers-will-add-1-gw-of-peak-demand-by-2025/519517/.

[58] *See* IRP § 4.1.3.1.

also appears to be discounting the proportion of vehicle electrification that will occur within its service territory.

3. Other Assumptions Affecting PGE's Capacity Forecast

In addition to the numerous concerns with PGE's capacity supply and demand assumptions, Swan Lake also has two additional concerns with PGE's capacity modeling.

a. Generic Capacity Pricing Assumptions Appear Unrealistic

First, PGE is using unrealistic pricing for its generic Capacity Fill resource, particularly in the near term, which is likely to skew the economics in favor of existing resources. For example, in Section 7.1.1.1 of its IRP, PGE states:

> The portfolio optimizing allows use of a generic Capacity Fill resource to meet a portion of its capacity needs. **The Capacity Fill resource is priced at just above the net cost of capacity of a simple-cycle combustion turbine** (SCCT) derived in Section 6.2.3 Capacity Value ($103/kW-yr). In the near term (through 2025), Capacity Fill can be used for up to the portion of PGE's capacity needs associated with expiration of contracts. **In other words, the Capacity Fill resource simulates the potential for PGE to replace the capacity that is rolling off due to contract expiration on a 1-to-1 basis.** PGE's ability to replace this capacity with cost-competitive contract options will depend on the products and pricing available from counterparties in the region.
>
> After 2025, portfolios are allowed unconstrained access to the Capacity Fill resource. **If none of the resource options provide capacity at a cost lower than the net cost of a SCCT, the portfolio will meet its remaining capacity needs beginning in 2026 with the Capacity Fill resource.** At a high level, the Capacity Fill resource could reflect capacity options that may be available through bilateral negotiations with counterparties in the region, from participation in demand response programs, or from new technologies such as energy storage, should their costs become competitive with the cost of an SCCT. While the cost of the Capacity Fill resource is estimated in this analysis based on the net cost of a new SCCT, actual costs of competitive capacity options may be less expensive.[59]

PGE's use of pricing for a new SCCT unit as the basis for determining the value of a generic Capacity Fill resource in the near-term is inappropriate, considering new natural gas facilities are

[59] *Id.* at § 7.1.1.1 (emphasis added).

virtually impossible to permit and construct, given recent clean energy legislation and stakeholder opposition to such facilities. As such, PGE should use a pure capacity resource (such as the cost to construct a fuel cell or similar resource) as the proxy for the value of a generic Capacity Fill resource. Furthermore, a number of impending market factors are likely to drive up capacity prices in the Pacific Northwest, meaning PGE's pricing assumptions for the cost of capacity additions are likely far too low, given their reliance on past prices for a new SCCT resource.

b. The IRP's Pumped Hydro 100 MW Increments Appear Arbitrary

The second concern with the IRP's capacity assumptions is that PGE's analysis constrains the addition of pumped storage resources to 100 MW increments, with little explanation for this seemingly arbitrary constraint. Specifically, the IRP states, "Pumped storage must be added in 100 MW increments" through 2025,[60] and offers no further explanation.

It is unclear why PGE chose 100 MW increments, particularly when a pumped storage project can be contracted for in varying amounts. Swan Lake is not aware of any requirement that would limit pumped storage from the Swan Lake Project or similar resources to being sold in this manner. Therefore, Swan Lake requests PGE consider relaxing this unit constraint for pumped storage, or explain in its Reply Comments whether this unit-size constraint is binding for purposes of contracting from pumped storage projects. Swan Lake's expectation is that this was merely a modeling convention that would not actually carry over to procurement and/or any capacity RFP, but requests that PGE confirm this expectation in its Reply Comments.

[60] *Id.* at § 7.1.1.4.

IV. CONCLUSION

Swan Lake appreciates the time and effort PGE has put in to modeling pumped storage, resulting in its inclusion in PGE's Preferred Portfolio. This initial step is both commendable and absolutely necessary if PGE plans to meet its future capacity need with pumped storage, which is the least-cost and only non-emitting, dispatchable, reliable, environmentally-friendly, and grid-scale storage resource available.

Despite the excellent work that has been done to date, however, PGE's phased procurement approach may serve as a barrier to the timely development of longer lead-time resources like pumped storage. For that reason, Swan Lake requests that PGE move up the procurement of all resources to 2020, which will ensure longer lead-time resources can be available to meet PGE's future capacity need in a timely manner, and further reduce PGE's exposure to market risk factors and capacity shortfalls that the Pacific Northwest is likely to experience in the coming decade.

If PGE or the Commission has any questions regarding these Comments, or any of the materials included herewith, please contact Nathan Sandvig or Erik Steimle at the email addresses listed below.

Sincerely,

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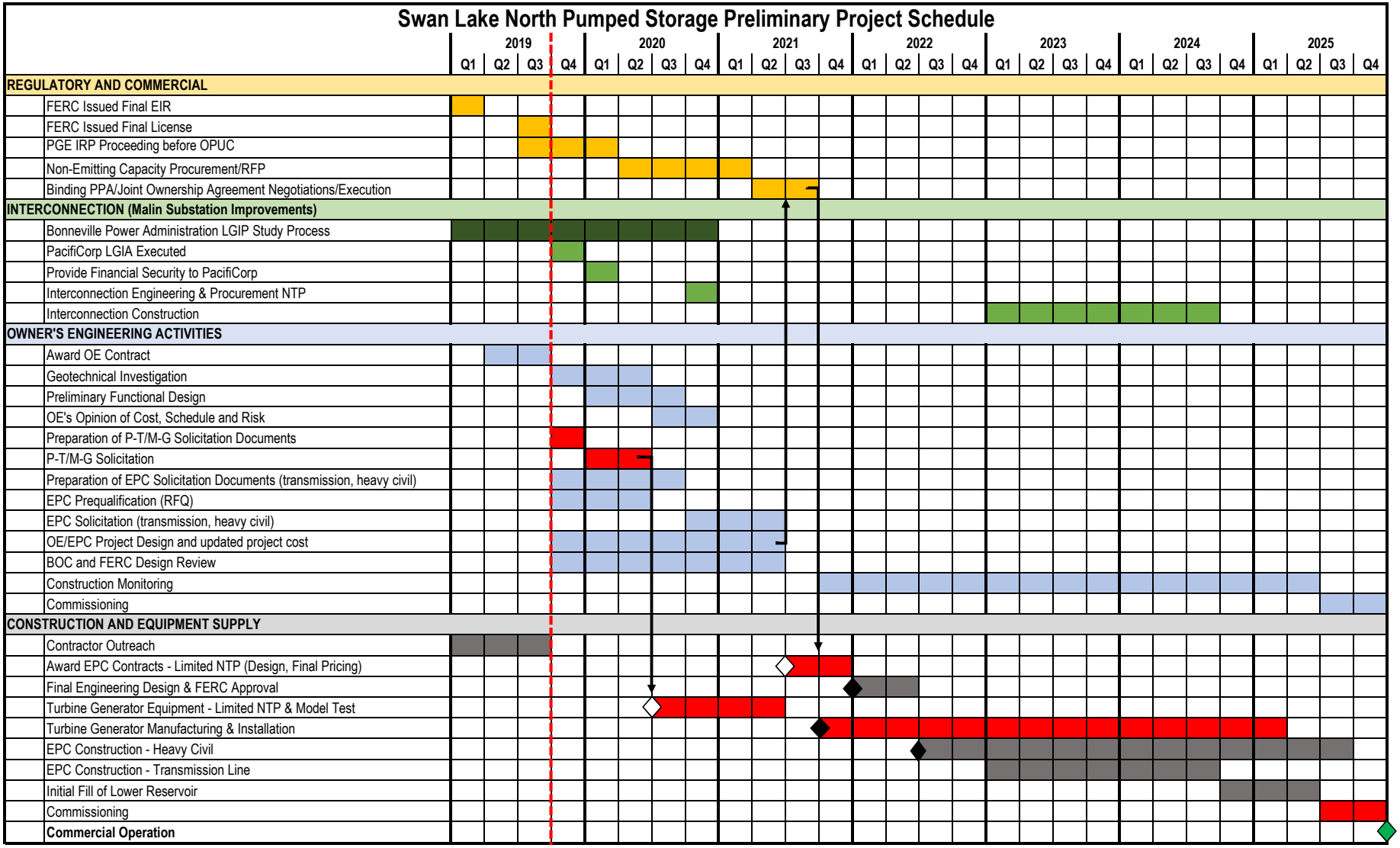
APPENDIX A

SWAN LAKE BLOCK SCHEDULE REQUIRED FOR A 2025 COMMERCIAL OPERATION DATE

Swan Lake North Pumped Storage Preliminary Project Schedule



*Draft schedule subject to review and final approval by project Owner.