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VIA ELECTRONIC FILING

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

Attn: Filing Center

Re: Docket UM 2011 – PacifiCorp's Comments

PacifiCorp d/b/a Pacific Power (PacifiCorp) respectfully provides these comments in response to the Public Utility Commission of Oregon (Commission) Staff Request for Public Comment in docket UM 2011.

I. Introduction

In Order 19-155, the Commission adopted Staff's recommendation that a general capacity investigation be opened, initiating docket UM 2011. The three-phased general capacity investigation is intended to "ensure a common framework of understanding by parties and stakeholders of appropriate assumptions to value capacity."[1] The goal of the third and final phase of the investigation, is to develop a broadly applicable methodology for valuing capacity.

On November 15, 2019, following two workshops that were held on June 14, 2019 and October 24, 2019, Staff issued a request for public comment (November 15 Public Comment Request) on two categories of questions: (1) "Section A" questions address refinement and narrowing of the broad categories of resource attributes that might be considered "capacity;" and (2) "Section B" questions address how to calculate and assign a value to capacity.[2] Comments to all questions were requested by December 16, 2019.

On December 2, 2019, Staff conducted a third workshop where Stakeholders expressed concern that the comment period did not allow sufficient time to answer the complex questions contained in the November 15 Public Comment Request. As a result, Staff bifurcated the questions into two sections with staggered due dates. Comments on Section A questions are due December 16, 2019 and comments to Section B questions are due on January 6, 2020.[3]

The following are PacifiCorp's comments to Section A questions contained in the November 15, 2019 Public Comment Request.

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[1] *In the Matter of Pub. Utility Comm'n of Oregon, General Capacity Investigation*, Docket UM 2011, Appendix A at 4 (Apr. 26, 2019).
[2] *See* Staff's Request for Public Comment at 3 (Nov. 15, 2019).
[3] *See* Staff's Extension of Public Comment Period (Dec. 3, 2019).

II. PacifiCorp's Comments to Section A Questions

Question 1. ***Which of these capacity definitions are applicable for which types/categories of capacity, if at all?***

(a) Nameplate Capacity
(b) Maximum dependable Capacity
(c) Baseload capacity
(d) Ability to meet energy needs
(e) Effective Load-Carrying Capability (ELCC)
(f) Peaking capacity

Comment: Besides item (e), which refers to a specific capacity contribution methodology, the definitions listed below are primarily colloquial, rather than a basis for determining the capacity provided by a resource.

a. **Nameplate capacity** is technically the maximum output of a resource's electricity generating equipment, as typically stamped on a plate on the side of the equipment. In practice, nameplate is often used interchangeably with "maximum output," however there are several nuances to this often-used characterization, which are described below.

   At thermal units, the maximum output may be limited by other system components, including the boiler, steam or combustion turbine, fuel supply, or emissions. Thermal units also typically have equipment loads while in operation, for pumps, compressors, coal mills, *etc*. The maximum potential output of a thermal unit is typically reported net of these equipment loads, to reflect what reaches the electric grid.

   At solar units, the nameplate output is measured in direct current (DC) at the panel, but there are losses as that power goes through collectors and inverters prior to reaching the grid as alternating current (AC) power. In addition, a solar resource may have an over-build on the DC side of the electrical equipment, such that under peak insolation conditions more power is generated by the panels than the inverters are capable of transforming into AC power. Lost generation in excess of inverter capacity is known as "clipping." Clipping creates a broader solar shape, with relatively more output in the more valuable shoulder hours in the morning and evening. Due to panel degradation, which typically reduces solar output by 0.5 percent per year, the amount of clipped generation will decline over time. Allowing generation to be clipped avoids adding inverter capacity which would be used infrequently and potentially only for a few years.

   Resources may also be limited in their ability to generate by their interconnection capacity. For example, PacifiCorp is currently repowering much of its wind fleet with longer blades and larger generators. The nameplate capacity of the repowered generators is typically 10-15 percent higher than the original equipment. At any given moment each individual wind turbine may generate more, but the aggregate output of the plant as a whole is limited to the original level due to the interconnection limit. In PacifiCorp's 2019 Integrated Resource Plan (IRP), the company also assessed combined renewable

and storage resources where the combined output was limited to the size of the renewable resources, rather than allowing for the renewable resource and the storage resource to both generate at maximum output at the same time. PacifiCorp has also seen proposals for other combinations of resources that share interconnection capacity, partly driven by the recent Federal Energy Regulatory Commission (FERC) Order 845 on generator interconnection procedures.[4]

b. **Maximum dependable capacity** (MDC) is the maximum net output a resource is capable of achieving, and typically is applicable to dispatchable resources. The MDC incorporates derates due to current conditions, including the impacts of equipment issues or ambient temperature on a resource's maximum output. For the determination of operating reserve holding and for reliability compliance, PacifiCorp maintains a real-time system to identify and monitor the MDC, generation, and ramping capability of its generation fleet.

c. **Baseload capacity** refers to resources which are typically available at all times, and whose dispatch price is relatively low, such that they provide economic generation in most hours. PacifiCorp's IRP does not assume that excess resource supply can be sold at market prices in all hours, due to transmission constraints and lack of counterparty interest. Consistent with this, in the IRP models, resources may be dispatched down due to transmission limits and caps on sales volumes, despite having variable costs below the price at a market point.

d. **Ability to meet energy needs** refers to the variation in both load and resources that occur throughout the year. In 2018, PacifiCorp's load varied from a peak of 10,000 megawatts (MW) to a minimum of less than 5,000 MW. These variations are present both seasonally and daily. For instance, in 2018, the average difference between the daily peak and daily minimum was over 2,000 MW. At the same time, the availability of resources in PacifiCorp's portfolio varies through time. While wind and solar resources have obvious variation with weather conditions, hydro conditions, ambient temperature, and generator outages also all contribute to PacifiCorp's resource supply at any given time. These parameters are generally probabilistic, as weather can be hotter or colder than average and thermal unit outages are random. However, these parameters can be correlated; for instance high temperatures in the summer can contribute to higher loads and lower ratings on gas plants. As a result, ensuring adequate resource supply to reliably meet load in every hour is dependent on both the characteristics of the resource under consideration and on the other resources in PacifiCorp's portfolio.

   Rather than solely considering energy needs, PacifiCorp's 2019 IRP assesses whether a portfolio *reliably* meets energy needs, by also accounting for operating reserve requirements as described in PacifiCorp's Flexible Reserve Study.[5] Operating reserve requirements must be met by keeping unloaded capacity available on flexible units that

[4] Order 845: https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14893812. Order 845A (clarifications): https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=15166001.
[5] LC 70 PacifiCorp 2019 IRP. Volume II. Appendix F: Flexible Reserve Study.

can be dispatched at short notice. While the specific amounts vary, some level is required in all hours.

e. **Effective Load-Carrying Capability** (ELCC) is a data-intensive calculation which can be used to determine the capacity contribution of a resource. The method uses a production dispatch model to determine the loss of load probability of a portfolio. Generally, a baseline portfolio will be developed such that the loss of load probability (LOLP) achieves a desired planning target. This typically requires a large number of stochastic model runs with hourly granularity to approximate the likelihood of a wide variety of system conditions. The resource being evaluated is added to the portfolio, which should reduce the LOLP. System load is then incremented until LOLP is again equal to the desired planning target. The incremental load represents the capacity contribution of the resource being evaluated. As a result, this method identifies the incremental contribution of resources, relative to the resources already present in the portfolio. To the extent the resources in the portfolio change, the incremental contribution will change. The process must be repeated for every resource alternative under consideration.

   While the capacity contribution of individual resources is important for modeling and valuation purposes, PacifiCorp's IRP is ultimately about comparing portfolios. Ideally all of those portfolios will achieve the desired LOLP planning target. This is not the same as the capacity value of a resource measured relative to incremental load. A capacity contribution methodology that is more closely aligned with the IRP portfolio evaluation process is the Equivalent Conventional Power (ECP) methodology, which after adding the resource being evaluated, decrements conventional resources (for instance an SCCT) until the LOLP target is met. The result is a new portfolio that has equivalent reliability and does not have a change in load.

   However, the drawback of both the ELCC and ECP methodologies is that they only calculate the contribution of incremental resources. Neither method produces an accurate estimate of the capacity contribution of the resources already present in the portfolio, even if they have the same shape as resources being assessed. Furthermore, even if all the resources in the portfolio were removed one at a time, it would not necessarily result in an accurate total contribution, due to the effects of diversity among different types of resources. For instance, solar can provide more reliable capacity in combination with evening and winter peaking wind resources, and batteries provide more reliable capacity as the energy from wind and solar resources is increased.

f. **Peaking capacity** refers to resources which are typically available at all times, but whose dispatch price is relatively high, such that they only provide economic generation in a limited set of hours.

When evaluating portfolios using production cost models, the most important metric is ensuring that the reliability of each portfolio is equivalent to the desired planning target. The capacity

contribution of individual resources within a portfolio may be helpful, but is not directly involved in the result.

However, when comparing individual resources, it is still valuable to be able to identify and compare the capacity contribution values. In PacifiCorp's 2019 IRP, capacity contribution values are calculated for specific resource profiles using the capacity factor methodology (CF Method). Using loss of load inputs based on a portfolio that is as close as possible to the 2019 IRP preferred portfolio ensures that incremental portfolio changes under consideration are reasonable, so long as the change in the portfolio is relatively small. Under the CF Method, capacity contribution is calculated by multiplying LOLP values on a twelve month by twenty-four hour basis (12x24) by a resource's expected 12x24 generation output. An adjustment is applied based on a resource's type and location to account for the day-to-day relationship between resource output and LOLP, calculated based on the difference between the CF Method capacity contribution for the IRP proxy resources' profiles in each location when LOLP is expressed as an 8760 hourly generation profile for every hour of a sample year, or as a 12x24 sample one day hourly profile for each of the 12 months in a sample year.

Generally, the average LOLP value across all iterations for each hour of the study period is used under the CF Method. For resources which are energy limited, such as energy storage or demand response programs, the LOLP values in each iteration must be examined independently, to ensure that the available storage or control hours are sufficient. If two successive hours both have a 10 percent LOLP in 500 studies, a resource with a one-hour energy limit would not be able to cover both hours if they occur in the same iteration, but could potentially cover all of the LOLP events if they occurred in different iterations.

Question 2. ***To what extent should flexibility and/or ability for the utility to dispatch a given resource (or resource category) be considered? In other words, should it be treated as a distinct capability or type/category of capacity, or as an enhancement to that resource's capability/capacity offering?***

Comment: Appendix F in PacifiCorp's 2019 IRP indicates that that the preferred portfolio has adequate flexible resource supply to meet requirements. As a result, incremental flexible resources are not needed for reliability at this time. Generally, so long as sufficient resources in the portfolio can provide either energy or flexible capacity, resource additions specific to either type provide equivalent capacity benefits. For example, the addition of a non-dispatchable resource can free up a flexible resource to provide additional operating reserves, while the addition of an energy-limited operating reserve resource, such as an interruptible load contract, can free up a flexible resource to provide additional energy. This is true so long as a portion of both the energy requirements and operating reserve requirements is met by resources providing both types, which is the case for PacifiCorp at present.

If a portfolio is not constrained by a need for flexible resources, the ability to dispatch does not impact capacity contribution, though it may have a significant impact on energy value. For example, consider a dispatchable 100 MW SCCT with a 3 percent outage rate and a non-

dispatchable 100 MW geothermal unit that also has a 3 percent outage rate. The expected availability of both units is identical, so the capacity contribution should be identical.

Question 3. Similarly, how should potential ancillary services offered by a resource or resource category be considered? Do they represent a distinct category of capacity? Or an enhancement to the available capacity offered by a given resource?

Comment: As indicated in PacifiCorp's response to Question (2) above, unless resource supply for a particular ancillary service is insufficient or has already been met by resources that cannot provide energy or other services, ancillary service capacity is interchangeable with capacity that does not provide ancillary services.

Question 4. Are there distinct types of capacity that could be separately compensated, assuming that adequate information, communications and control systems are in place? For example, should capacity that has the following capabilities be considered distinctly:

a. Available to meet system Resource Adequacy (RA) needs?
b. Available to meet system flexibility needs?
c. Available in a certain time frame?
d. Available in a certain location?

Comment:

a. It is unclear at this time exactly what parameters will be required for compliance under an RA program. The rules for that program could include contract term, transmission deliverability, or other parameters that differentiate between the capacity value attributed to different resources. To the extent the differentiation exists in the rules, it is appropriate to align compensation with the rules, though RA requirements may not fully represent all capacity needs or value.

b. If capacity requirements identify a specific need for flexible resources, it will be appropriate to account for the value they provide. It is also necessary to maintain the supply of flexible resources, as adjusting the compensation of resources without flexibility will not necessarily ensure system reliability.

c. PacifiCorp's LOLP data identifies the periods during a year in which its portfolio is most likely to require additional capacity. With regard to contract length, duration, and start dates, new resources typically have a lead time of between one and several years. Market transactions and negotiations for existing assets have a shorter lead time. To the extent a need for near-term capacity is identified, the options may be limited and a cost premium relative to longer lead-time options may be appropriate.

d. Reliable system operation includes serving loads in all locations. Resources which are located within transmission-constrained areas can reduce the need for incremental transmission capacity and ensure supply during transmission derates or outages. Because all resources have limitations and experience outages, a pool of resources and transmission options may be necessary to ensure reliable supply for a local area. As a result, the benefits of local area

reliability or avoided transmission system upgrades may result in higher value for capacity located in that area.

Question 5. ***Utilities and stakeholders have already submitted a good deal of relevant information in the form of presentations and workshop participation. Staff appreciate these contributions and will continue to draw upon them, and interested parties do not need to file the same presentation materials again. However, are there other comments pertinent to the questions asked in Phases I and II (i.e. "What is Capacity," and "How do we value Capacity today?") that you would like to share with all parties, to clarify, deepen, or add nuance to your position or understanding of these issues?***

Comment: PacifiCorp recommends that energy and capacity valuations for some representative resources be prepared using capacity contribution and valuation methodologies under consideration prior to making a final determination.

III. Conclusion

PacifiCorp appreciates the opportunity to provide these comments and looks forward to continuing to actively participate in this proceeding.

Sincerely,

Etta Lockey
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Pacific Power & Light Company