Spark Northwest
Creating clean energy communities

To: Oregon Public Utility Commission and Staff
From: Alexia Kelly, Policy Advisor, Spark Northwest

RE: OPUC General Capacity Investigation (Docket UM 2011)

Thank you for the opportunity to provide comments regarding the "General Capacity Investigation" under Docket UM 2011. The signatories support the PUC's interest in developing a methodology that fairly and comprehensively values the various capacity services that specific types of energy provide.

Spark Northwest is a regional non-profit organization dedicated to creating communities powered by locally controlled, clean energy. Through our education, policy and technical assistance programs, we help connect people with direct opportunities to participate in and benefit from clean energy.

This investigation set out to develop "a common framework of understanding by parties and stakeholders of appropriate assumptions to value capacity. Staff envisions this investigation resulting in the establishment of a methodology that looks to the characteristics of capacity a resource provides. This methodology could then be used across multiple dockets and technologies for valuing capacity brought to the electric system."[1] How capacity is defined and valued will play a central role in developing an energy system for Oregon that is able to respond to and benefit from the rapid changes occurring in the electricity sector globally and regionally.

An investigation into capacity valuation is particularly timely given the emergent consensus that the Pacific Northwest is, or will soon be, capacity resource *inadequate*. The Northwest Power Pool (NWPP) found in their November 2019 report: "There is general consensus among regional studies that the Northwest is, or will soon be, short on capacity resources…A common finding …is that the Northwest electricity system is either not resource adequate today or will become so within the next two years."[2]

The report went on to state: "The region's planning challenges will be made more acute by impending thermal plant retirements. Forecasted deficits of this size suggest increased exposure to extraordinary price volatility and outage risks that far exceed historical standards. To avoid this outcome, utilities will need to replace thousands of megawatts of retiring capacity over the next five to 10 years…Doing so will require proactive planning by utilities and careful oversight by regulators during a period of transition for the region's resource mix."[3]

Distributed clean energy and targeted energy efficiency programs should be core pillars of future capacity resource acquisition strategies and planning efforts and should be valued to reflect the full range of services that they provide. Further, incentive structures should be put in place that enable utilities, communities and individuals alike to rapidly deploy new and innovative products, such as battery energy storage, paired solar plus

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[1] https://edocs.puc.state.or.us/efdocs/HAA/um2011haa105618.pdf

[2] https://www.nwpp.org/private-media/documents/2019.09.30_E3_NWPP_RA_ExecSum.pdf

[3] *ibid*

storage, virtual power plants, demand side response and management programs, and poles and wires alternatives as core parts of their capacity acquisition and climate resilience strategies.

Ensuring that clean energy and efficiency resources are compensated for the full range of benefits that they provide will be central to addressing the looming capacity deficit in the region and to meeting environmental justice, climate change mitigation and resilience goals. As the costs of renewable energy and energy storage continue to fall and the technologies available to integrate distributed resources into grid operations and management become more widely available, the ways Oregon prices, manages and distributes power needs to fundamentally change. This includes energy efficiency, renewable energy and storage, demand side response, virtual power plant technologies, and other technological advancements that will enable the transformation of the electricity grid.

Distributed clean energy projects that are “grid interactive” must play a central role in the development of an electricity system that is environmentally just, addresses historical inequities in the energy system, is resource adequate, resilient to climate change impacts, meets decarbonization goals and other environmental objectives, and supports strong local economies. The local community and environmental impacts of capacity acquisition decisions must be fully taken into consideration.

These approaches could be particularly valuable in hard-to-reach rural areas that currently suffer from unreliable access to electricity on the edges of the distribution system and in parts of the grid projected to see increased demand for electricity above historical levels. Ensuring that incentive structures are in place to advance energy efficiency measures and to support generation resources located close to load will help address potential capacity challenges while building a stronger, more resilient electricity system.

Input from this docket should be carefully considered and integrated into the broader distribution system planning efforts currently underway (Docket UM 2005), discussions on the Resource Value of Solar (UM 1716), PURPA Reform efforts (UM 2001 and 2002), and the community solar docket (UM 1930). Furthermore, comprehensive valuation methodologies that result in more favorable pricing structures for various capacity resources can help support the achievement of other important state policy objectives, including, but not limited to: energy justice and equity, local community resilience during grid outages, water and energy conservation, natural disaster preparedness, greenhouse gas reduction, and rural and low-income community economic development, among others.

B. 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?

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

2. **Can a portfolio of resources that meet the availability requirement qualify for the same or better compensation than a dedicated physical asset?**
3. **Can a financial contract qualify for the same or better compensation than a physical asset?**

6.1. Capacity value compensation does not require a capacity resource to be available to meet all reliability needs in all time frames. An efficient and cost-effective grid utilizes its least cost generation assets to meet a given amount of demand at a given time. Even with large fossil-based generation sources reliability has historically been addressed through a variety of resource types (e.g. coal for baseload and natural gas for peaking). In almost all cases, a portfolio approach should be utilized to address capacity and reliability. This will become increasingly important as the region moves towards addressing decarbonization objectives and integrates larger amounts of intermittent renewable resources such as wind and solar.

6.2. Capacity value should be based on a generating asset's ability to provide power in a predictable and reliable manner to address a given energy need at a given time. A grid that has multiple generating resources is inherently more reliable and less prone to outages, as well as less vulnerable to disruptions and attacks. Further, a grid that utilizes a portfolio approach to meeting its generation needs is able to utilize the lowest-cost source of energy at a given time and to appropriately reflect the overall value to the grid that "negawatt" investments in energy efficiency, demand side management and "poles and wires" alternatives offer. Valuation methodologies that reflect both seasonal variations in demand and in generation capacity should be carefully considered and developed.

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?**
The elements listed in question 4 include: a) availability to meet system resource adequacy needs, b) availability to meet system flexibility needs, c) availability in a certain time frame, d) availability in a certain location.

Emergent capacity valuation procedures should ensure power availability from the lowest cost and cleanest sources available to meet the system's power needs at a given time that also address climate change adaptation and resilience needs. Given the Pacific Northwest's impending resource adequacy challenges, combined with regional decarbonization efforts and the need to develop a system able to operate under increasingly challenging and variable conditions due to climate change impacts, developing a more sophisticated and targeted resource acquisition and valuation strategy is of paramount importance. If properly valued and incentivized, distributed clean energy resources can be an integral element of the electricity grid of the future. The North American Electric Reliability Corporation notes in a 2017 report that: "newer DER technologies are capable of providing advanced support services that will be needed as the transition from conventional synchronous resources to nonsynchronous inverter-based resources continues."[4]

Each type of generating resource should be mapped against the elements included above to understand its "capacity characteristics", which can then be used to consider the most appropriate valuation methodology- either from an overall system perspective or from an individual capacity resource perspective. Interactions between and among various generating capacity resources should be considered. For example, solar and microhydro resources paired with battery energy storage can optimize for grid services and base-load capacity as well as provide ancillary services such as voltage and frequency regulation and ramping capacity. A more granular payment structure that reflects the value of power to the system in particular locations at a given time will enable the system to operate most effectively and efficiently over time. New technologies make the dynamic and interactive grid management services that multiple distributed resources can provide both possible and cost-effective. Developing capacity valuation methodologies that enable both the utility system and generators to benefit will be central.

Where generation capacity is located will have increasingly large system impacts as the transmission and distribution system continues to age, climate change impacts-particularly wildfire-become more acute, and load growth increases in rural areas through both agricultural activity and data center siting.

Examples of qualification criteria for a given generation type could include:

1. Available in a reliable and predictable manner
2. Provides environmental justice, climate change resilience and greenhouse gas mitigation benefit
3. Available in areas of the grid that are: vulnerable to outages (both natural and imposed, e.g. through Public Safety Power Shutoffs), on the grid edge, have existing load pockets, have transmission and distribution upgrade/investment deferral/elimination benefits, and have "grid interactive benefits" meaning that the generating source is equipped with inverters that enable it to provide grid management services such as frequency regulation, voltage regulation, and other bi-directional services that serve to increase the resilience and efficiency of the grid's operations.
4. Available at times when the system needs it e.g. both baseload and peaking times. A variety of Solar and storage, microhydro and other distributed energy resources can serve both of these needs.
5. Able to adjust its output during certain time periods and under particular conditions (e.g. winter and summer peak). Battery energy storage paired with solar and micro hydro could be a particularly valuable resource during peak periods and could potentially increase or decrease production during certain times of the day. Valuation methodologies that reflect both seasonal variations in demand and in generation capacity should be carefully considered and developed.

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[4] https://www.nerc.com/comm/Other/essntlrlbltysrvcstskfrcDL/Distributed_Energy_Resources_Report.pdf

Further, energy efficiency and other demand side response programs and interventions should be deployed to minimize peak period energy demand.

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?**

   Any resource type that meets the agreed capacity qualification criteria should be compensated based on the capacity services it provides. Demand-side interventions must be a core pillar of a capacity acquisition strategy.

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.***

   N/A

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.***
   1. **How could temporal and durational availability affect the valuation?**
      i. How could availability of a system peak capacity product at critical times affect its valuation?
      ii. How could availability and sustained duration of ramping capability affect valuation of a capacity product?
      iii. How could seasonal availability affect valuation for a capacity product?
      iv. How could ability to provide ancillary services at times of system stress affect valuation?

10.1. As noted in the answer to question 7, *when and how a resource is capable of serving load* will become a central question as Distributed Energy Resources (DERs) become more widespread, existing transmission and distribution system infrastructure ages, and climate change impacts impact different parts of the grid in different ways. Further, significant efficiencies could be realized by siting future energy generating facilities near areas projected to see increased load growth.

10.1.i. and iii. As the Northwest's energy system continues to evolve, availability of a system peak capacity product should be valued in accordance with the value it offers the grid. The NWPP notes that seasonal variation and addressing system peaks will be increasingly important: "Although the winter period shows improvement, serving winter peak demand remains a concern. And summertime peak demand continues to increase, focusing planners on peak capacity needs."[5] Solar and storage can play a valuable role in providing system peak relief; further, integrated demand side management and efficiency programs deployed in a variety of contexts could contribute substantially to shaving peak loads and reducing overall strain on the system. However, these services must be properly valued and compensated through targeted price signals-either through real-time market pricing or through long-term power purchase agreements- in order to drive behavior change and incentivize the development of additional generating capacity in key load growth areas. Availability during different seasons-particularly during winter and summer peak periods-should be compensated for the value it provides to grid stabilization and cost management during these times.

In addition, programs should be developed that enable residential "prosumers" (producers and consumers of electricity) to benefit from the full spectrum of services their systems can provide. Utility dive reported that recently in South Australia a 700+ MW coal fired power plant tripped offline and "[a]ccording to the Australian Energy Market Operator, the outage caused power system frequency to drop below normal levels but Tesla's VPP was able to inject power from hundreds of individual residential batteries to help return the system frequency back to stable levels."[6] According to the South Australian government, the VPP "detected the frequency drop and immediately injected power into the grid from hundreds of individual residential batteries installed on SA Housing Trust properties across the state."[7] This is one small example of how solar plus storage with as few as 1,000 homes participating through a Virtual Power Plant can provide valuable grid stability and ancillary services. Spark Northwest encourages the OPUC to look beyond Oregon's borders to identify how to effectively and efficiently value and accelerate uptake of distributed energy resources as a central pillar of Oregon's energy future.

10.1.ii. Solar plus storage, stand-alone battery energy storage and some microhydro (as long as it's operating at less than 100% production) can all effectively address ramping needs. An integrated portfolio of DERs can also help reduce the need for ramping capacity through the provision of 24-hour capacity, particularly during periods of time of lower production for solar resources (e.g. early morning, late afternoon/evening and during times of heavy rainfall or precipitation).

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[5] https://www.northwesternenergy.com/docs/default-source/documents/defaultsupply/plan19/volume2/pnucc-2019-forecast.pdf

[6] Utility Dive https://www.utilitydive.com/news/teslas-australian-virtual-power-plant-propped-up-grid-during-coal-outage/568812/

[7] Ibid

10.1.iv. Planned changes to the region's resource generating mix and unknowable changes that may arise from climate change impacts will likely result in greater price and grid operations variability in the coming years. Low-income communities and communities of color will be hardest hit by these impacts because they have the fewest resources to respond and lowest ability to absorb incremental costs associated with extended power outages or other electricity supply disruptions and/or associated rate increases. It has been clearly demonstrated that rooftop solar, when paired with battery energy storage, can provide important and valuable grid services and stabilization through frequency and voltage regulation (see example above), among other services. These systems also offer cost savings that contribute towards reducing the energy burden that low-income households in Oregon face.

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

All of these factors should be clearly and transparently analyzed on an individual basis and valued accordingly. As discussed above, distributed energy resources provide substantial value across all three of the areas indicated in question 11. Further, the resilience benefits of distributed generation resources should also be taken into account and valued. This will require the development of new methodologies for quantifying and assessing these values to the grid and to local communities, but is work that can and must be completed as quickly as possible. The National Association of Regulatory Utility Commissioners' (NARUC) recent analysis of "the Value of Resilience for Distributed Energy Resources: An Overview of Current Analytical Practices" provides a useful starting point for framing the methodology and quantification elements of assessing and valuing resilience services for the grid in the context of capacity, including the value of avoided power interruptions.[8]

12. How does the scale of a given resource affect its value?
  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?
  b. Could a threshold size in a specific location sometimes affect valuation?
  c. Could a threshold size affect whether MW-year or MWh compensation is appropriate.

Definitions of "value to the system" are challenging to develop. "The System" is comprised of many stakeholders and beneficiaries, including utilities, ratepayers, regulators, independent and merchant power generators and developers, as well as society as a whole. Each of these stakeholders in the system has a different cost-benefit calculus and ability to benefit from different types of resources

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[8] https://pubs.naruc.org/pub/531AD059-9CC0-BAF6-127B-99BCB5F02198

located in different parts of the grid at different thresholds. While a rooftop solar or community solar project might be seen as inconsequential to a utility operating thousands of Megawatts of generating capacity, that same facility is delivering significant benefit to the households it serves. Low-income households in particular suffer from larger energy burden than their higher income counterparts. According to Governor Brown's report on reducing energy burden in affordable housing: "The census data shows that on a national average, low-income households have an energy burden three times higher than non-low-income households. This results in less money for these low-income households to spend on other essential needs, such as food, transportation and healthcare." [9] When considering value to the system, multiple definitions and perspectives related to that value should be considered and a balanced methodology should be developed that reflects those different values.

Recent technological advances have fundamentally changed the value proposition that small-scale generating resources can provide to the grid. Virtual Power Plants, Demand Side Response programs and other technologies have forever changed the equation when considering investment into new generating resources. Even relatively small numbers of distributed generation projects with very low generating capacity can have huge impacts on grid operations, as illustrated by the recent case in Australia where less than 1,000 residential Tesla rooftop solar plus storage units that were aggregated into a Virtual Power Plant provided critical grid stabilization services when a 700+MW coal fired power plant tripped offline.[10] Distributed resources, when equipped with grid-interactive inverters, can also make substantial contributions to ensuring energy services continuity in the event of natural disasters and localized power outages, as in the case of Public Safety Power Shutoffs.

Integrated system planning could influence a threshold size valuation in a specific location when, for example, additional generation or targeted energy efficiency or demand side management programs could defer investment in transmission and distribution system upgrades and investments in particular areas of the grid.

Benchmarking and Other Valuation Techniques for Capacity

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

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[9] https://www.oregon.gov/energy/Get-Involved/Documents/2018-BEEWG-Ten-Year-Plan-Energy-Burden.pdf

[10] https://www.utilitydive.com/news/teslas-australian-virtual-power-plant-propped-up-grid-during-coal-outage/568812/

As the cost of generating resources changes, simple cycle gas plants may not be an appropriate capacity valuation benchmark. Capacity valuation should be based on the overall needs of the system and adjusted on a predictable and regular schedule to provide market continuity.

It no longer makes sense to use gas peakers as a proxy when policy makers are working to produce a cleaner, more just and more resilient grid. Instead, capacity resources should be evaluated on:

1) ability to provide capacity at a given time
2) ability to provide carbon-free capacity
3) ability to provide local capacity and resilience during grid disturbances

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

Meeting system capacity needs over the long term will require availability of capacity resources that are able to meet the needs of the "system" now and into the future. As new capacity acquisitions are considered-with an average operating life of 20-50 years-those assets must address the full range of considerations that will be necessary to ensure a functional and reliable electricity system. All of the elements listed above should be considered in the development of valuation methodologies for new capacity resources. Avoided costs, in particular, should be considered and integrated into capacity methodologies more comprehensively than they have been to date. Energy efficiency, distributed energy resources, demand side management and poles and wires alternatives must be fully and appropriately priced to reflect the full range of benefits and impacts to the system they offer. This should include:

1. **generation capacity deferral value** (for non-generating assets such energy efficiency, demand side management, etc)

2. **Transmission and distribution deferral value**
3. **Risk reduction value-** this should include the full range of risk-reduction benefits that these assets offer, including the value that energy savings brings to utilities by reducing uncertainty that could result in price volatility if the utilities' have to go to market to fill-in shortfalls in their ability to provide energy through their existing supply and distribution infrastructure. This should also include the reliability and grid services that grid-interactive distributed energy resources provide and the associated risk reduction from providing generation resources that are located in vulnerable areas of the grid. PG&E is estimating more than $30B in damages and liability resulting from the fires that were started by its under-maintained transmission and distribution system in 2017. Who ultimately bears those costs is still to be determined by regulators, bankruptcy courts and policy makers, but these costs are real and must be accounted for.
4. **Resilience value-** avoided damages that would be incurred in the event of an extended grid outage due to climate change response (e.g. public safety power shut off) to the system and ratepayers. The Stanford Woods Institute for the Environment estimated the costs of PG&E's recent power cuts in Northern California to be upwards of $2 Billion[11], largely stemming from negative impacts on businesses and the local economy. The tools in the toolbox for developing a more democratic, distributed, resilient and efficient electricity system has never been greater. However, extended power outages don't just cost economies, they also cost lives. Medically vulnerable population, low-income populations and rural and elderly populations are particularly at risk of negative impacts. People with medical conditions who rely on electrically operated medical equipment are particularly vulnerable to outages. The OPUC should avail itself of all of those tools to ensure development of a more equitable, reliable, cleaner and safer grid for all ratepayers and community members.

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

As explained in the answers provided above, small scale distributed energy resources, coupled with energy storage, energy efficiency demand side response, and other resources present a valuable opportunity to address fundamental challenges the electricity system is facing now and in the future.

Rapid integration of distributed clean energy generation, energy efficiency and energy storage resources can and should play a central role in addressing the looming capacity deficit and resource inadequacy issues that threaten the lives, safety and economy of the residents of the Pacific Northwest. Spark Northwest looks forward to engaging in future workshops and continued discussions and efforts to advance clean, distributed energy across the state through capacity valuation methodologies that reflect the full range of benefits different resources provide.

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[11] https://www.cnbc.com/2019/10/10/pge-power-outage-could-cost-the-california-economy-more-than-2-billion.html

Sincerely,

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On behalf of Spark Northwest
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