BEFORE THE PUBLIC UTILITY COMMISSION OF OREGON

UM 2011

In the Matter of **PUBLIC UTILITY COMMISSION OF OREGON,** **General Capacity Investigation.**	**COMMENTS OF** **NW ENERGY COALITION**

The NW Energy Coalition (NWEC) appreciates the opportunity to provide comments on the second set of questions proposed by Staff in Phase III of this investigation, concerning capacity valuation.

The issues raised by the second round of staff questions are complex and growing in importance given the challenges ahead for resource adequacy on both a long term planning basis and in operational time. Below, NWEC presents its current views as an initial contribution to a robust discussion that will identify and sort through the building blocks for an expanded and effective approach to capacity valuation.

It is important to recognize at the outset that coal retirement and decarbonization are just part of a grid transformation that poses challenges but also major opportunities to take advantage of a broader range of resources to provide the capabilities needed to meet capacity needs and support resource adequacy.[1] The rapid advance of hybrid resources such as solar and/or wind with battery storage is in addition to existing but untapped potential for all forms of flexible demand including traditional peak load reduction measures and new capabilities for system balancing and flexibility.[2]

The trend toward smaller scale and more diverse clean energy resources poses operational challenges, but there are significant advantages from diversity in geographic distribution and

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[1] E. Ela et al., "Designing Electricity Markets with Massive Amounts of Zero-Cost Variable Renewable Resources," IEEE Power and Energy (2019): http://dx.doi.org/10.1109/MPE.2019.2933281 *Also available at:* https://www.esig.energy/wp-content/uploads/2020/01/Future_Markets_2019_PE_Preprint.pdf Also, NWEC is highlighting these emerging capabilities in our Harmonious Grid series: https://nwenergy.org/featured/the-harmonious-grid-a-new-direction-for-the-nw-electric-system/

[2] R. Quint et al., "Ensuring Bulk Power System Reliability with Increasing Penetration of Distributed Energy Resources," IEEE Power and Energy (2019), dx.doi.org/10.1109/MPE.2019.2933071. *Also available at:* https://www.esig.energy/wp-content/uploads/2020/01/DownloadCompleted-Quint.pdf *Also see* Gridlab and GridWorks, "The Role of Distributed Energy Resources in Today's Grid Transition" (2018): https://gridworks.org/wp-content/uploads/2018/09/GridLab_RoleOfDER_online-1.pdf

resource type to create a more robust portfolio addressing all forms of capacity need. Capacity value is not merely related to the defined output of a given resource, it is also context-dependent.[3] And in a changing climate, we are ever more aware of the need to address long duration system stress events that are at or outside the historical range.

As in our first set of comments, we start by highlighting the importance of moving beyond the traditional focus of the capacity issue primarily on the annual system coincident peak hour (while continuing to recognize the importance of that system condition), and shifting to measures of system requirements throughout the operating year instead of the use of a reference power plant to meet peak annual hour need as the effective standard for capacity valuation.

While the traditional focus on winter and summer peak demand remains important, the real issue is the range of the supply-demand balance over all hours of the year. As we learned in October 2018 following the explosion and outage of the Westcoast Energy gas pipeline in British Columbia, even during "shoulder months" of low demand, forced outage constraints on fuel supply have uncovered capacity needs that must be addressed going forward.

NWEC's response to the second part of the Staff questions follows below.

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How Should Capacity Be Valued?

Capacity Value as a Function of Resource Type

6. Does capacity value compensation require a capacity resource to be available to meet all reliability needs in all time frames?

No. It is particularly important to consider system needs and resource capabilities across the entire annual cycle. In addition to annual system coincident peak demand, sufficient capacity is also needed for long duration peaks (very infrequent occurrences, where high demand persists over multiple days), seasonal or monthly peak, flexibility/ramping in the diurnal cycle, and adjustments needed to meet local capacity requirements where transmission is constrained.

No single resource can meet all needs in all time frames, and each resource type has advantages and disadvantages, so the task at hand is to conduct full assessment of all resources that have capabilities to help meet various types of capacity need, and to assemble the best portfolio to

[3] See NREL's multi-part series, the Western Wind and Solar Integration Study, demonstrating the improved capacity value of careful geographic distribution of grid-connected renewable resources to reduce output correlation and improve the match to overall system needs: https://www.nrel.gov/grid/wwsis.html

meet those needs on a "least regrets" basis.[4] The experience of other regions is instructive concerning the effects of regulations that impede the ability of all resources, especially renewables, storage and demand-side, to provide valuable capacity, for example by requiring availability year-round or for long duration. In the ongoing series of reforms in the PJM forward capacity market, for example, demand response participation has tended to fall in recent years because market rules are not well aligned with the ability of demand side resources to meet system needs on a seasonal basis.[5]

a. Can a dedicated physical asset qualify to meet all reliability needs, or does it need to be supplemented with other resources?

NWEC does not view this as an "either one or the other" choice. Many types of dedicated physical assets can provide most system capabilities on their own. But as the recent strong trend toward hybrid projects combining renewable generation and battery storage indicates, augmentation may be a desirable strategy to extend both the types and the robustness of capabilities to meet grid capacity needs.[6] Furthermore, combining a variety of resources (sometimes called a "virtual power plant") as a specific offering for a capacity product may be desirable. Whether considering a standalone physical resource, a hybrid or a combination, the question to be asked is what system value it can provide, at what cost, and with what performance expectations. Ultimately, all such resources will form an overall portfolio to meet specific capacity needs.

b. Can a portfolio of resources that meet the availability requirement qualify for the same or better compensation than a dedicated physical asset?

Yes. See response (a) above.

c. Can a financial contract qualify for the same or better compensation than a physical asset?

The question is difficult to answer without context. There may be important distinctions to make for areas with bilateral vs. organized markets, consideration of mandatory reliability standard

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[4] "Therefore, we view the requirement for additional procurement now as a 'least regrets' strategy, since electricity shortages would most certainly lead to regrets. This is consistent with the Commission's responsibility to ensure that customers have safe and reliable electric service. Procurement of the exact 'right' amount of system power is never possible, and requires a balancing act of reasonableness." California Public Utility Commission, Decision Requiring Electric System Reliability Procurement for 2021-2023, R.16-02-007, November 7, 2019,

[5] NRDC, "Got Clean Energy? Not So Much from PJM's Latest Auction" (2017): https://www.nrdc.org/experts/jennifer-chen/got-clean-energy-not-much-pjms-latest-auction.

[6] Grid Strategies and CESA, Enabling Versatility: "Allowing Hybrid Resources to Deliver Their Full Value to Customers" (2019): https://gridprogress.files.wordpress.com/2019/09/enabling-versatility-allowing-hybrid-resources-to-deliver-their-full-value-to-customers.pdf

requirements, etc. For the moment, NWEC observes that not only availability but also "showing up" is a key attribute, including the effectiveness of recourse provisions such as penalties for nonperformance.

7. Regarding the capabilities listed in question 4 above, what should be the qualification criteria for determining if a resource can meet these needs, assuming the information, communications and control systems are in place to support development of qualification criteria?

Question 4 addresses availability to meet system resource adequacy, system flexibility, time frame and location needs. Noting the complexity and context dependency of creating qualification criteria, NWEC anticipates that further discussion in this docket will address these issues directly and does not have specific recommendations at this time.

8. Should supply-side and demand-side resources that demonstrate the capability to satisfy the qualification criteria for that type of capacity be valued in the same way?

The same overall effective criteria should be applicable to all resources potentially providing capacity value to the system. That said, it will be important to focus close attention on the differing attributes and constraints of each such resource. Again, NWEC suggests that the correct perspective is not comparison to a reference resource but to defined system need: seasonal and diurnal effective availability, duration, dispatchability, flexibility, location, and emissions/externalities.

Capacity Value as a Function of Temporal, Durational, Locational and Size Attributes of Resources

9. How should the value of each type of capacity be calculated and how should its temporal availability (e.g. short vs. long-term capacity) affect the valuation? In response to stakeholder requests for clarification, this question refers to the time period and duration for which a resource is committed by contract, ownership by a utility, or other arrangement.

NWEC notes the importance of carefully distinguishing the contexts in which long run incremental cost and short run marginal cost should drive the assessment. That said, there is no "one size fits all" -- all resources have relative strengths and constraints.

There are overlapping time periods for capacity assessment: for example, within-hour, hourly and day-ahead out to a year or more for operational planning; and longer periods up to 20 years or more for resource adequacy assessments in integrated resource planning and other processes. Resources providing capacity for shorter durations will require renewal or replacement more frequently, with associated transaction costs. Conversely, longer duration opens up risk for capital misallocation, overbuild and other forms of opportunity cost.

10. How should temporal and durational attributes of capacity be calculated? In response to stakeholder requests for clarification, this question refers 'temporal availability' in a different sense: when and how a resource is capable of serving load, regardless of its ownership structure or contractual arrangements.

a. How could temporal and durational availability affect the valuation?

Availability is a function of physical capability, operational control, forced outage/unavailability factors, customer participation (for demand side measures), and possibly locational aspects on a time-aligned basis with system stress conditions (i.e., some transmission constraints are seasonal). In general, while the value of resources providing capacity is greatest when market prices are highest, local constraints and specific resource characteristics (such as slow or fast start, ramp rates, emissions, outage rates, etc.) also play a role in capacity valuation.

i. How could availability of a system peak capacity product at critical times affect its valuation?

In addition to the comment above, NWEC notes that valuation at critical times is not only dependent on availability but also the range of capability – a resource with a high minimum run rate (Pmin), limitations on ramp speed or less fidelity in following a dispatch signal may offer lower value than alternatives, even if the aggregate amount of capacity within a given interval is similar.

ii. How could availability and sustained duration of ramping capability affect valuation of a capacity product?

As mentioned above, greater flexibility and duration generally corresponds with higher value, but availability and other factors such as start costs, emissions, etc. may also have an effect.

iii. How could seasonal availability affect valuation for a capacity product?

Finding the right time intervals for capacity products is a key question. NWEC firmly believes that capacity products should be structured on a seasonal or monthly basis. First, broadly speaking, demand conditions on the system vary on those intervals. Second, resource capabilities also vary, especially for renewable generation but also for thermal resources, given seasonal factors in fuel availability and ambient conditions (e.g., gas power plant or solar performance at different temperatures).

iv. How could ability to provide ancillary services at times of system stress affect valuation?

Many resources have multiple capabilities, including both traditional bulk capacity and ancillary services. Indeed, ancillary services themselves have an aggregate capacity need, since they help the system ride through disturbances. For example, a system that meets anticipated demand and reserve requirements going into the operating hour but does not have sufficient fast frequency response, voltage support or short circuit strength is not a secure system and "lacks capacity" in that sense.

In general, bulk capacity and ancillary services should be compensated separately but it is important not to double-count. Although traditionally much ancillary service value has been effectively covered by resources providing bulk capacity, it will be appropriate to evolve separate pricing so that all resources can provide and be compensated for the ancillary services they can be called on to provide.

11. If locational capacity is something that should be compensated, which factors should be used to inform the locational value of capacity?

a. Avoided transmission costs (or needed upgrades),b. Avoided distribution costs (or needed upgrades),
c. Impact of new capacity in a "load pocket," if applicable, or
d. Other factors

NWEC agrees that the locational value of capacity is relevant and important, and notes the extensive review and debate this issue has already received both at this Commission (for example in Docket No. 1716 on the resource value of solar) and elsewhere. In addition to the deferral or avoidance of transmission and distribution costs and upgrades, and the value of reducing congestion as a result of local constraints (load pockets), we note that such value may be greater during system stress conditions than on annual or seasonal averages.[7]

12. How does the scale of a given resource affect its value?

NWEC observes that increasing scale may not always increase value in a linear fashion. For example, large thermal and hydro resources have associated "shaft risk." That is, forced outage could result in a significant impact to the system. In the Northwest, Columbia Generating Station is effectively the single largest contingency for this reason. Additionally, marginal

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[7] J. Lazar and X. Baldwin, "Valuing the Contribution of Energy Efficiency to Avoided Marginal Line Losses and Reserve Requirements," Regulatory Access Project (2011): https://www.raponline.org/knowledge-center/valuing-the-contribution-of-energy-efficiency-to-avoided-marginal-line-losses-and-reserve-requirements/

additions of specific resources may provide declining capacity value, though there are strategies to mitigate for this effect.[8]

We return to the point that diversity in all forms – resource type, geographic spread, operational profile – matters more than scale, but the benefits of a "spread the risk" strategy for all forms of capacity value must be carefully balanced against costs, performance and complexity of management.

a. Is there a threshold size of a project, above or below which its value to the system as a whole changes categorically, or out of proportion to an increase or decrease the number of MWs of power it can produce?

NWEC does not see this as a threshhold issue but rather as a continuous function. Finding the right portfolio of scale, diversity, performance and availability risk is not a matter of any one factor but all of them.

b. Could a threshold size in a specific location sometimes affect valuation?

Because locational aspects, sometimes on a seasonal basis, may pertain, the answer can be yes. A large supply resource in a constrained area for transmission may not be able to provide its full capacity contribution.

On the other hand, large aggregate demand side resources are not subject to that possibility. In addition, analysts have focused on the "demand reduction induced price effect" (DRIPE), which occurs when energy efficiency and demand response lowers prices across the system as a whole.[9]

c. Could a threshold size affect whether MW-year or MWh compensation is appropriate.

NWEC is not sure about the context for this question, and does not have a comment at this time.

13. Currently, simple-cycle gas plant costs are generally used to value capacity. Is this method still appropriate for some types or categories of capacity?

a. If yes, for which types?

b. If no, for which types?

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[8] A. D. Mills and R. H. Wiser, "Strategies to Mitigate Declines in the Economic Value of Wind and Solar at High Penetration in California," Applied Energy 147 (June 2015): 269–278. doi:10.1016/j.apenergy.2015.03.014.
[9] G. Relf and B. Baatz, "Energy Efficiency in Capacity Auctions: A Historical Review of Value," American Council for an Energy Efficient Economy, Report U1714 (2017): https://aceee.org/research-report/u1714

i. Further, is a new or different benchmark or proxy more appropriate? If so, for which types/categories of capacity?

NWEC strongly believes that it is time to move away from reference resource concept, which is already obsolete and hides factors of importance. Even the most efficient new combustion turbines ("peakers") have operational characteristics (cold start, standby, turn up/down) that are not optimal for grid capacity needs. Furthermore, the security of fuel supply and the effect of regulations such as the "no-bump rule" [10] and other aspects of the gas/electric interface play an under-recognized role in the performance of gas power plants.

The traditional reliance on gas plants, whether "baseload" or "peaker," also obscures some related issues. For example, the performance of gas power plants can lead to misconceptions about "system inertia." While rotating-mass resources (thermal and hydro) do provide physical inertia, the notion that other resources must provide "synthetic inertia" misses the point that what the grid needs is not inertia but fast frequency response.

Going forward, it is important to consider the capability of resources connecting to the grid through power electronics (e.g., solar and battery inverters and wind converters) to respond faster and more precisely to a dispatch signal than the electromechanical response of conventional generators.[11] At the same time, failure modes are different, and the electric power industry faces an important challenge going forward to provide grid capability as the resource mix changes.[12]

In summary, NWEC suggests that no single resource is a perfect match for grid capacity needs. However, the rapid expansion of the range of resources that can contribute, as well as the overall shift in our regional resource mix, suggests that reliance on gas power plants -- and associated valuation constructs such as net cost of new energy (Net-CONE) -- is no longer appropriate and viable.

At the same time we recognize that there is no "perfect" capacity resource and, at this time, no generally accepted way to ascertain a system reference value for capacity. This will take time

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[10] FERC Order No. 809, (2015). In Order 809, FERC retained but modified the longstanding "no-bump rule," which preserves gas nominations by nonfirm shippers in the last daily nomination cycle, but rejected proposals to eliminate the rule or more substantially align the gas nomination and electric scheduling cycles. Because many natural gas power plants rely on nonfirm gas transportation, such issues potentially have a significant effect on electric capacity value during periods of high demand.

[11] C. Loutan et al., "Demonstration of Essential Reliability Services by a 300-MW Solar Photovoltaic Power Plant," National Renewable Energy Laboratory Technical Report NREL/TP-5D00-67799 (2017): https://www.nrel.gov/docs/fy17osti/67799.pdf

[12] D. Lew and N. Miller, "Reliability Implications of Our Future Grid," presentation to Committee on Regional Electric Power Cooperation (CREPC), October 2018: https://westernenergyboard.org/wp-content/uploads/2018/10/10-26-18-crepc-wirab-lew-miller-reliability-implications.pdf

and effort, but NWEC is hopeful this stage of the current docket will help clarify the issues and set an effective direction.

14. Should capacity compensation for Distributed Energy Resources (DER) be based solely upon contribution to meeting an identified system need, or should it be supplemented with other factors considered in DER valuation? How relevant are the following factors for capacity valuation, and which are missing?

a. Avoided environmental costs
b. Avoided fuel costs
c. Avoided plant O & M costs
d. Avoided generation capacity costs (capex)
e. Avoided cost of transmission upgrade
f. Avoided distribution capacity costs
g. New costs for new distribution system technologies
h. Costs associated with forecasting (variable renewables)"
i. Ability to dispatch (i.e. small turbines, gen sets, storage) vs. lack of ability to dispatch (i.e. variable renewables)
j. Avoided (or differently calculated) costs of reserve capacity

As explained above, NWEC believes that all resources potentially providing defined capacity products (annual system peak, long duration events, seasonal/monthly peak and ramping/flexibility) should be assessed with regard to general capacity criteria, including all of those those listed above.

We note that, contrary to the assertion in question 14(i), renewables are capable of dispatchability, and subject as all resources are to energy availability. As explained previously, because those resources deploy power electronics for grid interconnection, their ability to respond to a dispatch signal may in fact be faster and have higher fidelity. To the degree that dispatchability is desired, some portion of output may be held back, which raises cost and compensation issues, but the same is true for conventional resources held as reserves.[13]

15. How can proper calculation of RA capacity help to cost effectively address the region's RA issues?

Appropriate and comprehensive capacity valuation is one of the key building blocks to achieve a "least regrets" approach to resource adequacy. Oregon and the Northwest should move toward

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[13] Energy and Environmental Economics, "Investigating the Economic Value of Flexible Solar Power Plant Operation" (2019): https://www.ethree.com/wp-content/uploads/2018/10/Investigating-the-Economic-Value-of-Flexible-Solar-Power-Plant-Operation.pdf

standardized or good practice definitions for resource adequacy, capabilities and capacity value because resource adequacy and operational efficiency, while planned and implemented at the utility and balancing area authority scale, affect all in a regionally connected grid. A common basis for assessment will clarify where actual issues lie, promote coordination and help reduce the potential for "leaning" between systems.

16. Given your answers to all of the above questions, do you have recommendations about what types of capacity should be compensated, how to define those types of capacity, and do you have examples of calculations or methodology suggestions you would like to offer?

As we have stated, NWEC believes this is a good time to explore the full range of options for assembling portfolios of resources that meet grid capacity needs. The assessment should be based on the full range of capabilities, not merely nameplate capacity or other single value metrics, should include annual peak as a key focal point but shift the field of view to capacity needs across the operating year, provide a valuation metric related to overall system value rather than relying on a reference resource type, and include all supply, demand and storage resources on a comparable basis.

Recently, the Natural Resources Defense Council and allied organizations enunciated five principles for capacity.[14] Although specifically focused on RTO/ISO organized markets, they may provide guidance for this docket:

1. Not focus on or discriminate against any particular technology or resource that is capable of providing a given service.
2. Respect state and local public policies and resource choices without making customers over-procure resources.
3. Enable customers and suppliers to more easily transact as they choose through contracts.
4. Determine prices through market forces and pay resources only for the services they provide.
5. Reduce barriers to new resources coming online or retiring. Markets should be allowed to stabilize before new solutions are layered on.

NWEC proposes that some effort be made in this docket to propose and potentially adopt common principles in a similar fashion that are commensurate with the capacity needs of Oregon utilities, recognize the full range of supply, storage and demand resources that can offer relevant capabilities, and are responsive to the changes in our resource mix and regional market development.

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[14] J. Chen, "Diverse Coalition Sets Forth Vision for FERC Power Markets," NRDC (2018): https://www.nrdc.org/experts/jennifer-chen/diverse-coalition-sets-forth-vision-ferc-power-markets

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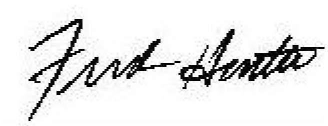

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