

April 1, 2024

VIA ELECTRONIC FILING

Public Utility Commission of Oregon
Attn: Filing Center
201 High Street SE, Suite 100
Salem, OR 97301-3398

Re: Docket LC 82—In the Matter of PacifiCorp’s 2023 Integrated Resource Plan and Clean Energy Plan

Consistent with Order No. 24-073 issued in this proceeding, PacifiCorp d/b/a Pacific Power encloses for filing this Oregon Planning Supplement (Supplement) which provides the Public Utility Commission of Oregon (Commission) with the appropriate information necessary to demonstrate continual progress on PacifiCorp’s strategies to comply with HB 2021’s greenhouse gas emissions reductions requirement.

PacifiCorp appreciates the Commission’s and Stakeholders’ continued engagement on these important issues, and submits this informational filing for the Commission’s consideration. Consistent with Staff’s revised recommendations adopted in Order No. 24-073 and OAR 860-027-0400(11), the Company is not requesting acknowledgment of this Clean Energy Plan (CEP) Supplement, nor does the Company believe that additional actions or proceedings are necessary at this time.

If you have questions about this filing, please contact Stephanie Meeks at (503) 813-5867.

Sincerely,



Matthew McVee
Vice President, Regulatory Policy and Operations

Enclosure

OREGON CLEAN ENERGY PLANNING SUPPLEMENT

On March 19, 2024, the Commission issued Order No. 24-073 that, among other things, partially acknowledged PacifiCorp’s 2023 Integrated Resource Plan (IRP) and declined to acknowledge the company’s 2023 CEP. This included declining to require PacifiCorp to revise and resubmit its entire CEP.¹ Instead, the Commission adopted several recommendations that it expects PacifiCorp to incorporate in the 2025 IRP and CEP, and determined that the Commission “will assess continual progress” in the company’s 2023 IRP Update. The Commission has noted IRP or CEP Updates are an appropriate proceeding to evaluate continual progress.²

This Oregon Clean Energy Planning Supplement responds to the Commission’s directives, and provides adequate information for the Commission to evaluate PacifiCorp’s continual progress. This Supplement includes five sections: (1) a discussion on continual progress; (2) projected system and Oregon-specific resource needs; (3) PacifiCorp’s actual greenhouse gas emissions reductions as reported to the Oregon Department of Environmental Quality (ODEQ), and forecasted greenhouse gas emissions reductions that result from the 2023 IRP Update; (4) Oregon-specific compliance modeling that details how PacifiCorp incorporates the state’s small-scale renewables, and various levers that the company could deploy to implement HB 2021’s emissions reductions requirements; and (5) actions taken to implement the Commission’s recommendations for the 2025 IRP and CEP.

This Supplement is based on analyses and information from PacifiCorp’s 2023 IRP Update, which has been concurrently filed with the Supplement in this docket. Additional information on the methodologies or planning assumptions that underly this Supplement can be found in the 2023 IRP Update, and to avoid redundancy is not reproduced here.

The Company appreciates the Commission’s and Stakeholders’ continued engagement on these critical issues, and submits this informational filing for the Commission’s consideration. The Company is not requesting acknowledgment of this CEP Supplement, nor does the Company believe that additional actions or proceedings are necessary at this time to evaluate the Company’s continual progress.³

Continual Progress

Oregon requires PacifiCorp to reduce greenhouse gas emissions 80 percent below 2010-2012 baseline levels by 2030, 90 percent by 2035, and 100 percent by 2040.⁴

¹ Order No. 24-002, Appendix B, Recommendation 3 (Jan. 5, 2024) (Staff’s revised recommendation three struck language that would have required PacifiCorp to file a revised CEP, and instead resulted in the Commission only declining to acknowledge the CEP).

² Order No. 24-002 at 29 (“We will evaluate continual progress regularly in connection with our proceedings for acknowledgment of IRPs and CEPs and review of IRP and CEP updates.”).

³ See OAR 860-027-0400(11) (indicating that utility may, though is not required, to request acknowledgment of an IRP Update, though not specifying if this also applies to CEPs).

⁴ ORS 469A.410.

To ensure utilities are taking steps to achieve these significant goals, the law requires utility CEPs to demonstrate “continual progress within the planning period” towards meeting HB 2021’s clean energy targets, including demonstration of “a projected reduction of annual greenhouse gas emissions.”⁵ The law also requires the Commission to ensure that utilities demonstrate “continual progress,” and are “taking actions as soon as practicable that facilitate rapid reduction of greenhouse gas emissions at reasonable costs to retail electricity consumers.”⁶

The Commission has recently provided guidance on these requirements. In Order No. 24-002, the Commission noted that its “existing CEP and IRP review processes are appropriate for making regular determinations that utilities are achieving continual progress at an appropriate pace,” and that the Commission can “initiate additional processes if we need to direct utility action.”⁷

Importantly, the Commission declined to firmly define continual progress, nor require utilities “to pursue a linear trajectory of expected emissions reductions” or “solely or even primarily” measure progress on year-over-year emissions reductions reported to DEQ.⁸ This is because firm definitions of continual progress “would prevent us from giving meaning to the full phrases in HB 2021 section 4(6), which require us to understand tradeoffs around practicability, emissions reductions, and costs.”⁹ Rather, because “CEPs and IRPs are planning exercises, evaluating continual progress will similarly be directional, with the ability to look at actual performance in the next round of IRPs, CEPs, and updates and use that information to adjust forward direction and, ultimately, to inform rate case and compliance decisions.”¹⁰

While docket UM 2273 did not apply to initial utility CEPs that were created and filed before the Commission issued guidance in that proceeding, PacifiCorp believes that Order No. 24-002 is instructive for future CEPs, including this Supplement.

Applied here, PacifiCorp represents that this Supplement demonstrates that the company is making adequate continual progress to comply with HB 2021’s emissions reductions requirements. This is based on actual performance, and discussion of actions PacifiCorp has identified that will improve its greenhouse gas emissions compliance position.

Regarding actual performance, PacifiCorp has demonstrated continual emissions reductions associated with electricity provided to end-users in Oregon since at least 2019, with 9,042,557 million tonnes of carbon dioxide equivalent (MTCO_{2e}) in 2019, 8,448,143 MTCO_{2e} in 2020, 8,257,696 MTCO_{2e} in 2021, and 7,902,638 MTCO_{2e} in 2022. This represents a steady decline in actual greenhouse gas emissions over the past 4-year reporting period.

Regarding forecasted compliance, PacifiCorp is taking steps to demonstrate continual progress to comply with HB 2021. This includes significant system and Oregon-specific resource needs,

⁵ ORS 469A.415(4)(e).

⁶ ORS 469A.415(6).

⁷ Order No. 24-002, 25-26 (Jan. 5, 2024).

⁸ *Id.* at 28.

⁹ *Id.*

¹⁰ *Id.* at 30.

amounting to over 20 GWs of system assets (a portion of which is allocated to Oregon), and almost 2 GWs of Oregon-specific resources. Oregon-specific resource additions include small-scale renewable resources and additional utility-scale HB 2021-compliant resources. The 2025 IRP and CEP will discuss PacifiCorp's plans to procure these resources.

However, while the 2023 IRP Update included endogenous development of a resource portfolio based on Oregon policy requirements, including the small-scale resource requirement as well as the ODEQ emission rates and annual emissions limits associated with the greenhouse gas compliance requirement, the 2023 IRP Update does not yet provide a complete view of Oregon's greenhouse gas emissions compliance requirements. PacifiCorp continues to refine these modeling techniques and expects to develop and present these during the 2025 IRP public input process.

Accordingly, while the IRP Update does not achieve the same level of greenhouse gas emissions reductions across the planning horizon as was indicated by the 2023 CEP, this Supplement discusses multiple compliance actions, or "levers", that the company could pursue to make up these additional emissions reductions. These "levers" represent the likely multiple, non-exclusive, actions that could be pursued to achieve compliance.

PacifiCorp continues to stress that the company, the Commission, and stakeholders will need to thoughtfully consider these levers, and determine the appropriate balance and allocation of risks and costs in the upcoming decades as the company gets closer to HB 2021's 2030, 2035, and 2040 deadlines. These issues are detailed below.

Projected System and Oregon-Specific Resource Needs

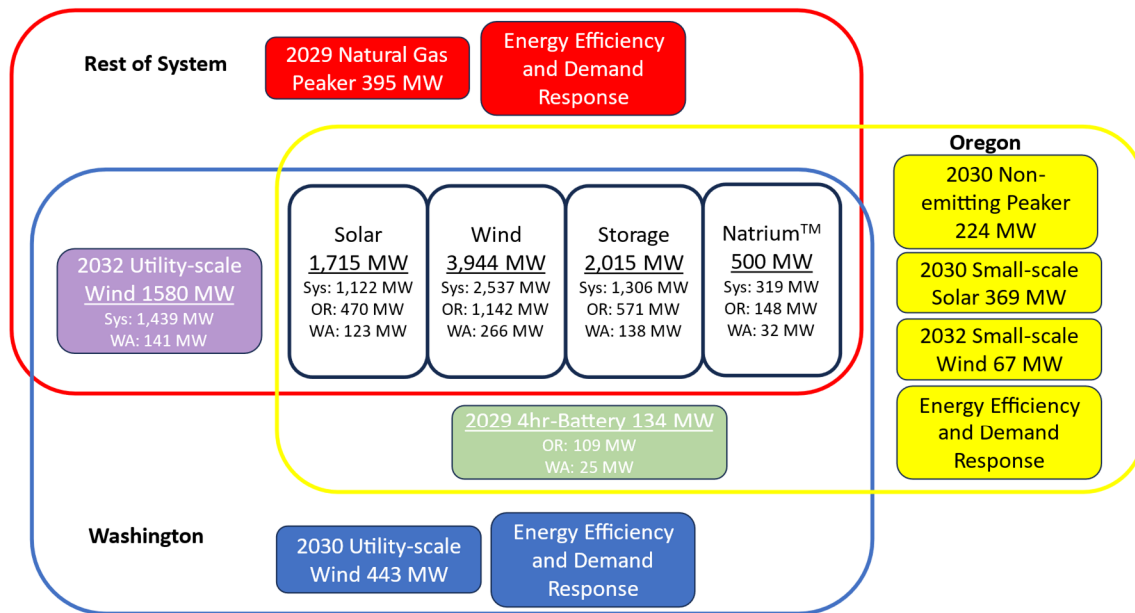
As discussed in the Executive Summary of the 2023 IRP Update, the Ozone Transport Rule (OTR) materially increased the volume and pace of PacifiCorp's procurement needs in the 2023 IRP. The 2023 IRP further showed that the least-cost, least-risk mix of incremental system energy and capacity resources to meet this need could be met with non-emitting resources that could also support state-specific policies. However the stay of the EPA's rejection of the Utah OTR plan, and the EPA's acceptance of the Wyoming OTR plan, removed these pressures to accelerate resource acquisitions. In particular, the Tenth Circuit Court of Appeals stay of the Utah OTR plan was on the basis that the plaintiffs were likely to succeed on the merits. The 2023 IRP Update preferred portfolio reflects these developments, and demonstrates that significant system benefits in scaling down and delaying these resource acquisitions that were originally identified in the 2023 IRP.

That said, while PacifiCorp's overall capacity needs for new assets are lower, and the projected dates to procure these resources are further in the future than what the 2023 IRP contemplated, the 2023 IRP Update continues to support the need for investments in generation, transmission, and distribution assets. For example, the 2023 IRP Update preferred portfolio includes the following generation resources through 2042:

- 9,818 megawatts of new wind resources (including 443 megawatts for Washington and 239 megawatts of small-scale wind for Oregon).
- 4,016 megawatts of storage resources, including batteries collocated with solar generation, standalone batteries, and pumped hydro storage resources (including 101 megawatts of standalone batteries for Oregon and Washington).
- 3,763 megawatts of new solar resources, mostly paired with battery storage (including 483 megawatts of small-scale solar for Oregon).
- 4,326 megawatts of capacity saved through energy efficiency programs.
- 1,123 megawatts of capacity saved through demand response programs.
- 500 megawatts of advanced nuclear (Natrium™ reactor demonstration project) in 2030.
- 5,385 megawatts of natural gas convertible peaking resources that meet high-demand energy needs (including 224 megawatts of clean-fueled peaking resources for Oregon).
- Installation of carbon capture technology on Jim Bridger Units 3 and 4.

To visualize how these resources are assumed to be allocated across PacifiCorp’s system in a given year, please refer to Figure 1 below. This Figure includes resources that were selected in the 2023 IRP Update preferred portfolio through 2032, which include resources allocated to Oregon to achieve its policy objectives.¹¹

Figure 1—Allocation of the 2023 IRP Update Preferred Portfolio Through 2032



The red rectangle depicts system resources, and resources that are not shared with Washington or Oregon, including: 395 megawatts of natural gas peakers and energy efficiency and demand response; and portions of 1,580 megawatts of utility-scale wind, 1,715 megawatts of solar, 3,944

¹¹ Additional information can be found in PacifiCorp’ 2023 IRP Update, Ch. 6 – Portfolio Development (Apr. 1, 2024).

megawatts of wind, 2,015 megawatts of storage, and 500 megawatts of clean baseload resources that are shared between the rest of the system, Oregon, and Washington.

The blue rectangle depicts Washington resources, including: a Washington-specific 443 megawatts of utility-scale wind and energy efficiency and demand response; portions of 134 megawatts of 4-hour batteries; and portions of the four resource categories shared with the rest of the system (portions of solar, wind, storage, and clean baseload resources).

The yellow rectangle depicts Oregon resources, including: an Oregon-specific 224 megawatts of non-emitting peakers, 369 megawatts of small-scale solar, 67 megawatt of wind, and energy efficiency and demand response; a share of the 134 megawatts of 4-hour batteries with Washington; and portions of the four resource categories shared with the rest of the system (portions of solar, wind, storage, and clean baseload resources).

The upcoming 2025 IRP and CEP will inform PacifiCorp's next steps for procuring these resources including all-source and small-scale procurement strategies.

Moving to transmission, PacifiCorp is also finalizing construction of the Energy Gateway South and Energy Gateway West Sub-Segment D1 transmission projects and partnering with Idaho Power to build the Energy Gateway Sub-Segment H (Boardman-to-Hemingway or B2H) transmission project. And the 2023 IRP Update supports two gigawatts of interconnection capacity through 2032—these are incremental to the increased capacity from Energy Gateway South, Energy Gateway West Sub-Segment D1, and B2H.

The impact of these resources on PacifiCorp's greenhouse gas emissions reductions, as well as additional incremental levers, are discussed below.

Greenhouse Gas Emissions Reductions

This section discusses PacifiCorp's actual greenhouse gas emissions reductions from recent years; forecasted greenhouse gas emissions reductions associated with the 2023 IRP Update preferred portfolio; as well as the company's potential incremental options to achieve HB 2021 compliance.

First, ORS 469A.420(4)(a) requires PacifiCorp to provide the Commission with its two most recent annual emissions reports that have been filed with the ODEQ. Information from these reports, for years 2021 and 2022 as well as from several prior years, are available on the ODEQ's website.¹² This data indicates that PacifiCorp has steadily reduced greenhouse emissions associated with electricity provided to end-users in Oregon since 2019, with 9,042,557 MTCO_{2e} in 2019, 8,448,143 MTCO_{2e} in 2020, 8,257,696 MTCO_{2e} in 2021, and 7,902,638 MTCO_{2e} in 2022.

¹² Available here: <https://www.oregon.gov/deq/ghgp/Pages/GHG-Emissions.aspx>.

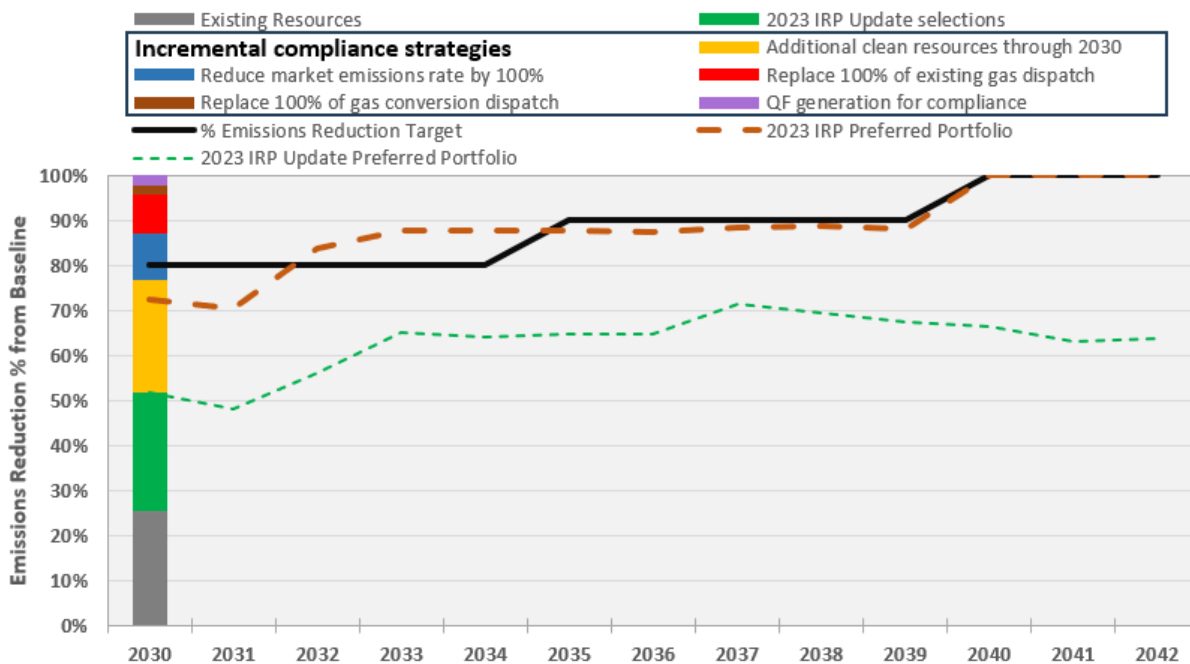
Second, PacifiCorp’s forecasted emissions reductions that could result from the 2023 IRP Update portfolio are compared to emissions reductions from the company’s 2023 IRP preferred portfolio in Figure 2, below. This figure serves two purposes.

First, it indicates that PacifiCorp’s 2023 IRP Update preferred portfolio under current resource allocations (reflected in the green dashed line), provides noticeably reduced emissions reductions

compared to those contemplated by the 2023 IRP (reflected in the brown dashed line). Oregon’s greenhouse gas emissions reductions requirements are also included to provide a reference for how the respective IRP preferred portfolios could have contributed to meeting HB 2021 emissions reduction targets (solid black line). The forecasted greenhouse gas emissions reductions from the 2023 IRP Update preferred portfolio are based on the least-cost system dispatch under a medium natural gas and CO₂ (MM) price-policy scenario, and does not attempt to dispatch resources and manage market transactions to comply with all state policies.

As described in the 2023 IRP Update, these increased emissions reflect the notable changes in PacifiCorp’s planning environment, namely, increased summer dispatch of gas and coal-fired resources in Wyoming and Utah that otherwise would not occur if the OTR was in place for each of those states. Because of the developments with the OTR, these resources are expected to see increased summer dispatch in the 2023 IRP Update, which has led to reduced and delayed needs for the procurement of additional non-emitting resources.

Figure 2—2023 IRP Update, 2023 IRP, and HB 2021 Emissions Reductions



Second, this Figure includes the greenhouse gas emissions that could result from the application of all of PacifiCorp’s various incremental HB 2021 compliance levers that are discussed in the next section. For reference, the gray bar in year 2030 represents the emissions reductions from

PacifiCorp's current HB 2021 compliant resources; the green bar represents forecasted emissions reductions that would result from resources identified from the 2023 IRP Update preferred portfolio; while the yellow, brown, red, blue, and purple bars represent the incremental emissions reductions that could result from the company's potential HB 2021 emissions reduction levers.

Importantly, these incremental greenhouse gas reductions only represent one possible combination of compliance levers, and each lever is a category of actions that could be considered. This is neither PacifiCorp's recommended nor preferred combination; rather it provides insights on how various levers could be toggled to establish different HB 2021 compliance pathways using resources in the 2023 IRP Update preferred portfolio.

The section below discusses these levers and provides greater transparency for the incremental actions that will be required to comply with the law. This will allow PacifiCorp, the Commission, and stakeholders to continue assessing the appropriate balance of benefits, risks, and costs to comply with Oregon's emissions reductions requirements. PacifiCorp looks forward to continuing these discussions in future CEP planning cycles.

Oregon Compliance Modeling

As discussed in Chapter 3 of the 2023 IRP Update, Oregon has several policies that impact resource selection and operations. These key policies include:

- **Renewable Portfolio Standard (RPS).** Renewable energy certificates (RECs) must be acquired to match a growing share of Oregon load on an annual basis, with certain limitations on technology types, and the procurement and banking of RECs.
- **No-Coal Requirement.** Under SB1547-B, coal-fired resources must be eliminated from Oregon's allocation of electricity by January 1, 2030.
- **Small-Scale Renewables Requirement.** At least ten percent of the nameplate capacity of generating resources used to serve Oregon customers (i.e. allocated to Oregon) must have a generating capacity of 20 megawatts or less, with a limited exception for larger biomass resources.¹³ To qualify, small-scale resources must also qualify and be certified as renewable for compliance with Oregon's RPS.
- **Greenhouse Gas Emissions Reductions.** HB 2021 directed utilities to reduce emissions below 2010-2012 baseline levels by 80% by 2030, 90% by 2035, and 100% by 2040.

In recent IRPs, up to and including the 2023 IRP, PacifiCorp did not model Oregon's resource allocations and compliance as part of a systemwide portfolio, and instead evaluated compliance with these state-specific policies in subsequent processes. Because compliance with Oregon's RPS could be achieved with the systemwide portfolio without any additional requirements, i.e. at no extra cost to customers beyond the system-wide, least-cost solution, additional modeling would not have changed the company's compliance outcome for this policy.

¹³ ORS 469A.210.

Yet this dynamic changed with HB 2021, as compliance with the small-scale resources requirement and greenhouse gas emissions reduction requirement will require changes in PacifiCorp's portfolio and/or forecasted operations and dispatch relative to the least-cost outcome.

The impact from these requirements, particularly Oregon's small-scale resources requirement and greenhouse gas emissions reductions, and how the company could pursue various levers to achieve these requirements, are discussed below.

Small-Scale Renewables

Of the two primary Oregon clean energy policies, the small-scale renewables requirement is less complex to incorporate in PacifiCorp's modeling processes compared to HB 2021. This is because the policy is tied to nameplate capacity, and is unaffected by system dispatch, at least in terms of determining PacifiCorp's overall compliance needs.

To incorporate this requirement, 10 megawatts of small-scale resources must be procured for every 100 megawatts of total resources. After accounting for the fact that small-scale resources must be accounted for in the Company's total nameplate capacity, this indicates that 90 megawatts of utility-scale resources can be added for each 10 megawatts of small-scale resources. Within PLEXOS, this relationship can be expressed with the following constraint:

$$0.1 * \text{Utility-scale capacity} - 0.9 * \text{Small-scale capacity} \leq 0$$

After incorporating this constraint, PacifiCorp's multi-state planning processes must determine how much capacity from a given resource can be allocated to comply with the requirement (for example a full or partial allocation the nameplate capacity of each resource). As an initial estimate, the company's modeling assumed that existing and new non-emitting resources had a system generation (SG) factor applied to their nameplate capacity. As a result, PLEXOS modeling assumes Oregon is assigned around 30% of each resource.

There are general exceptions to this 30% SG factor allocation. For example, Oregon will exit coal-fired resources by 2030, so Oregon's allocation factor for these resources is zero after 2030. Similarly, in 2040 the modeling assumes Oregon has exited existing natural gas-fired resources (this includes coal-fueled resources being converted to natural gas) for greenhouse gas compliance, and is not allocated any new natural gas resources. In 2030, Oregon will be allocated 100% of its own QFs, and zero percent for QFs from other states. Finally, while small-scale resources could potentially be cost-effective for other states, initial modeling did not indicate that this was likely, as the least-cost system portfolio and the Washington compliance portfolio did not include any small-scale resources. Given that outcome, 100% of all small-scale resources are assumed to be allocated to Oregon.

Taken together, the small-scale compliance resources allocated to Oregon from the 2023 IRP Update preferred portfolio would allow for allocation of over 4,600 megawatts of utility-scale resources to Oregon in 2030, rising to over 7,000 megawatts by the end of the study horizon (based

on 574 megawatts of small-scale resources in 2030, and 882 in 2042). These results are shown in [Table 1](#) below.

Table 1— Small-Scale Resource Compliance Modeling

Nameplate (MW)	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Small-scale QF	171	171	169	169	169	169	168	147	144	136	136	136	136
Small-scale Existing	34	35	28	28	28	28	28	28	25	25	25	25	24
Small-scale Proxy	369	374	441	613	613	613	613	722	722	722	722	722	722
Small-scale Total	574	580	638	810	810	810	809	896	891	882	883	883	882
Potential Utility-scale	5,168	5,219	5,742	7,288	7,289	7,289	7,283	8,064	8,020	7,942	7,944	7,944	7,934
Total	5,742	5,799	6,380	8,097	8,099	8,099	8,092	8,960	8,911	8,824	8,827	8,827	8,816
Small-Scale %	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%

Note the significant increases in small-scale resources and potential utility-scale resources in 2033 and 2037. This reflects changes in utility-scale resources that are selected as part of the Oregon policy portfolio (and described in the 2023 IRP Update). 2033 is the first year that the Del Norte-Central Oregon 500 kilovolt transmission option was available for selection, and the Oregon policy portfolio included significant onshore wind additions using the interconnection capacity that the Del Norte-Central upgrade provides. This transmission upgrade would also provide additional transfer capability between PacifiCorp’s Southern Oregon and Central Oregon load areas, reducing transmission congestion and increasing the ability to deliver the associated generation to load. Modeling for the 2023 IRP Update also assumed that 2037 is the final year of tax credit eligibility under the Inflation Reduction Act; thus resources acquired in that year are more economic than in later years. These credits apply to both small-scale and utility-scale resources, but to take advantage of the substantial cost savings, utility-scale resources have to be paired with a quantity of small-scale resources in a 9:1 ratio as described above.

To provide an example of how these resource and cost constraints are related, the 2023 IRP Update preferred portfolio includes 108 megawatts of small-scale Utah solar PV in 2037. Using the 9:1 ratio, this can facilitate an additional 972 megawatts of utility-scale resources beginning in that year (or subsequent years). The simplest mechanism to comply with Oregon’s small-scale requirement is to identify the best location for resources and then add utility-scale and small-scale in the appropriate proportions. The resulting effective cost for that resource would represent a composite of utility-scale and small-scale resources. These sample costs compared to resource values (in terms of \$/kW), as shown in [Table 2](#) below.

Table 2— Small-Scale Resource Cost Premium for Same Resource

2030 Build Cost (\$/kW) Resource	Scale		1:1 Ratio	9:1	9:1 Ratio
	Utility	Small	Premium	Composite	Premium
ID Solar	1,398	1,729	24%	1,431	2.4%
OR Solar	1,497	1,851	24%	1,533	2.4%
WA Solar	1,469	1,816	24%	1,504	2.4%
UT Solar	1,384	1,712	24%	1,416	2.4%
WY Solar	1,440	1,781	24%	1,474	2.4%
ID Wind	1,748	2,363	35%	1,810	3.5%
OR Wind	1,716	2,351	37%	1,779	3.7%
WA Wind	1,818	2,486	37%	1,884	3.7%
UT Wind	1,780	2,390	34%	1,841	3.4%
WY Wind	1,717	2,329	36%	1,778	3.6%

Note that the 2023 IRP Update preferred portfolio includes a variety of utility-scale resource locations and technology types, whereas it includes only two types of small-scale resources: Utah solar and Wyoming wind. This means that the premiums identified above are not specifically applicable, though they provide illustrative examples.

The small-scale selections in the 2023 IRP Update preferred portfolio reflect several factors. First, utility-scale resources are constrained by the cost and capacity of transmission upgrades, which vary by time and volume and are not included in Table 2. Second, small-scale resources are not assumed to require transmission upgrades, so they can be selected in areas where transmission is unavailable or has a high cost. Both of these assumptions provide flexibility that would generally reduce the cost of compliance with the small-scale requirement, and the actual transmission requirements associated with small-scale resources may be larger, particularly at the volumes identified in the 2023 IRP Update preferred portfolio. Third, to the extent the model seeks to add peaking resources and is forced to add small-scale wind or solar to compensate for the incremental utility-scale capacity, the incremental cost would be higher than what is shown. Finally, it is possible that renewable peaking resources, small-scale hydro, or other technologies could be configured as small-scale with a lower premium. In addition, while compliance with the small-scale requirement is independent of dispatch or generation from small-scale resources, the value of the energy and capacity provided by small-scale options will vary by technology type and location, and could defray much of the project costs.

Next, because the small-scale capacity requirement is based on capacity, and not generation amounts, the benefits of small-scale capacity are disconnected from energy output or the small-scale resources expected capacity factor. This has material price implications. For example, on a levelized annual basis, the 2030 small-scale Utah solar resource included in the 2023 IRP Update preferred portfolio to meet Oregon’s small-scale requirement costs an extra \$29,000 per megawatt of installed capacity per year relative to a comparable utility-scale resource. This equates to about \$10.30 per megawatt-hour based on the capacity factor of the Utah small-scale solar resource. In contrast, spreading that \$29,000 across one megawatt of a baseload resource with a 100% capacity

factor would result in an incremental cost of about \$3.30 per megawatt-hour, while spreading that \$29,000 across one megawatt of a peaking resource with a 10% capacity factor would result in an incremental cost of \$33 per megawatt-hour. In each case, the cost is \$29,000 and the benefit is an additional megawatt of capacity from small-scale resources for compliance, enabling nine megawatts of utility-scale capacity.

Incremental Greenhouse Gas Emissions Reduction Levers

This section discusses several modeling and regulatory levers that PacifiCorp could pursue to achieve Oregon's greenhouse gas emissions requirements. The incremental emissions reductions from each of these strategies are reflected in Figure 2 above, and the strategies are detailed below.

First, some background on HB 2021. Oregon's greenhouse gas emissions calculation is adapted from longstanding emissions reporting standards to ODEQ, and is intended to ensure that all of the resources used to serve forecasted Oregon customer load are identified and attributed appropriate emissions. This requirement is expressed as an absolute volume reduction, relative to a 2010 to 2012 baseline. As shown earlier in Figure 2, the 2023 IRP Update preferred portfolio achieves a roughly 60% reduction in emissions by 2030, based on the approved emissions reporting methodology. This combination of resources in the 2023 IRP Update is based on least-cost system dispatch under the MM price-policy scenario, so it does not include any attempt to re-dispatch resources and manage market transactions to achieve compliance. Additionally, the Company performed analyses that included least-cost system dispatch according to Oregon's policies as part of portfolio development, and continues to refine the modeling of emissions and resource allocations among its different states so that comprehensive results can be presented in the future (including Oregon's policy requirements).

Next, while HB 2021 specifies emissions reductions relative to a baseline emission volume measured in metric tons (MT), this differs from the emissions that the company has historically modeled and reported in the IRP. The IRP uses the emission rates of fuels, measured in pounds per MMBTU (million British Thermal Units), which range from 118.9 lb/MMBTU for natural gas up to around 209.8 lb/MMBTU for coal. These values reflect the carbon content of the fuel and correspond to the modeled fuel usage and heat rate. For example, thermal generators have the lowest heat rate (i.e. are most efficient) when they operate near their maximum output. To the extent that thermal generators are moving up and down in response to the availability of variable energy resources and daily variation in load, they will spend more time at less efficient operating levels, and their average heat rate and fuel consumption will be higher. Because the modeled emissions are based on fuel, these impacts are captured in the results. This emissions modeling does not include upstream emissions or the impacts of other greenhouse gases, though these could likely be separately identified and included.

The Oregon compliance calculation differs from this value in several ways. First, it is based on CO₂ equivalent (CO₂e), which translates the impacts of other greenhouse gases into the amount of CO₂ that would have the same impact. Second, the CO₂e emissions rates for each resource are established by ODEQ in metric tons of CO₂e per megawatt-hour. Third, the Oregon methodology

applies an emissions rate for unspecified market purchases, i.e. with no identified source, which is not part of the standard IRP modeling of emissions from fuels. For the 2023 IRP Update, PacifiCorp modeled the ODEQ emissions rate for Oregon's share of emitting resources, in addition to the standard IRP modeling. The endogenous Oregon policy portfolio developed in the 2023 IRP Update uses the ODEQ emissions rates in concert with annual emissions volumetric limits associated with the greenhouse gas compliance requirement. Elements of this compliance calculation are dependent on the average emissions rate, rather than volumes, so the 2023 IRP Update modeling does not yield a complete view of compliance requirements. While PacifiCorp has not been able to endogenously model Oregon's allocated emissions rate, it is continuing to refine these modeling techniques and expects to discuss modeling developments during the 2025 IRP public input process.

In addition to the difference between CO₂ per MMBTU and CO_{2e} per megawatt-hour, other elements of the compliance calculation make it more helpful to consider the requirement in terms of the reduction in the average emissions rate, rather than the reduction in the volume of the emissions themselves. This is because the average emissions rate of the resources used to serve Oregon load is multiplied by Oregon load (plus losses) to calculate the total emissions quantity,

rather than using the calculated emissions volume outputs from the IRP directly. The key inputs to the company’s compliance calculation methodology are shown in Table 3 below.

Table 3— Oregon Greenhouse Gas Compliance Calculation, 2030

Category	Emissions	Energy	Rate	Reduction
	(a) MT CO ₂ e (000s)	(b) GWh	(c) = (a) / (b) MT CO ₂ e / MWh	(d) = 1 - (c) / 0.444 %
Coal	0	0	0.000	
Coal to Gas Conversion	384	661	0.581	
Natural Gas	1,518	3,861	0.393	
Other	0	4,556	0.000	
Proxy	0	5,519	0.000	
QF	[12]	[1,159]	[0.010]	
Sub-total	1,901	14,596	0.130	
Market (System)	925	2,161	0.428	
Market (OR Energy Shortfall)	1,508	3,522	0.428	
Total	4,334	20,280	0.214	
Retail Sales		19,882	↓	
Retail Sales w/ 2% Losses	4,334 ←	20,280 ←	0.214	51.8%
2030 Target 80% Reduction	1,799		0.089	80.0%
2030 No Reduction	8,994		0.444	0.0%
Baseline (2010-2012 avg.)	8,994			

Table 3 illustrates a number of considerations within the compliance calculation. First, while a line item for QFs is shown, the values are included in brackets because their energy and emissions are not considered in the compliance calculation: the sub-total only includes the other categories.

Second, there are two market purchase line items. The Market (System) line item reflects Oregon’s SG allocated share of all market purchases in the least-cost system dispatch results. The Market (OR Energy Shortfall) line item reflects any remainder necessary to ensure that the total annual allocation of energy to Oregon is at least equal to Oregon’s retail sales plus 2% line losses. Both types of market purchases are assumed to be from “unspecified sources,” and are deemed to have an emissions rate of 0.428 MT CO₂e per megawatt-hour. The average emissions rate of 0.214 MT CO₂e per megawatt-hour is multiplied by the volume of retail sales with losses to yield the total emissions volume of 4,334 MT CO₂e. This happens to be the same as the total emissions associated with the energy supply, but this is only the case if Oregon’s allocation of energy is less than or equal to its load plus losses.

Based on this compliance calculation, the company has developed several compliance levers that could help further reduce PacifiCorp’s emissions to comply with HB 2021. These levers include

procuring new resources (Supply-Side and Energy Efficiency), decreased dispatch or re-allocation of existing emitting resources (including Coal-to-Gas and Natural Gas), or amendments to the emissions treatments of Qualifying Facilities or Market Purchases. Each of these six strategies are discussed below.

New Resource Additions

The 2023 IRP Update only allocates new resources to Oregon if they have zero emissions. These additional zero-emissions resources directly benefit the company's average emissions rate, though the magnitude of this benefit depends on Oregon's energy position. To the extent that Oregon would otherwise have an energy shortfall (and disregarding any other changes in system dispatch), increased zero-emission energy would reduce the volume of unspecified market purchases. This substitutes a zero-emitting resource for a 0.428 MT CO₂e per megawatt-hour unspecified market purchase, and has a relatively large benefit on the average emissions rate. Once Oregon is allocated resources sufficient to meet its retail sales plus losses, incremental zero-emission energy continues to bring down the average emissions rate, but no longer displaces unspecified purchases. Instead, incremental zero-emissions energy displaces a pro-rata quantity of the rest of the resource mix, including both emitting and non-emitting resources.

As discussed in the 2023 IRP Update, the preferred portfolio includes 25% of the near-term renewable resources and storage in 2027-2028, and Oregon's allocated share of these resources is around 30% in 2030. If Oregon were instead allocated 100% of these resources, it would increase Oregon's energy position by about 1.5 million megawatt-hours in 2030. This would eliminate much of Oregon's energy shortfall, and associated unspecified purchases, dropping the average emissions rate from 0.214 MT CO₂e per megawatt-hour to 0.182 MT CO₂e per megawatt-hour, and increasing the emissions reductions relative to the baseline from 51.8% to 58.9%. This lever would represent approximately 25% of the original shortfall relative to the 2030 80% greenhouse gas reduction requirement.

Through 2030, the 2023 IRP Update preferred portfolio also includes a nuclear resource as well as peaking resources that could be configured to use zero-emissions fuel and comply with HB 2021. If these resources were 100% allocated to Oregon, the incremental energy represents approximately 3.5 million megawatt-hours of energy in 2030. Adding this volume to that associated with the early renewables in the example above results in a total of 5.0 million megawatt-hours of additional energy, which drops the average emissions rate from 0.214 MT CO₂e per megawatt-hour to 0.130 MT CO₂e per megawatt-hours. This increases the emissions reduction relative to the baseline from 51.8% to 70.7%, and represents approximately 67% of the original shortfall relative to the 80% greenhouse gas reduction requirement. Note that, even though the additional energy volume is more than double that from the early renewables, the incremental benefit is reduced once the Oregon energy shortfall is eliminated. Approximately 3.5 million

megawatt-hours of additional zero-emission energy is required in 2030 to balance out the energy shortfall in the current analysis.

The examples above would also involve reallocation of resources identified as part of the 2023 IRP preferred portfolio. If, in addition to these allocations, the portfolio was modified to assign 100% of the early renewable resource options to Oregon instead of the current 25%, the incremental energy represents approximately 6.3 million megawatt-hours of energy in 2030. This drops the average emissions rate from 0.214 MT CO_{2e} per megawatt-hour to 0.096 MT CO_{2e} per megawatt-hour, and increases the emissions reduction relative to the baseline from 51.8% to 78.4%. This represents approximately 94% of the original shortfall relative to the 80% greenhouse gas reduction requirement. Note that because this lever would introduce additional resources, rather than just changing allocations, it would necessarily result in indirect impacts as the resource additions offset the need for emitting resources and market purchases. This would further improve PacifiCorp's Oregon compliance position. The resource additions contemplated in this example are substantial, and the total energy allocated to Oregon is nearly 50% higher than its adjusted retail sales plus losses. Reductions in emitting resource generation and market purchases would reduce this somewhat, but it is likely that the energy allocated to Oregon would remain well above its retail sales plus losses within the compliance calculation.

Energy Efficiency Additions

While energy efficiency is treated as a resource in the IRP portfolio development process, within the Oregon compliance calculation it reduces load. This provides two direct benefits, depending on Oregon's energy position. First, to the extent that Oregon would otherwise have an energy shortfall (and disregarding any other changes in system dispatch), increased energy efficiency reduces the volume of unspecified market purchases. Second, increased energy efficiency results in lower retail sales, such that the average emissions rate is applied to a lower volume of energy, resulting in lower total emissions. Both would improve the company's compliance position.

In addition to these direct benefits, additional energy efficiency would indirectly impact system dispatch, and would reduce dispatch of emitting resources or market purchases in some hours. The 2023 IRP Update preferred portfolio includes approximately 83% of the potential Oregon energy efficiency measures. If the remaining measures were also included, it would reduce retail sales by approximately 17 average megawatts. Modifying the original 2030 greenhouse gas compliance calculation to include this additional energy efficiency reduces the Oregon energy shortfall and would reduce the average emissions rate from 0.214 MT CO_{2e} per megawatt-hour to 0.212 MT CO_{2e} per megawatt-hour. This increases the emissions reduction relative to the baseline from 51.8% to 52.5%, and would represent approximately 3% of the original shortfall relative to the 80% greenhouse gas reduction requirement.

Dispatch/Allocation of Coal-to-Gas Conversion Resources

While coal resources are eliminated from Oregon's allocation of electricity in current modeling, the heat rates of coal resources that are converted to natural gas are higher than the heat rate of efficient combined cycle combustion turbines that make up much of PacifiCorp's natural gas fleet.

As a result, PacifiCorp's gas-converted coal resources have the highest emissions rate, and significantly impact the company's average emissions rate. Removing these resources from Oregon's allocation of electricity could occur happen in several ways. The most straightforward would be to reduce Oregon's allocation of these resources relative to the current SG share. However because Oregon is no longer allocated coal-fired resources in 2030, the allocations contemplated in the 2023 IRP Update may not provide sufficient capacity to meet Oregon's load and resource adequacy requirements. Capacity and resource adequacy requirements were not assessed with respect to state-level allocation in the 2023 IRP Update, but will be developed further in the 2025 IRP.

Another possibility is for resources allocated to Oregon to only be dispatched in emergency situations, which would ensure reliable operation without as much reliance on emitting resources. It may also be possible to develop market-based solutions to maximize the value of these resources while minimizing their emissions, which could likely require changes to market structures or other greenhouse gas authorities.

In practice, this lever could have significant impacts. Starting from a balanced portfolio where new resources are allocated to Oregon to cover all energy shortfalls, i.e. including a portion of the additional new resources contemplated above, eliminating coal-to-gas conversion volumes from Oregon's compliance position drops the average emissions rate from 0.139 MT CO₂e per megawatt-hour to 0.120 MT CO₂e per megawatt-hour, and increases the emissions reduction relative to the baseline from 68.6% in the balanced portfolio to 72.8% in the portfolio without coal to gas conversion resource dispatch. This would represent approximately 15% of the original shortfall relative to the 80% greenhouse gas reduction requirement. Note that this reduction assumes that these converted resources would be replaced with zero-emitting resources. If gas conversion volumes were instead replaced with unspecified market purchases, the emissions reductions would be lower.

Dispatch/Allocation of Existing Natural Gas Resources

While the emissions rates for many of PacifiCorp's existing natural gas resources is slightly lower than the emissions rate for unspecified market purchases, their energy volume makes that category the largest contributor to the company's average emissions rate. As with coal-to-gas conversions, excluding these resources in favor of other options in Oregon's allocation of electricity could happen through dispatch and/or allocation, or through market-based solutions.

Starting from a balanced portfolio in which coal-to-gas conversion volumes have already been eliminated, reducing dispatch of the remainder of the existing natural gas fleet by 42% and replacing it with zero-emitting resources would provide enough incremental emissions reductions to meet HB 2021's 2030 compliance target. This drops the average emissions rate from 0.120 MT CO₂e per megawatt-hour to 0.089 MT CO₂e per megawatt-hour, and increases the emissions reduction relative to the baseline from 72.8% in the portfolio without coal-to-gas conversion volumes to 80.0% in the portfolio that includes reduced existing natural gas resource dispatch. This eliminates the shortfall relative to the 80% greenhouse gas reduction requirement. Note that this reduction is predicated on replacing existing gas volumes with zero-emitting resources. If

existing gas volumes were instead replaced with unspecified market purchases, emissions would actually increase, because of the higher emissions rate for unspecified market purchases.

Treatment of Qualifying Facility Generation

While QF generation is not currently included in the greenhouse gas compliance calculation, HB 2021 directed the Commission to update QF avoided cost calculations to ensure they reflect the characteristics of generators that contribute to compliance.¹⁴ To the extent that QFs receive avoided cost pricing that reflects greenhouse gas compliance costs and/or benefits, it should be appropriate to include the associated emissions reductions benefits in the compliance calculation. If this were possible, modifying the 2030 greenhouse gas compliance calculation to include the energy and emissions associated with QFs would result in a reduction in the Oregon energy shortfall, dropping the average emissions rate from 0.214 MT CO₂e per megawatt-hour to 0.190 MT CO₂e per megawatt-hour. This would increase the emissions reduction relative to the baseline from 51.8% to 57.2%, and represents approximately 19% of the original shortfall relative to the 80% greenhouse gas reduction requirement.

Emissions Attributed to Market Purchases

As the share of non-emitting resources grow within the western interconnect, the emissions rate associated with unspecified market purchases will fall. To the extent that market purchases displace energy from emitting resources that enables a non-emitting resource to generate (instead of being curtailed), this market purchase would not result in increased emissions. While the availability of such opportunities are likely to vary considerably from hour to hour and across seasons, and tracking hourly or sub-hourly emissions content in market transactions would require additional processes (and there are ongoing discussions around this issue in development of certain organized markets), this lowered emissions rate would improve the company's emissions rate.

That said, it is currently possible to procure non-emitting resources from other market participants. These "specified" purchases would eliminate the need for unspecified market purchases and the associated higher emissions rate. These specified-source products currently include slices of hydro power projects and bundled renewable energy transactions, but with rising interest additional products are likely to be increasingly available in the future. Additionally, with the expansion of organized markets, there may be interest in accounting for energy purchases from these markets to more accurately reflect the region's mix at a factor that is lower than the current unspecified rate.

Assuming it were possible to modify the 2030 greenhouse gas calculation to include a 25% reduction in the emission rate of market transactions to 0.321 MT CO₂e per megawatt-hour drops the average emissions rate from 0.214 MT CO₂e per megawatt-hour to 0.184 MT CO₂e per megawatt-hour. This increases emissions reduction relative to the baseline from 51.8% to 58.6%,

¹⁴ HB 2021: Section 8 (4)(a).

and would represent approximately 24% of the original shortfall relative to the 80% greenhouse gas reduction requirement.

Combined Results

Consistent with least-cost, least-risk planning principles, PacifiCorp will continue to examine a range of strategies that are likely to produce the most cost-effective outcomes for its customers. Therefore it is likely that the Company will consider a combination of these various levers (in addition to others discovered in future planning cycles), to achieve the necessary greenhouse gas emissions reduction requirements relative to the 2023 IRP Update preferred portfolio. Table 4 below identifies the potential range of benefits that could result from these levers, in order of the resulting incremental emissions reductions compared to what would otherwise result from the 2023 IRP preferred portfolio. These emissions reductions could include:

- New resources through 2030: 100% allocation of all early renewable resource options, plus peaking and nuclear in the 2023 IRP preferred portfolio. This provides an additional 2,254 MT CO_{2e} of emissions reductions, or an approximate 52% increase relative to the original 2030 greenhouse gas calculation from the 2023 IPR Update preferred portfolio.
- Market emissions: average emissions rate reduced by 100%. 925 MT CO_{2e} of emissions reductions, around a 21% increase.
- Existing gas: replace 100% of dispatch with new resources. 759 MT CO_{2e} of emissions reductions, around an 18% increase.
- QF generation counts toward compliance: 204 MT CO_{2e} of emissions reductions, around a 5% increase.
- Gas conversion: replace 100% of dispatch with new resources. 192 MT CO_{2e} of emissions reductions, around a 4% increase.

Modifying the original 2030 greenhouse gas calculation to include these levers lowers PacifiCorp's average emissions rate from 0.214 MT CO_{2e} per megawatt-hour to 0 MT CO_{2e} per megawatt-hour. This would increase emissions reductions relative to the baseline from 51.8% to 100%, well above HB 2021's 80% requirement for 2030.

Table 4— Oregon Greenhouse Gas Emissions Reduction Levers, 2030

Levers	Category	Emissions	Energy	Rate	Reduction
		(a) MT CO ₂ e (000s)	(b) GWh	(c) = (a) / (b) MT CO ₂ e / MWh	(d) = 1 - (c) / 0.444 %
	Coal	0	0	0.000	
Replace 100% of gas conversion dispatch	Coal to Gas Conversion	0	0	0.000	
Replace 100% of existing gas dispatch	Natural Gas	0	0	0.000	
	Other	0	4,556	0.000	
Additional clean resources through 2030	Proxy	0	18,317	0.000	
QF generation for compliance	QF	[12]	1,159	0.000	
	Sub-total	0	24,033	0.000	
Reduce market emissions rate by 100%	Market (System)	0	2,161	0.000	
Offset by clean resources	Market (OR Energy Shortfall)	0	0	0.000	
	Total	0	26,194	0.000	
	Retail Sales		19,882	↓	
	Retail Sales w/ 2% Losses	0 ←	20,280 ←	0.000	100.0%
	2030 Target 80% Reduction	1,799		0.089	80.0%
	2030 No Reduction	8,994		0.444	0.0%
	Baseline (2010-2012 avg.)	8,994			

Similar to the company’s 2023 CEP, PacifiCorp anticipates pursuing multiple compliance strategies to meet these additional emissions reductions requirements. These include: (a) procurement of resources that would be fully allocated to Oregon to achieve the necessary emissions reduction; (b) continued jurisdictional cost allocation negotiations in the Multi-State Process on new and existing resources to support Oregon compliance; (c) new tariff provisions that would result in certain customers (for example, those with large loads), being served entirely with HB 2021 compliant resources; and (d) deployment of the additional levers discussed above.

PacifiCorp looks forward to discussing these compliance strategies with the Commission and stakeholders in the upcoming 2025 CEP and future planning processes.

Incorporation of Commission Recommendations

The Commission directed PacifiCorp to consider several improvements for the 2025 IRP and CEP planning processes.¹⁵ PacifiCorp has strived, in exceedingly expedited circumstances, to try to incorporate two of these improvements in its 2023 IRP Update, which also inform this Supplement. These improvements include:

- Recommendation 15 asked the Company: “In the 2025 IRP/CEP model, PacifiCorp must: (1) demonstrate that simultaneous compliance with all state-level policies is feasible with the least-cost, least-risk Preferred Portfolio and with the Preferred Portfolio variants tested in the IRP under multiple allocation paradigms; (2) include expected CBREs in the Preferred Portfolio and ensure that the Preferred Portfolio meets Oregon’s Small Scale Renewable Requirement; (3) adopt best practices in resource adequacy modeling, including consideration of load and resource performance under multiple weather years

¹⁵ Order No. 24-073, at Appendix B, 3-7.

and calculation of loss of load expectation and capacity contributions using probabilistic analysis.”¹⁶

PacifiCorp has taken the substantial step to meet this request by moving towards an integrated systemwide preferred portfolio. This planning methodology creates an endogenous and iterative study process that informs the selection of an optimized all-state preferred portfolio. The details on these actions are found in Chapter 6 of PacifiCorp’s 2023 IRP Update.¹⁷

This new systemwide planning approach results in three types of resources: shared resources between all six PacifiCorp states; shared only between certain states; and situs-assigned resources only for specific states. Details on the specific allocation of resources allocated between states can be found in Chapter 6 of PacifiCorp’s 2023 IRP Update.

This approach attempts to ensure that PacifiCorp can achieve compliance with state-specific policies (like Oregon’s small scale renewable requirement), and capture any system benefits from these specific policies, while at the same time avoiding unreasonable cost allocation or sharing of resources that are not preferred for other states, or creating a layered approach to state-specific compliance. The Company will continue to work with stakeholders to implement Recommendation 15 in future planning processes.

- Recommendation 20 asked PacifiCorp to “report on steps that the Company took to reduce the magnitude of reliability and granularity adjustments, how the Company engaged with stakeholders on adjustments, and describe the methodology and report the resulting reliability and granularity adjustments by resource. Include any supporting work papers demonstrating the granularity/reliability adjustments in the Data Disc.”¹⁸

PacifiCorp has taken steps to reduce the magnitude of its reliability and granularity adjustments, and details on these actions are found in Chapter 6 of the company’s 2023 IRP Update.¹⁹ While the company has not had adequate time to provide adjustments by resource, or provide supporting workpapers on these adjustments, PacifiCorp will continue working with stakeholders over the next planning cycle to inform additional developments for the 2025 IRP and CEP.

Conclusion

This Supplement demonstrates PacifiCorp’s continual progress towards complying with HB 2021’s greenhouse gas emissions reductions requirements, projected system and Oregon-specific resource needs, and expedited incorporation of Commission recommendations from Order No. 24-073.

¹⁶ Order No. 24-073, at Appendix B, 6.

¹⁷ 2023 IRP Update, Ch. 6, §§ “Portfolio Development Process Overview,” “Preferred Portfolio Development”.

¹⁸ Order No. 24-073, at Appendix B, 7.

¹⁹ 2023 IRP Update, Ch. 6, §§ “Granularity Adjustment Detail,” “Reliability Adjustment Detail”.

PacifiCorp requests the Commission conclude that the company has demonstrated adequate continual progress towards complying with HB 2021's greenhouse gas emissions reductions requirements, and that no additional actions or proceedings are necessary at this time.