BEFORE THE PUBLIC UTILITY COMMISSION OF OREGON

LC 67

In the Matter of PACIFICORP, dba PACIFIC POWER, 2017 Integrated Resource Plan.	NATIONAL GRID USA's COMMENTS

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National Grid USA's Comments on
PacificCorp's 2017 Integrated Resource Plan

National Grid USA ("National Grid") appreciates the opportunity to provide comments to the Oregon Public Utilities Commission ("the Commission" or "Oregon PUC") on the PacifiCorp, dba Pacific Power ("PacifiCorp") 2017 Integrated Resource Plan ("IRP") in accordance with the "Prehearing Conference Memorandum," dated May 5, 2017, which was issued in this proceeding.

Summary

National Grid supports the PacifiCorp IRP to the extent to which PacifiCorp's actions are intended to continue transitioning to a low-carbon grid. In particular, National Grid supports the overall PacifiCorp plan for the first ten year planning period to acquire significantly more renewables in a manner that is cost-effective and maintains reliability. National Grid notes, however, that the IRP indicates that after the first ten year planning period, PacifiCorp intends to build new natural gas-fired power plants, the first of which would become operational in 2029. Rather than accepting this portion of the PacifiCorp's plan, National Grid believes that that PacifiCorp should be required to do further analysis of flexible capacity that can cost-effectively integrate renewables carbon-free and absorb low-cost oversupply. This is consistent with PacifiCorp's position: "Recognizing the long time horizon before the first natural gas plant is added, PacifiCorp will continue to evaluate potential long-term supply alternatives, including the potential penetration of energy storage, through its on-going resource planning efforts." *See* IRP Vol. I at 238.

National Grid files these comments to suggest to the Commission that it should require PacifiCorp to do a study of the benefits of building regional pumped storage projects in the Pacific Northwest which will help meet the needs of Oregon, Washington, and California, to attain their shared climate change and renewable energy goals while maintaining the reliability of the electric grid. This study would build on PacifiCorp's storage IRP reports, but would include analysis on a sub-hourly basis of the benefits and cost-savings that pumped storage provides both as a generation, transmission asset class and the "portfolio effect" value added to existing grid infrastructure.

National Grid recognizes that to do such a regional pumped storage study PacifiCorp would have to collaborate with other utilities, Bonneville Power Administration, and the California

Independent System Operator ("CAISO"). While this is not easy, National Grid believes PacifiCorp is in the best position of any utility to lead such a study. PacifiCorp has already taken a leadership role with respect to efforts to get states to cooperate with each other, particularly with respect to helping to lead the West in formation of the now robust Energy Imbalance Market ("EIM") and consideration of expansion of the CAISO by joining as a Participating Transmission Owner. The modeling work that PacifiCorp has already done with the CAISO should facilitate cooperation on a regional pumped storage study. Moreover, PacifiCorp's customers have an interest in ensuring that regional pumped storage options are carefully considered since PacifiCorp serves customers in Oregon, Washington, and California and has transmission assets which are likely to be affected and possibly better utilized by any new regional pumped storage project.

In the PacifiCorp's regionalization benefit study prepared by Energy and Environmental Economics ("E3") that was the primary motivator to seek to join the CAISO, E3 found integration would have significant benefits such as more efficient unit commitment and dispatch, lower peak capacity needs, more efficient overgeneration management, and renewable procurement savings.[1] National Grid is confident that further analysis of new underlying physical modern grid infrastructure will show that Pacific Northwest pumped hydro storage could provide significant benefits to Oregon as well as Washington and California, and would facilitate regional GHG reduction efforts, integration of renewable energy, and overall reliability. Pacific Northwest pumped storage may also accelerate coal retirements due to obsolescence since a large number of PacifiCorp's coal units were built before 1980.[2] Many of the coal units are nearing the end of their useful life.[3] Moreover, PacifiCorp's Preferred Portfolio includes some questionable assumptions regarding whether PacifiCorp will be authorized to install SCR to prolong the life of two of its coal units, Jim Bridger Units 1 and 2, for only a few years.[4]

National Grid points out ordering such a regional pumped storage study would also be consistent with the "Western Public Utilities Commissions' Joint Action Framework on Climate Change," ("Joint Action Framework") which representatives of the Oregon PUC, Washington Utilities and Transportation Commission ("WUTC"), and California Public Utilities Commission ("CPUC")

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[1] *See* Energy and Environmental Economics, *Regional Coordination in the West: Benefits of PacifiCorp and CAISO Integration*, October 2015, at 37, available at http://www.oatioasis.com/PPW/PPWdocs/StudyBenefits-PacifiCorp-ISOIntegration.pdf

[2] For example, information provided by PacifiCorp about the Huntington, Jim Bridger, Naughton, and Wyodak plants indicates that all units at these plants were built before 1980. See plant descriptions at https://www.pacificorp.com/es/thermal.html .

[3] *See* PacifiCorp IRP Vol. I at Table 5.3 (showing that of PacifiCorp's 24 existing coal units, 11 will reach their assumed end-of-life year by 2030).

[4] The IRP indicates that at Jim Bridger Units 1 and 2 PacifiCorp must install SCR in 2021 and 2022, respectively, but intends to retire these units by 2028 and 2032 respectively. *See* IRP Vol. I at 238 (dates for preferred portfolio coal retirements); and 269 (dates for installation of SCR). The cost of installation of SCR for these two units has been estimated to approach $400 million. *See The True Cost of Coal - Fully Accounting for Coal-Fired Electricity Use in the 7th Northwest Power and Conservation Plan*, July 2015, at 12, available at http://www.nwenergy.org/data/True-Cost-of-Coal-NWEC_0715.pdf (discussing cost estimate for installation of SCR at Jim Bridger). PacifiCorp indicates that it will be preparing an economic analysis of the installation of SCR, but it will not be available until the 2017 IRP Update is issued. *See* IRP Vol. I at 269.

recently signed. Under the Joint Action Framework, the commissions agree to work together to address climate change and to, among other things, "[e]xplore the collaborative development and use of low-carbon energy capacity resources to lower customers' costs and improve system reliability." In order to facilitate joint action on its study request, National Grid has: (1) filed comments with WUTC on the PacifiCorp IRP; (2) filed comments with both the Oregon PUC and WUTC is their storage proceedings; and (3) intends to file comments with the CPUC.[5]

These comments provide relevant background information regarding state goals, discuss relevant sections of the IRP, and offer recommendations regarding what the PacifiCorp study of pumped storage should cover.

I. Background

A. Interests of National Grid

National Grid is a subsidiary of National Grid plc, a Fortune Global 500 company and one of the largest investor-owned energy companies in the world, with a market capitalization of over $40 billion. National Grid plc has utility operations in both the United Kingdom and the United States. National Grid is actively engaged in the development and operation of bulk transmission and grid-scale storage assets that will be necessary as the United States transitions the electric system to a low-carbon grid cost-effectively and reliably.

National Grid believes that pumped storage hydropower will be critical to providing the required flexibility of the electricity system while also decarbonizing the grid with intermittent renewable power. Pumped storage hydropower is a mature and commercially proven technology. Because it can be deployed at utility scale cost-effectively, pumped storage is uniquely positioned to leverage existing regional transmission infrastructure and generation resources to address current and foreseeable significant regional operational challenges, including grid reliability and the integration of additional renewable energy resources.

National Grid is presently pursuing development of the two most promising pumped storage projects in the Pacific Northwest, the Swan Lake North Pumped Storage Hydropower Project in southern Oregon ("Swan Lake Project"), and the JD Pool Pumped Storage Hydropower Project in southern Washington ("JD Pool Project").[6] Both projects will utilize environmentally-friendly "closed-loop" technology, are located near existing high-voltage transmission corridors (i.e. AC-DC Interties), are capable of providing unmatched and environmentally unconstrained flexibility, are capable of serving multiple uses, and can provide stacked benefits on an individual utility and/or regional basis. Both projects will be able to take advantage of low-cost California solar midday oversupply.

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[5] National Grid filed comments with WUTC on the PacifiCorp IRP, Docket No. UE-160353, on June 16, 2017. National Grid filed comments in the Oregon PUC proceedings relating to storage, Docket No. UM1751, on March 2, 2017, and in the WUTC proceeding relating to storage, Docket Nos. UE-151069 and U-161024, on March 31, 2017.

[6] In the IRP, PacifiCorp has included an appendix which contains a Bulk Storage Study prepared by Black & Veatch. *See* IRP, Vol. II, App. P. In this appendix two of the three pumped storage projects discussed are National Grid's JD Pool and Swan Lake projects. *Id*. at 3-5.

While the pumped storage projects that National Grid is developing are physically located in the Pacific Northwest, they can play an important regional role with respect to providing the flexibility that Oregon, Washington, and California need to effectively integrate renewable resources and cost-effectively decarbonize the grid. There is already a substantial amount of electricity exchange between the Pacific Northwest and California and additional flexibility could enable better utilization of intermittent resources and the existing high-voltage transmission network throughout the region. This could avoid having to build costly segments of Energy Gateway to deliver out-of-state wind by instead serving load with midday solar oversupply.

The Swan Lake Project, which is being jointly developed by National Grid and Rye Development, will have an installed capacity of 393.3 MW in generating mode and will be located approximately 11 miles northwest of Klamath Falls, Oregon.[7] The unique location of the Swan Lake Project will enhance its value as a regional resource particularly to PacifiCorp. Located in southern Oregon and interconnecting to the nearby Malin Substation, the Project will use the California-Oregon Intertie to deliver power to, or receive power from, California. Alternatively, the Project could interconnect at the nearby Captain Jack Substation and send or receive power using the California-Oregon Transmission Project. In either case, the Project will be well situated to serve as a regional pumped storage resource that dynamically transfers electricity between the western portion of the PacifiCorp Balancing Authority Area ("PACW") and the CAISO to meet the needs of Oregon, Washington, and California investor-owned utilities and publicly owned utilities as well as the needs of the CAISO.[8]

The JD Pool Project will have an installed capacity of 1,200 MW in generating mode and is strategically located approximately 8 miles southwest of Goldendale, Washington, at the top of the AC-DC Interties along a major import/export path to SP15 where solar oversupply is most pronounced and local capacity resource adequacy requirements are challenging. JD Pool would support and enhance beneficial regional power exchanges between California and the Pacific Northwest. In addition, JD Pool is a highly viable project with secure water rights and little controversy.

B. Renewable Energy and Greenhouse Gas Reduction Goals

In order to assess PacifiCorp's IRP it is important to have greenhouse gas reduction and renewable energy goals in mind. While the IRP does this to some extent, some of the analysis assumed implementation of the Clean Power Plan.[9] Regardless of what happens to the Clean Power Plan, however, the IRP needs to meet the increasingly stringent climate change and renewable energy goals that are being set by states.

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[7] The Swan Lake Project filed a license application at the Federal Energy Regulatory Commission on October 28, 2015 (FERC Project No. 13318).

[8] The CAISO estimates that the current maximum transfer capability on Path 66, the California-Oregon Intertie, from PACW to the CAISO is 432 MW and from the CAISO to PACW is 331 MW. *See Western EIM Benefits Report - First Quarter 2017*, at 7, available at http://www.caiso.com/Documents/ISO-EIMBenefitsReportQ1_2017.pdf

[9] IRP Vol. I at 15 (explaining Clean Power Plan modeling).

In light of their shared goals, representatives of the Oregon PUC, WUTC, and the CPUC have signed the "Western Public Utilities Commissions' Joint Action Framework on Climate Change," ("Joint Action Framework") in which they agree to work together to address climate change.[10] The Joint Action Framework includes certain "Shared Principles" which "serve as a general guide for a cooperative effort to promote cost effective, reliable, and clean energy resources and infrastructure" including: (1) "Regional cooperation to address climate change;" (2) "A strong, continued commitment to renewable energy resources; " and (3) "Support for energy planning processes that recognize the ability of low-carbon resources to provide reliability and cost-effective benefits, while fostering new technology and innovation." One of the action items identified in the Joint Action Framework is to "[e]xplore the collaborative development and use of low-carbon energy capacity resources to lower customers' costs and improve system reliability."

It is appropriate for Oregon, Washington, and California to have a Joint Action Framework since they share many goals with respect to greenhouse gas reductions and clean energy. Each state has adopted laws which set greenhouse gas reduction targets, establish renewable portfolio standards, and impose a greenhouse gas emissions performance standard designed to reduce reliance on coal. In the last few years, each state has also recognized the need to address the intermittency of renewable resources by passing legislation or taking administrative action which requires utilities to consider the use of storage. Thus, it is appropriate that the public utility commissions of all of these states consider jointly studying the need for one or more pumped storage projects to serve their needs. The relevant laws of each of the states are described in the PacifiCorp IRP at Vol. 1 at 39-47. A brief overview of the relevant laws, along with some updated information beyond what is provided in the IRP, is provided in Attachment 1.

As Oregon, Washington, and California strive to meet their shared greenhouse gas reduction and renewable portfolio standard goals, it appears likely that there will be an increase in the already significant electricity exchanges between the Pacific Northwest and California. It is already clear that in order for California to meet its greenhouse gas reduction and RPS goals, California agencies are considering strengthening ties to the Pacific Northwest. In addition to the Joint Action Framework:

- PacifiCorp and Puget Sound Energy already participate in the EIM and other northwest utilities are scheduled to participate soon.[11]
- PacifiCorp and the CAISO signed an MOU to consider whether PacifiCorp should join the CAISO.
- In order to meet California's new more stringent RPS requirements which require 50% of retail sales to be from eligible renewable resources by 2030, California utilities are likely to be in need of new renewable generation from the Pacific Northwest.[12]

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[10] Available at https://www.utc.wa.gov/regulatedIndustries/utilities/Documents/2017-03-07%20Western%20States%20MOU%20%28002%29.pdf .

[11] The latest information regarding plans for participation in the EIM is available at https://www.caiso.com/informed/Pages/EIMOverview/Default.aspx

[12] *See* Cal. Pub. Util. Code § 399.15(b)(2)(B) (50% requirement for investor-owned utilities); Cal. Pub. Util. Code § 399.30 (c)(2) (50% requirement for publicly-owned utilities). It is particularly likely that

- While the Sacramento Municipal Utility District ("SMUD"), once had plans to build the Iowa Hill pumped storage project, SMUD and the Western Area Power Administration ("WAPA") are now beginning work on the Colusa-Sutter Transmission Line, a new transmission line in California intended to enable SMUD to gain access to more renewable and low-carbon energy from the Pacific Northwest.[13]
- CAISO has proposed allowing California utilities with flexible resource adequacy requirements to count flexible generating resources in the Pacific Northwest toward their flexible resource adequacy requirements in California.[14] Significantly, in comments on the proposal, the Bonneville Power Administration indicated a willingness to make changes which would facilitate power exchanges across the CAISO interties.[15]

In reviewing PacifiCorp's IRP it is important to bear in mind that since PacifiCorp serves customers in Oregon, Washington, and California, PacifiCorp should take into account the aligned interests of these states by taking actions which enable these states to meet their goals and to look for regional opportunities where cooperation among people in different states can lead to results that are better than any state acting on its own can accomplish. One of the regional opportunities for cooperation is pumped storage.

II. Overview of Relevant Parts of the PacifiCorp IRP

A. Introduction

This section will describe key parts of the IRP which relate to National Grid's proposed study of the benefits of regional pumped storage projects.

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utilities will be in search of opportunities to procure electricity produced from wind resources in Oregon and Washington since under the California RPS, at least 75% of the resources California utilities procure must be from "Portfolio Content Category 1." Cal. Pub. Util. Code § 399.16(c)(1). This category includes only those resources that are interconnected to a California balancing authority area or dynamically transferred to a California balancing authority area. Cal. Pub. Util. Code § 399.16(b)(1). While wind and solar resources from Oregon and Washington can often meet these requirements, it is not possible for wind and solar resources in most states to qualify for Portfolio Content Category 1.

[13] For more information regarding the Colusa-Sutter project see *Colusa-Sutter Transmission Line Project Scoping Summary Report*, April 24, 2017, at 2 ("The purpose of the CoSu Line Project is to enable and enhance SMUD's access to regional markets for both the import and export of energy, including additional renewable and low-carbon energy from the Pacific Northwest and in the greater Sacramento Valley, by interconnecting the California-Oregon Transmission Project (COTP) line with SMUD's transmission system.") available at https://www.wapa.gov/regions/SN/environment/Pages/CoSu_Transmission_Line_Project_EIS.aspx

[14] CAISO, "Flexible Resource Adequacy Criteria and Must Offer Obligation – Phase 2 Revised Straw Proposal – Short Term Solutions," May 1, 2017, at 13 available at http://www.caiso.com/Documents/RevisedStrawProposal-FlexibleResourceAdequacyCriteriaandMustOfferObligationPhase2.pdf.

[15] *See* comments of the Bonneville Power Administration at http://www.caiso.com/Documents/BPAComments_FlexibleResourceAdequacyCriteriaandMustOfferObligationPhase2-RevisedStrawProposal.pdf

In the first section, the preferred portfolio will be described. As discussed above, National Grid supports the overall PacifiCorp plan for the first ten year planning period to acquire significantly more renewables in a manner that is cost-effective and maintains reliability. National Grid notes, however, that the IRP indicates that after the first ten year planning period, PacifiCorp intends to build new natural gas-fired power plants the first of which would become operational in 2029. Rather an accepting this portion of the PacifiCorp's plan, National Grid believes that that PacifiCorp should be required to do further analysis to determine whether there are better alternatives to building new natural gas-fired power plants in addition to accelerating retirement of coal plants requiring significant upgrades for compliance to operate into the future.

In the second section, the portion of the IRP relating to storage will be described. While the IRP contains some information about pumped storage projects and their costs, it does not contain an analysis of the benefits of pumped storage at the granularity necessary to articulate its value and cost savings to the grid.

In the final section, the portion of the IRP relating to the Flexibility Reserve Study will be discussed. As this section shows, PacifiCorp currently relies on both coal and natural gas-fired power plants to address the intermittency of wind and solar resources and during the second ten year planning period currently expects to rely on building more natural gas-fired power plants to meet its need for flexibility rather than relying on GHG-free flexible resources such as pumped storage.

B. Key Parts of the Plan

1. Preferred Portfolio

For the first ten year planning period the IRP relies heavily on Wyoming wind and the transmission lines needed to move the electricity generated to load centers. In particular, PacifiCorp indicates that if its preferred portfolio is adopted:

- By 2020, the company can add 905 MW of repowered wind resources, 1,100 MW of new wind resources, and a new 140-mile 500 kV transmission line in Wyoming to access the new wind resources and relieve congestion for existing capacity.
- Beyond 2020, the preferred portfolio includes:
    - An additional 859 MW of new wind—85 MW of Wyoming wind coming online in 2031, and 774 MW of Idaho wind in 2036.
    - New solar resource additions totaling 1,040 MW come on-line over the 2028 to 2036 timeframe. Approximately 77 percent of the new solar is located in Utah (beginning 2031), and the remaining 23 percent is located on the west side of PacifiCorp's system (beginning 2028).
- The first new natural gas resource is added in 2029.
- Existing owned coal capacity will be reduced by 3,650 MW through the end of 2036.

IRP Vol. I at 2-3.

For the second ten year period of the planning horizon, the IRP indicates:

- PacifiCorp will procure renewables "just in time" to meet the Oregon RPS requirement of 50% renewables by 2040.
- PacifiCorp assumes that over 1,300 MW of new natural gas-fired generation will have to be built in PACW between 2030 and 2036.

With respect to the construction of new natural gas-fired generators, PacifiCorp states:

> The first natural gas resource, a 200 MW frame simple cycle combustion turbine (SCCT), is added to the portfolio in 2029 . . . . The first combined combustion turbine (CCCT), a 436 MW G-class 1x1, is added to the system in 2030 . . . . In aggregate, the 2017 IRP preferred portfolio includes 1,313 MW of new natural-gas-fired capacity . . . . Recognizing the long time horizon before the first natural gas plant is added, PacifiCorp will continue to evaluate potential long-term supply alternatives, including the potential penetration of energy storage, through its on-going resource planning over the next decade.

IRP Vol. I at 7.[16] It is clear that PacifiCorp recognizes that since it does not need to procure new natural gas resources soon it has the time to study alternatives, including storage, which could also meet its needs.

2. Evaluation of Storage

While the Preferred Portfolio does not include new storage facilities, the plan does include some discussion of storage options.[17] The plan includes a storage screening analysis and an appendix which includes both a Battery Energy Storage Study and a Bulk Energy Storage Study in IRP Vol. II, Appendix P.

The Bulk Energy Storage Study contains information regarding three potential pumped storage projects, including the two pumped storage projects being developed by National Grid, the Swan Lake Project, and the JD Pool project. While National Grid believes the information in the Bulk Storage Study is helpful, it only describes the projects rather than providing an analysis of the benefits of the projects.

The IRP includes a sensitivity analysis for two storage options, one 80 MW battery storage facility and an 80 MW compressed air storage unit. As the IRP explains:

> PacifiCorp includes two energy storage sensitivities. Both force large scale energy storage resources into the resource portfolio, but allow the models to optimize their usage. The first storage sensitivity forces 80 MW of battery storage capacity in

[16] *Accord* IRP Vol. I at 179 ("Natural gas-fired resources do not appear in the preferred portfolio until 2029 . . . . By the end of the planning horizon, natural gas-fired capacity totals 1,313 MW . . . .. PacifiCorp will continue to evaluate potential long-term supply alternatives, including the potential penetration of energy storage, through its on-going resource planning efforts.")

[17] The plan also indicates that for Oregon PacifiCorp is working to meet the requirements of HB 2193, which will result in proposing one or more energy storage projects in Oregon. IRP Vol. I at 256.

> PacifiCorp's east BAA (Wyoming). The second storage sensitivity forces an 80 MW compressed air storage plant (CAES) sited in PacifiCorp's east BAA (Utah South). The sites selected were based on a qualitative assessment of locations best suited for storage to provide support for added renewables, in the expectation that storage plants have the ability to mitigate the non-dispatchable nature of wind and solar energy production.

IRP Vol. I at 178.[18]

While the IRP describes potential pumped storage projects, the IRP does not do any modeling to assess the benefits of pumped storage:

> In the 2017 IRP, storage resources available to the models include pumped storage, compressed air energy storage (CAES), and lithium and flow batteries. Interest in storage resources continues to grow as these technologies advance. PacifiCorp recognizes that there are stacked benefits from storage systems, that certain benefit categories are difficult to value with existing IRP modeling tools, and that improving storage analytics is a priority. With this in mind, PacifiCorp continues to explore options for modeling storage resources that are capable of capturing additional benefit streams, including voltage support, renewable resource integration, and deferral of transmission and distribution upgrades. While the sensitivity cases conducted in the 2017 IRP cycle are limited in scope, PacifiCorp plans to leverage work being performed in its review of distribution level studies when evaluating storage applications in future IRPs.

IRP Vol. I at 256.

PacifiCorp explains that it is difficult to model storage:

> Estimating the value cases of ESS's [Energy Storage Systems] is still under development. PNNL recently developed the Battery Storage Evaluation Tool (BSET) which models up to four stacked use cases in using actual load data. PacifiCorp is also participating in EPRI's Energy Storage Integration Council (ESIC) on the development of a new model called StorageVET which recently underwent alpha and beta testing. StorageVET appears to combine aspects of earlier models. While these models are being evaluated, more work is needed to accurately model the value of potential energy storage projects. Each project needs to have different values applied to the applicable use cases. Additionally, in a dynamic market those values may change over time, especially as more of the service is introduced to the market. The Company will continue to work with organizations like ESIC to further develop storage valuation modeling.

IRP Vol 1 at 129.

3. <u>Flexibility Reserve Study</u>

[18] *See also* IRP Vol. I at 168 (description of storage modeling assumptions for storage); 255-258 (description of storage sensitivity modeling results).

The IRP also contains a Flexibility Reserve Study. *See* IRP Vol. II, App. F. This study estimates the regulation reserve required to maintain PacifiCorp's system reliability and comply with North American Electric Reliability Corporation ("NERC") reliability standards and compares PacifiCorp's overall operating reserve requirement to its flexible resource supply over the IRP study period. IRP Vol. II, App. F at 73.

a. Need for Flexible Resources

The Flexibility Reserve Study starts with a discussion of the need for flexible resources and, in particular, the need for flexible resources to integrate new wind and solar resources. With respect to wind resources, the IRP notes that PacifiCorp had previously done wind integration studies, but is expecting a new need to have flexible resources because of substantial growth in solar resources:

> At the start of 2015, PacifiCorp had less than three megawatts of utility-scale solar generating capacity on its system. . . .[S]olar capacity has increased rapidly in both PACE and PACW and by the end of 2017 is expected to total over 1,000 MW. . . Because solar resources have only recently been added to PacifiCorp's system, the 2015 study period used for the regulation reserve requirements for load, wind, and Non-VERs does not have data suitable predict current and future solar regulation reserve requirements.

IRP Vol. II, App. F at 107. The IRP also explained that there were some factors which may lead to problems with estimating the flexible resource needs for integration of solar. IRP Vol. II, App. F at 113.

Overall, PacifiCorp concludes that, after taking into account the significant diversity benefits provided by the EIM, the need for regulation reserves to integrate its wind and solar resources is currently less than 653 MW. *See* IRP Vol. II. App. F at 118 (summary of need for regulation reserves).

b. Current Sources of Flexibility

The IRP also contains information regarding the resources it currently uses to meet its flexibility needs. PacifiCorp explains:

> The resources that PacifiCorp employs to serve its reserve requirements include owned hydro resources that have storage, owned thermal resources, and purchased power contracts that provide reserve capability.
>
> Hydro resources are generally deployed first to meet the spinning reserve requirements because of their flexibility and their ability to respond quickly. The amount of reserve that these resources can provide depends upon the difference between their expected capacities and their generation level at the time. The hydro resources that PacifiCorp may use to cover reserve requirements in the PacifiCorp West balancing authority area include its facilities on the Lewis River and the Klamath River as well as contracted generation

from the Mid-Columbia projects. In the PacifiCorp East balancing authority area, PacifiCorp may use facilities on the Bear River to provide spinning reserve.

Thermal resources are also used to meet the spinning reserve requirements when they are online. The amount of reserve provided by these resources is determined by their ability to ramp up within a 10-minute interval. For natural gas-fired thermal resources, the amount of reserve can be close to the differences between their nameplate capacities and their minimum generation levels. *In the current IRP, PacifiCorp's reserve are served not only from existing coal- and gas-fired resources, but also from new gas-fired resources selected in the preferred portfolio.*

IRP Vol. II, App. F at 128 (emphasis added). PacifiCorp provides a table which indicates that, surprisingly, it is relying on a number of its coal-fired power plants for flexibility. *See id*. at 135 (e.g. Colstrip). Since coal-fired power plants are baseload plants with very limited ramping capability, it is unlikely that they can provide the type of fast response needed to effectively balance intermittent wind and solar generation.

Since this analysis suggests that PacifiCorp needs new natural gas plants at least in part to meet its need for flexible resources, it would be timely to consider whether PacifiCorp can instead meet its needs for flexibility with a pumped storage facility which adds no greenhouse gas to the environment.[19]

III. Suggestions for What a Pumped Storage Study Should Contain

National Grid believes that it would not be appropriate for the Oregon PUC to accept the PacifiCorp plan for the second ten year planning horizon without ordering PacifiCorp to study the alternative of relying on regional pumped storage projects in the Pacific Northwest to meet the needs of Oregon, Washington, and California.

National Grid recognizes that the Oregon PUC has already required PacifiCorp to do some work on storage as a result of an order in its separate storage proceeding.[20] It appears, however, that such work will focus on small storage projects.[21] National Grid believes that the study it is

[19] Although the Flexible Reserve Study does not specifically discuss the extent to which PacifiCorp uses hydroelectric generation to meet its flexibility needs, elsewhere in the IRP PacifiCorp notes: "PacifiCorp owns 1,135 MW of hydroelectric generation capacity and purchases the output from 127 MW of other hydroelectric resources. These resources provide operational benefits such as flexible generation, spinning reserves and voltage control." IRP Vol. I at 80 (footnote omitted). PacifiCorp also notes that as a result of the Klamath Hydroelectric Settlement Agreement and hydroelectric relicensing PacifiCorp will be losing a very substantial number of megawatt hours of hydroelectric generation, particularly after 2021. *See* IRP Vol. I at 82, Table 5.11. It may be that prospectively PacifiCorp will need the ancillary services which pumped storage projects can provide to replace the ancillary services which are currently provided by its hydroelectric facilities.

[20] *See In the matter of Public Utility Commission of Oregon Implementing Energy Storage Program Guidelines Pursuant to HB 2193*, Docket No. UM1751, entered March 21, 2017.

[21] *Id*., App. A at 11 ("PacifiCorp is proposing to leverage their prior energy storage work and PacifiCorp study "Battery Energy Storage Study for the 2017 IRP" conducted by DNV-GL. The conclusions of the DNV-GL study form the foundation of PacifiCorp's proposed analysis." (footnote omitted); and at 13

proposing here should be done in addition to the work which PacifiCorp is already required to do as a result of orders in the storage proceeding.

National Grid intends to file comments with WUTC and the CPUC which make recommendations for what should be studied which are similar to those offered in this section. Thus, National Grid hopes that by participating in proceedings before all three regulatory agencies it will facilitate having them take a consistent approach.

1. The Study Should Take a Regional Approach to Meeting Storage Needs.

Given its leadership in developing the EIM, PacifiCorp has played a key role in helping to guide developments on a Western Grid that is becoming regionalized and interdependent. The growing interdependence means new types of alternatives need to be evaluated.

The existence of the EIM itself changes what needs to be studied in an IRP. As the EIM grows it will have an increasingly important impact on the Western electricity market that will need to be reflected in the PacifiCorp IRP. With respect to pumped storage, one of the impacts which should be assessed is whether the EIM could serve as a ready source of "as-available" low cost (or negative cost) charging energy which can be brought to a regional "sink," such as a pumped storage facility, for storage and later use to generate electricity when it will command a higher price.

In addition to taking into account the existence of the EIM, PacifiCorp's study of alternatives for the second ten year planning period should take into account the impact of Oregon's neighbors on PacifiCorp. In particular, there are many ways in which the California's aggressive greenhouse gas reduction targets and RPS requirements could affect PacifiCorp operations in Oregon and Washington. For example:

- It appears likely that in order for California to meet its RPS goal of 50% renewables by 2030, California utilities will be seeking to procure renewable resources from Oregon and Washington which could pose transmission and renewable integration challenges for Oregon and Washington.
- In light of the increasing need for California to curtail production of solar resources during the day through negative pricing in the CAISO, there may be opportunities to assist the CAISO and for Oregon and Washington to benefit by importing otherwise curtailed electricity from renewable resources at very little or no cost.
- Since the CAISO recently proposed allowing California utilities to enter into agreements with flexible resources in the Pacific Northwest that would count toward utility obligations to provide flexible resource adequacy, there may be new opportunities for generators to earn revenue for providing flexible resource adequacy capacity.

An additional reason for PacifiCorp to take a regional approach is that it has proposed putting its transmission system under the control of the CAISO. At this time, it is not clear whether

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("Staff points out that the acquisition requirement of 5 MWh and the resource acquisition cap outlined in the legislation does make consideration of traditional large supply side pumped hydro units difficult, unless the Commission exercises its discretion to lift the procurement cap.")

PacifiCorp will join the CAISO and, if so, when this would happen. Nonetheless, the possibility that PacifiCorp will one day be part of the CAISO is an additional reason for the Oregon PUC to require that the study take a regional approach and focus on the impact of a regional pumped storage project.

2. The Study Should Take Into Account the Many Benefits of Storage.

The Study should identify the benefits of pumped storage not only for PacifiCorp, but for other affected utilities, generators, and ratepayers in the region.

The Northwest Power and Conservation Council's ("NWPCC") *Seventh Northwest Conservation and Electric Power Plan* (the "7th Power Plan") calls for a white paper on the "full value stream of energy storage and its role in the power system, including transmission, distribution, and generation."[22] NWPCC notes that, "One of the potential constraints to extensive storage development is the ability of the developer and/or investor to capture and aggregate the full value of the storage system's services in a non-organized market and transform interest and overall system need into revenue streams and project funding."[23]The NWPCC has already produced a second draft of a *White Paper on the Value of Energy Storage to the Future Power System*, May 2017, which is being developed by a working group.[24] PacifiCorp should be encouraged to participate in the drafting efforts.

Just as the NWPCC has begun to investigate the full value of energy storage, National Grid believes the Commission should direct PacifiCorp to analyze the full value of energy storage in its study of the benefits of storage. The benefits of storage, some of which are difficult to monetize, 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.

- 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. 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. Providing a portion of these ancillary services with energy storage resources has the potential to reduce power integration costs.

[22] Northwest Power and Conservation Council, *Seventh Northwest Conservation and Electric Power Plan,* February 2, 2016, at 4-25, available at https://www.nwcouncil.org/energy/powerplan/7/plan/ .
[23] *Id*.
[24] For information regarding the NWPCC's most recent webinar regarding development of the *White Paper on the Value of Energy Storage to the Future Power System* and links to the second draft of this paper, see https://www.nwcouncil.org/energy/grac/meetings/2017-05_grac-webinar/ .

- 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. Energy storage systems have the potential to absorb excess generation during curtailment events, reducing the cost of meeting renewable energy targets.

- Avoided greenhouse gas emissions. Since storage facilities can avoid renewable curtailment, they can also facilitate greater reliance on GHG-free renewable resources rather than fossil-fuel fired resources. This will reduce greenhouse gas emissions.

- System peaking value. 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.

- Locational value. Depending on siting and operational considerations, energy storage can provide locational value by deferring investment in transmission or distribution upgrades. Energy storage systems could further support system reliability and integration costs by reducing the reliance on thermal plants to accommodate forecast errors and sub-hourly fluctuations.

Storage also delivers additional benefits, 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.

3. The Study Should Explain the Benefits of Closed-Loop Pumped Storage in Particular.

Closed-loop pumped storage resources could provide greater benefits than any other, large-scale, long-term, dispatchable resources. 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 an existing generation fleet.

No viable resource, other than closed-loop pumped storage, can provide upward *and downward* regulation capacity on a nearly instantaneous basis, every single day of the year. As PacifiCorp's generation fleet evolves to satisfy RPS mandates, adding additional flexible thermal resources will not solve the problem of substantial overgeneration and the resulting renewable generation curtailment. 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 that have been experienced 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 RPS costs, which in turn,

maximizes the benefits of existing renewable resources and provides customers with the greatest benefit from existing resources.

Additionally, closed-loop pumped storage facilities are uniquely capable of providing 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 when additional energy is needed, closed-loop pumped storage optimizes existing assets, renewable or otherwise, thereby increasing the overall value that existing resources provide to its customers and improving the economics of its existing generation fleet.

Further, National Grid believes that closed-loop pumped storage is uniquely capable of meeting demonstrated capacity and system flexibility needs, while maximizing the use of the existing generation fleet and also reducing greenhouse gas emissions.

4. The Benefits of Storage Should be Modeled to the Extent Possible.

As PacifiCorp notes in its IRP, it is difficult to model the many benefits of storage. IRP Vol. 1 at 129. PacifiCorp indicates it will continue to work with organizations such as EPRI's Energy Storage Integration Council to further develop storage modeling. *Id.*

While it is appropriate for PacifiCorp to continue to work on storage models, it may be more valuable for PacifiCorp to talk to the CAISO, which it has already worked with extensively on other modeling efforts. In particular, the CAISO is working on the modeling of bulk storage in the CAISO system, so it is likely that the CAISO has expertise to share with regard to modeling of regional pumped storage needs. It may even be possible for PacifiCorp and the CAISO to agree to jointly model the impact of a regional pumped storage project on their systems.

National Grid notes that since PacifiCorp is regulated by the CPUC and is a participant in the CPUC's integrated resource planning process, it may be able to raise modeling issues in the modeling advisory group to the CPUC.

PacifiCorp's modeling work should also include participation by the Northwest Power and Conservation Council and the Pacific Northwest National Laboratory who are working on the modeling of storage needs in the Pacific Northwest.

In connection with our development of pumped storage resources in the Pacific Northwest, National Grid has made investments in significant (and ongoing) modeling efforts that show substantial value in the hundreds of millions of dollars per year of a single pumped storage project by providing generation capacity value, energy arbitrage (negatively priced solar and must run wind), regulation up/down, spinning reserve and non-spinning reserve, in addition to avoided curtailment, fuel/O&M savings, and start cost savings. National Grid realizes, however, that modeling requires the participation of utilities to ensure there is agreement regarding how the modeling should be done. If the modeling work that National Grid has done thus far is of interest, National Grid would be willing to share its modeling results with Staff or others in a workshop.

5. The Study Should Identify Possible Business Models and Regulatory Approaches.

National Grid intends to develop the Swan Lake and JD Pool pumped storage projects, but is agnostic as to what company will ultimately own and operate these projects. Thus, National Grid believes the study should identify possible business models and paths to procurement for a regional pumped storage facility and the regulatory changes which would be required to make the options viable.

The simplest business model would be the traditional approach for such facilities — the pumped storage facility would be owned by a single utility which puts it in the utility's rate base. There are, however, several ownership and business models to consider. For instance, with respect to ownership:

- The facility could be jointly owned by two or more utilities.
- The facility could be owned by investor-owned utilities and/or municipal utilities.
- The facility could be owned by a company which only owns the facility as a standalone investment.

With respect to business models:

- The facility could make its money through arbitrage, *i.e.* purchasing charging electricity for less than the price at which the electricity is sold.
- The facility could be in utility generation rate base and subject to state ratemaking authority.
- The facility could be in utility transmission rate base and, if the owner is subject to the jurisdiction of the Federal Energy Regulatory Commission ("FERC"), would have rates set by FERC.
- The facility could be owned by an entity that sells open access storage services, similar to the way in which a natural gas storage facility provides storage services.

With respect to cost recovery, the study should provide guidance regarding the latest regulatory developments. Late last year FERC issued a notice of proposed rulemaking which would require all independent system operators to review their tariff rules to remove barriers to the participation of electric storage resources.[25] A final rule has not yet been issued. The study should also explain FERC's policy statement regarding the circumstances under which the costs of storage can be recovered in transmission rate base.[26]

National Grid also believes it would be very valuable for the study to propose some options for the Oregon PUC to consider with respect to exercising its authority to order procurement or secure long-term contracts for pumped storage. The legislature authorized the Oregon

[25] FERC, Notice of Proposed Rulemaking, "Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators," 157 FERC ¶ 61,121 (Nov. 17, 2016).

[26] FERC, Policy Statement, "Utilization of Electric Storage Resources for Multiple Services When Receiving Cost-Based Rate Recovery," 158 FERC ¶ 61,051 (Jan. 19, 2017).

PUC to consider procurement of pumped storage in HB 2193 (2016).[27] In particular, although it appears the Oregon PUC will be considering primarily small storage projects initially under the authority of HB 2193, the legislation says:

> (b) The Public Utility Commission may waive the limit [on the size of the storage project] described in paragraph (a) of this subsection if the commission determines, in consultation with the State Department of Energy, that a qualifying energy storage system is of statewide significance and one or more electric utilities, as defined in ORS 757.600, participates in procuring the qualifying energy storage system and shares the costs and benefits associated with procuring the qualifying energy storage system.

HB 2193 Section 2(b). The legislation, however, provides no guidance with respect to how to interpret key terms of this portion of the statute, such as an "energy storage system of statewide significance." The Oregon PUC also has not provided guidance with respect to the process it will use to evaluate procurement of ownership interests in pumped storage facilities and/or the process for seeking approval for long-term contracts for pumped storage services.

In addition, the study should include options for the Oregon PUC to consider with respect to the process for seeking cost recovery for expenditures relating to storage.[28] In particular, what types of costs will be recoverable and what process will be used to make decisions with respect to whether particular costs can be recovered? For instance, an early issue may be whether utilities can recover the just and reasonable costs incurred for development of a pumped storage project even if the utility does not ultimately add the cost of the pumped storage project to its rate base.

6. <u>The Study Should Be Completed in 2018.</u>

It is important that regulators require a study of the benefits of a regional pumped storage projects as soon as possible so that the study can be completed before the end of next year. Such projects have a very long lead time. The PacifiCorp IRP indicates that for a 600 MW pumped storage project the "Total development time is estimated at 10 years for permitting." *See* IRP Vol. 1 at 118. National Grid believes it can develop a project more quickly given the advanced permitting stage of the Swan Lake project, with the project being in-service in 2025, or possibly sooner. Regardless, the sooner the study is completed, the sooner the viability of a

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[27] HB 2193 (2015) is available at https://olis.leg.state.or.us/liz/2015R1/Downloads/MeasureDocument/HB2193/Enrolled.

[28] SB 1547, (Oregon Laws 2016, Chap. 28), which is available at https://www.oregonlegislature.gov/bills_laws/lawsstatutes/2016orLaw0028.pdf, expressly authorizes recovery of costs relating to storage:

> (2)**(a)** The Public Utility Commission shall establish an automatic adjustment clause as defined in ORS 757.210 or another method that allows timely recovery of costs prudently incurred by an electric company to construct or otherwise acquire facilities that generate electricity from renewable energy sources [*and for*]**,** costs related to associated electricity transmission **and costs related to associated energy storage.**

SB 1547 Section 11(2)(a) (to be codified at Oregon Rev. Stat. 469A.120) (emphasis added).

pumped storage project can be assessed and decisions regarding PacifiCorp's proposed 2029 COD for gas-fired generation can be made.

Moreover, this is the appropriate time for the Oregon PUC to order the study since the Oregon PUC, WUTC, and CPUC are all in the midst of considering their storage options for meeting their states' ambitious greenhouse gas reduction and RPS goals.[29] Thus, the time is now for consideration of a regional option which may be better than any option these states can secure for their ratepayers if they act alone.[30]

Conclusion

Combining cost-effective, technologically proven, environmentally sound, utility-scale energy storage integrated with renewables holds great promise to enable the regional transmission grid to transition the electric system to a low carbon grid. Specifically, National Grid believes that 21st century hydropower and proven "closed-loop" pumped storage hydropower can serve as an important tool to unlock the greater value of existing and future renewables and best manage the massive operational challenges created by the ambitious greenhouse gas reduction and RPS goals of Oregon, Washington, and California.

National Grid encourages the Commission to require PacifiCorp to do a study of the benefits of building regional pumped storage projects to serve the needs of Oregon, Washington, and California in accordance with the recommendations for what such a study should contain which are provided in these comments.

Dated this 23rd day of June, 2017.

Respectfully submitted,

Nathan Sandvig
Director, Business Development
National Grid USA

[29] *See generally* Attachment 1 (list of Oregon, Washington, and California laws and regulatory proceedings relating to greenhouse gas reductions, renewable portfolio standards, greenhouse gas emissions performance standards, and storage).

[30] It is not clear whether PacifiCorp will work with the CAISO on this study. If it does, the proposed timing is consistent with the CAISO schedule for possible preparation of a special study as part of its 2018-19 Transmission Planning Process, which is the process the CAISO has used to study CAISO bulk storage needs. Under this process, special study results are available in the fall of the first year of the planning process, which would be 2018.

National Grid U.S.A.'s Comments

ATTACHMENT 1

Overview of Oregon, Washington and California Laws Relating to Greenhouse Gas Reductions, Renewable Portfolio Standards, and Storage

1. Oregon

The Oregon legislature has adopted several laws intended to encourage reductions in greenhouse gas emissions and the development of renewable resources. Specifically:

- Oregon has statutory targets for reductions in greenhouse gas emissions:
    - The State has set a statutory goal of reduce emissions by 10% and 75% below 1990 levels by 2020 and 2050, respectively.[1]
    - The current status of Oregon's efforts to reduce greenhouse gas emissions is described in the *Oregon Global Warming Commission 2017 Biennial Report to the Legislature*.[2] The report states:

> Key Takeaway: Oregon's GHG goals are not likely to be met with existing and planned actions.
>
> The new forecast clearly shows the expected impacts of legislation from 2016 which extended the renewable portfolio standard and implemented a coal import ban that comes into effect in 2030. We appear to be on track to miss our 2020 goal by just under 11 million MTCO2e. In 2035, we project we will miss the Commission's adopted interim goal by just under 22 million MTCO2e.
>
> Despite the anticipated reductions due to implementation of Oregon's RPS and other policies, the state's forecast is not expected to come within striking distance of either the statutorily mandated 2020 and 2050 emission reduction goals, or the 2035 interim goal that the Commission proposed in our last report.

Oregon Global Warming Commission 2017 Biennial Report to the Legislature at 8-9.[3]

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[1] HB 3543 – Global Warming Actions (Oregon Laws 2007, Ch. 907) available at https://www.oregonlegislature.gov/bills_laws/lawsstatutes/2007orLaw0907.html .

[2] Available at http://www.keeporegoncool.org/sites/default/files/meeting-supporting-files/DRAFT%202017%20Biennial%20Report%20to%20the%20Legislature%20v5_new.pdf

[3] The IRP explains that the Oregon PUC issued a report on the estimated rate impacts of greenhouse gas reduction goals in 2014. IRP Vol. 1 at 40. The Oregon PUC also issued a report in 2016, the "Greenhouse Gas Reduction Goal Rate Impact Report - Report to the 2017 Oregon State Legislature," which is available at

- In 2016, Oregon substantially increased its RPS - 50% by 2040.[4]
- In 2016, Oregon banned imports of electricity produced from coal by 2030.[5]
- In 2015, Oregon enacted HB 2193, to begin consideration of storage as part of Oregon's electric grid, and the Oregon PUC has issued an order requiring utilities to prepare a storage potential evaluation which is likely to focus on small projects.[6]

2. Washington

The state of Washington also has several laws intended to encourage reductions in greenhouse gas emissions and the development of renewable resources. In particular:

- Washington's Climate Change Framework E2SHB 2815, establishes greenhouse gas emissions reduction limits: (1) reduce emissions to 1990 levels by 2020; (2) reduce emissions to 25 percent below 1990 levels by 2035; and (3) by 2050, reduce emissions to 50 percent below 1990 levels or 70 percent below Washington's forecasted emissions in 2050.[7]
- In 2016, Washington adopted a Clean Air Rule to reduce greenhouse gas emissions in the state.[8]

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http://www.puc.state.or.us/docs/2016%20Greenhouse%20Gas%20Reduction%20Report%20per%20SB%20101.pdf
In this report, the Oregon PUC provides information regarding progress of the electric utilities toward these greenhouse gas reduction targets: (1) reduce greenhouse gas emissions 10 percent below 1990 levels by 2020; and (2) reduce greenhouse gas emissions 15 percent below 2005 levels by 2020. The report indicates that under the then current PacifiCorp IRP, PacifiCorp's projected emission would exceed both targets. In particular, to "comply with the 10 percent reduction in emissions below 1990 level, PacifiCorp would have to reduce its projected greenhouse gas emissions in 2020 by an estimated 16 percent."
It appears that the Preferred Portfolio in the IRP will decrease CO_2 emissions, but it is not clear whether this assures that it will meet Oregon's greenhouse gas reduction targets. The IRP indicates: "Over the first 10 years of the planning horizon, average annual CO_2 emissions are down by over 10.5 million tons (21 percent) relative to the 2015 IRP. By the end of the planning horizon, system CO_2 emissions are projected to fall from 43.8 million tons in 2017 to 33.1 million tons in 2036—a reduction of 24.5 percent." IRP Vol. 1 at 243.

[4] SB 1547, (Oregon Laws 2016, Chap. 28), available at https://www.oregonlegislature.gov/bills_laws/lawsstatutes/2016orLaw0028.pdf) .

[5] *Id*.

[6] HB 2193 (2015) available https://olis.leg.state.or.us/liz/2015R1/Downloads/MeasureDocument/HB2193/Enrolled. *See also In the matter of Public Utility Commission of Oregon Implementing Energy Storage Program Guidelines Pursuant to HB 2193*, Docket No. UM1751, entered March 21, 2017. National Grid filed comments in this proceeding on March 2, 2017.

[7] E2SHB 281 (Washington Laws 2008, Ch. 14,), available at http://lawfilesext.leg.wa.gov/biennium/2007-08/Pdf/Bills/Session%20Laws/House/2815-S2.SL.pdf

[8] For information regarding Washington's adoption of the Clean Air rule see http://www.ecy.wa.gov/programs/air/rules/wac173442/1510docs.html

- Under I-937, utilities must supply 15 percent of their energy from renewable resources by 2020.[9]
- Washington has a greenhouse gas emission performance standard.[10]
- The WUTC has issued a draft report and policy statement regarding the need for storage to integrate renewable resources.[11]

3. California

California has taken similar steps to reduce greenhouse gas emissions and promote the use of renewable energy. Specifically:

- As required by AB 32, the Global Warming Solutions Act of 2006, the California Air Resources Board issued a Scoping Plan for reducing greenhouse gas emissions to 1990 levels by 2020 and move the state closer to its goal of reducing greenhouse gas emissions by 80% below 1990 levels by 2050. First by Executive Order, and now by statute, California set a new interim statutory target for GHG reduction targets of 40% below 1990 levels by 2030.[12] The California Air Resources Board has indicated that the state is on track to meet the 2020 target and soon is expected to issue the *2017 Climate Change Scoping Plan Update* which contains measures for attaining the 2030 targets.[13]
- In 2015, California increased its RPS requirement to 50% by 2030.[14] The legislature is currently considering legislation which would further increase this requirement. The need for renewable resources is already being met in part by purchasing electricity generated in Oregon.
- California has long had a greenhouse gas performance standard for power plants which has diminished its reliance on coal.[15]
- California has enacted storage legislation to begin to address the need to integrate intermittent renewable resources and has legislation requiring the study of bulk storage.[16]
- The CAISO is studying the need for bulk storage on its system.[17]

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[9] https://www.sos.wa.gov//elections/initiatives/text/I937.pdf

[10] For information regarding the greenhouse gas emission performance standard see http://www.commerce.wa.gov/growing-the-economy/energy/emission-performance-standards/ .

[11] *See Draft Report and Policy Statement on Treatment of Energy Storage Technologies in Integrated Resource Planning and Resource Acquisition*, WUTC Docket Nos. UE-151069 and U-161024, dated March 6, 2017. National Grid filed comments on the draft report and policy statement on March 31, 2017.

[12] *See* SB 32 (Cal. Stat. 2016, Ch. 249 Pavley).

[13] For information regarding the *2017 Climate Change Scoping Plan Update*, see https://www.arb.ca.gov/cc/scopingplan/scopingplan.htm

[14] SB 350 (Cal. Stat. 2015, Ch. 457 De León).

[15] Information regarding the greenhouse gas performance standard can be found at http://www.cpuc.ca.gov/General.aspx?id=5927.

[16] AB 2515 (Cal. Stat. 2010, Ch. 469 Skinner) (bill requiring CPUC to consider requiring acquisition of storage); and AB 33 (Stat. 2016 Ch. 680 Quirk) (bill requiring CPUC and CEC to study bulk storage).

[17] *See, e.g.,* Mark Rothleder of the CAISO included the latest results of the CAISO's ongoing bulk storage study on page 23 of his presentation at the workshop entitled "Renewable Integration" which is available at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=17-IEPR-07

- Under SB 350, the CPUC has started a new integrated planning process focused on attaining the greenhouse gas reduction and renewable resource goals.[18] In this proceeding, the CPUC is considering establishing a new track or new proceeding to consider the need for long-lead time, capital intensive resources such as pumped hydro.[19]

[18] SB 350 (Cal. Stat. 2015, Ch. 457 De León). Details regarding the California RPS statute are provided in IRP Vol. 1 at 42-44.

[19] *See Energy Division Staff Proposal for Implementing Integrated Resource Planning at the CPUC,* May 17, 2017, at 12, available at http://www.cpuc.ca.gov/irp_proposal/