ITEM NO. 1

PUBLIC UTILITY COMMISSION OF OREGON
STAFF REPORT
PUBLIC MEETING DATE: March 10, 2015

REGULAR X **CONSENT** ____ **EFFECTIVE DATE** **Per Commission Order**

DATE: February 9, 2015

TO: Public Utility Commission

FROM: John Crider JC

THROUGH: Jason Eisdorfer and Aster Adams

SUBJECT: RENEWABLE GENERATOR CONTRIBUTION TO CAPACITY: Utilities and Stakeholders present their position on policies and calculation methodologies related to the determination of a renewable generator's contribution to capacity, in compliance with Order 14-415 Section IV(B) in Docket LC 56 (PGE 2013 IRP).

STAFF RECOMMENDATION:

Staff recommends an investigation be opened into the determination of a renewable generator's contribution to peak-load capacity.

DISCUSSION:

Background

At the conclusion of Portland General Electric's (PGE) 2013 Integrated Resource Plan (IRP) filing in Docket No. LC56 the Commission issued Order No. 14-415 acknowledging the IRP with conditions. In Section IV(B) the Commission expressed their resolution concerning the topic of a renewable generator's contribution to capacity. In the Order the Commission states:

> We recognize the increasing importance and use of the value assigned to a renewable generator's contribution to system capacity. We understand the participants' desire for a more targeted and robust review of the methods used by the utilities to calculate this value. We take under advisement the recommendation to open an investigation into this matter, and will consider it at an upcoming meeting where we can hear comment from all utilities and stakeholders.

This current agenda item provides a forum for comments as resolved by the Commission.

General Issues

A renewable generator's contribution to capacity (CTP) is a measure of the most likely amount of capacity (megawatts) the resource can deliver at the exact time of the utility's annual peak load. CTP can be calculated for a single generation source or for a class of resources (for example, the CTP of a particular wind turbine or the CTP of an entire wind portfolio).

Since the exact peak load hour of an upcoming year cannot be known for certain, any estimate of CTP by necessity is an estimate based on probabilities. Even a deterministic calculation of CTP by analyzing past actual data can only be considered an estimate because of the uncertainty that future years will exactly reflect historical data. This fact coupled with the inherent variability and intermittency of renewable generation means determination of CTP will necessarily be inexact.

However, several methodologies have been developed and utilized to stochastically calculate the value of CTP. Each of these approaches has merits and drawbacks and each has been designed to estimate a range of values for CTP that fall within an acceptable confidence level or other measure of error. To date no single method has clearly been accepted as either an adopted standard or a de facto standard.[1]

Current Utility Methods to Calculate CTP

PacifiCorp

PacifiCorp first presented a substantial description of its CTP methodology in its 2013 IRP (Appendix O).[2] In summary, PacifiCorp analyzed four years of actual data to determine the 100 annual hours with the highest peak loads. After identifying these hours, PacifiCorp analyzed generation data to identify which resources were generating at these hours, and how much energy they each contributed to system generation. From this analysis, PacifiCorp calculated the contribution to peak capacity by renewable resource and determined that wind resources provided CTP at 4.2 percent of their nameplate capacity value while solar resources contribute 13.6 percent.[3]

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[1] For example, North American Electric Reliability Corporation (NERC) study "Methods to Model and Calculate Capacity Contributions of Variable Generation for Resource Adequacy Planning", p.4.
[2] PacifiCorp 2013 Integrated Resource Plan filing Docket No. LC 57, Appendix O, filed April 30, 2013.
[3] CTP is represented as a percentage such that CTP% = (capacity at peak hour)/(nameplate capacity).

In its most recent CTP analysis in support of the 2015 IRP,[4] PacifiCorp used a more sophisticated methodology based on computing a stochastic error measure called Loss of Load Probability. Five hundred iterations of a Monte Carlo simulation were used to statistically determine the CTP. PacifiCorp's results from this analysis differ greatly from the previous calculation. The CTP values derived from this study are shown below as "CF Method Results":

Table O.2 – Peak Capacity Contribution Values for Wind and Solar

	East BAA			West BAA		
	Wind	Fixed Tilt Solar PV	Single Axis Tracking Solar PV	Wind	Fixed Tilt Solar PV	Single Axis Tracking Solar PV
CF Method Results	14.5%	34.1%	39.1%	25.4%	32.2%	36.7%
2013 IRP Results	4.2%	13.6%	n/a	4.2%	13.6%	n/a

PGE

Prior to 2013, PGE assumed a five percent CTP for wind and solar, based on studies by the Northwest Power and Conservation Council.[5] For its 2013 IRP, PGE performed its own analysis to determine CTP, similar to PacifiCorp's approach in 2013.

Hourly generation data from 2011 and 2012 for PGE's sole wind farm, Biglow Canyon, were paired with hourly loads for the same years. Capacity factors were calculated on an hourly basis, and then examined across periods of top load hours. The Biglow Canyon capacity factors (CFs) and concurrent loads for each of the top 100 load hours in 2011 and 2012 were then examined and a range of median capacity factors at peak load were obtained. Resulting CTP for wind ranged from about 3 percent to 8 percent; PGE chose 5 percent as its value for planning purposes.[6] This analysis was performed only for wind resource.

Idaho Power

Idaho Power assumes a five percent capacity contribution from wind resources for peak-hour capacity planning in both their 2011[7] and 2013[8] IRPs. No description of the underlying methodology is explicitly described.

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[4] PacifiCorp's 2015 IRP is expected to be filed in March 2015.
[5] For example, Portland General Electric 2009 Integrated Resource Plan, p. 15.
[6] Portland General Electric 2013 Integrated Resource Plan report, pp. 173-6.
[7] Idaho Power 2011 Integrated Resource Plan, p.5.
[8] Idaho Power 2013 Integrated Resource Plan, p.107. Both the Elkhorn Wind project and the PURPA totals assume an embedded 5 percent CTP for wind.

For the 2013 IRP (Docket No. LC 58) the Company analyzed solar data from the National Renewable Energy Laboratory (NREL) in order to determine a CTP for solar. Idaho Power examined the NREL data to determine the likely capacity factor for solar at the peak load hour and determined the CTP value to be 25 percent.[9]

2013 IRP Proceedings

Comments filed by parties in each of the utilities' 2013 IRP proceedings (PGE - Docket No. LC 56, PacifiCorp – Docket No. LC 57, and Idaho Power – Docket No. LC 58) included identification of several potential stakeholder impacts related to determination of the CTP value.[10] These impacts include:

- The Commission decision to include avoided cost of capacity in PURPA QF[11] payments means CTP has a financial impact on QF business plans and as such could impact the number of viable QFs on each utility system.
- Utility planning reserve capacity can be directly affected by the level of capacity assigned to each renewable on the system.
- Utility regulation reserve capacity and the related costs to comply with the Oregon Renewable Portfolio Standard are affected by the determination of CTP.
- In the future, CTP may play a part in determining the resource value of solar.
- Depending on the method used to compute CTP, ratepayers may be forced to pay for capacity that is not actually realized, or conversely, independent power producers under contract as a QF may not be fairly compensated for the amount of capacity they actually provide the system.

All of these have the potential to impact customer rates moving forward.

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[9] Ibid., Appendix C pp. 93-5.

[10] Similar comments raising the same issues were filed by parties to Docket Nos. LC 56, LC 57 and LC 58. See, for example, Oregon Docket No. LC 57 Opening Comments of the Oregon Department of Energy (ODOE); LC 58 Opening Comments ODOE, and LC 57 Opening Comments of Renewable Northwest Project (RNP).

[11] PURPA QF - the part of the Federal Power Act known as the Public Utilities Regulatory Policies Act (PURPA), (Public Law 95-617) requires utilities to purchase certain renewable energy from independent power producers referred to as Qualifying Facilities (QFs).

Potential Issues for Investigation

If the Commission chooses to open an investigation into this topic, Staff has identified several potential issues for examination. In the event that a formal proceeding is initiated, Staff recommends an initial Scoping Workshop to be held to discuss these and other potential specific issues for investigation.

Staff Identified Issues:

- At present each utility is left to make its own determination of CTP. This could be seen as unfair treatment of independent renewable power producers (IPPs) under a standard PURPA QF contract among the three utilities – some parties will gain and some lose simply based on the CTP calculation method chosen. The relative risks and benefits of a standardized method of calculation should be explored.
- The various approaches currently used by Oregon utilities to determine CTP have not been compared to each other and analyzed for accuracy and precision. The methodologies should also be compared to those methods utilized by utilities outside of Oregon to compare accuracy and precision.
- It is expected that CTP will vary over time as the number of renewables on the system changes. The question of how often and on what schedule CTP determinations should be filed should be investigated.

RECOMMENDATION:

Staff recommends an investigation be opened into the determination of a renewable generator's contribution to peak-load capacity.

PROPOSED COMMISSION MOTION:

An investigation be opened to explore issues related to a renewable generator's contribution to peak-load capacity, including, but not limited to, the issues identified and set forth by Staff in this memorandum.