BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

UM 2011

In the Matter of PUBLIC UTILITY COMMISSION OF OREGON, General Capacity Investigation.	COMMENTS OF SWAN LAKE NORTH HYDRO, LLC

Swan Lake North Hydro, LLC ("Swan Lake") appreciates the opportunity to provide comments on the "Principles of Capacity Valuation" study produced by Energy+Environmental Economics ("E3"), dated December 2020 (the "E3 Study"). Swan Lake respectfully requests that the Commission and Commission Staff accept and consider these comments, despite them being filed one day late. Good cause exists to accept these comments, despite their untimeliness, because Swan Lake provides an invaluable perspective on capacity issues, considering it is developing a large, grid-scale, flexible capacity resource in the form of a pumped storage project. No other party in this proceeding can offer this perspective. Swan Lake apologizes to the Commission, Commission Staff, and the other parties in this proceeding for its tardiness in filing these comments.

I. COMMENTS

After reviewing the E3 Study, Swan Lake offers the following observations regarding the findings contained in the E3 Study, as well as some general observations about capacity modeling that Swan Lake requests the Commission and Commission Staff consider.

1. *The E3 Report at p. 2 states, "Effective Load Carrying Capability or ELCC is becoming increasingly recognized as the "gold standard" approach to accurately measuring the*

capacity contribution of a resource using LOLP principles. ELCC is a technology-neutral measurement of equivalent "perfect" capacity of any resource. For example, if solar has an ELCC of 50%, an electricity system with 100 MW of solar would achieve the same reliability as a system with 50 MW of a perfect firm resource."

It is important for the Commission and Commission Staff to remember that ELCC modeling is the "average" result of thousands of stochastic simulations of hydro, temperature, load, wind, solar, and forced outage scenarios. Thus, it is possible that two resources with similar ELCCs can have different risk bands (*i.e.,* the standard deviation of ELCC or capacity that a particular resource provides). This is particularly true for energy storage, where at small, incremental capacity additions, ELCC values appear to be, on average, very similar. The ELCC risk associated with shorter duration, however, is much wider than long duration.

2. *The E3 Report at p. 5 states, "When historical data is not available, it must be simulated using the best available estimates of its actual productive capability. For renewables, the National Renewable Energy Laboratory (NREL) System Advisor Model is an industry-accepted method for developing renewable generation profiles. For energy-limited resources such as energy storage and demand response, incorporating the duration of these resources and any limitations on how often they can be used/called is critical in calculating ELCC."*

When using the National Renewable Energy Laboratory ("NREL") System Advisor Model for developing renewable generation profiles, utilities should be careful to consider the way the NREL model "hair clips" generation based on losses and availability assumptions. The hair clipping effect may limit the expected peak hourly production of wind and solar, which may have an impact on the system ELCC values.

3. *The E3 Report at p. 5 states, "It is important to note that the capacity contribution of an energy resource is dependent on more than just a resource's physical capability but also how the resource is operated. To the extent that a resource is dispatchable, such as energy storage, different operational strategies for otherwise identical resources may result in different ELCCs. To the extent that a resource's compensation framework or price signals influence its operation, the two fundamental questions of "How much capacity can a resource provide?" and "What compensation framework should be used to pay for capacity?" may become inseparable."*

In any resource adequacy discussion or IRP planning processes, large, grid-scale storage devices like pumped storage should be considered primarily as capacity resources and the modeling used in ELCC models should reflect this. In real operations, storage devices like a pumped storage project would not be operated on purely economic arbitrage signals, and instead would be made available for capacity service if the utility is forecasting potential loss of load hours. This could mean charging the storage device during the hours leading up to a loss of load event, even if market prices do not signal an economic opportunity. Thus, accurate ELCC modeling for large storage resources like pumped storage requires taking into account the operational realities of these resources, in addition to the actual ability to contribute capacity.

4. *The E3 Report at p. 5 states, "While ELCC has been increasingly recognized within the industry as the most rigorous and accurate method for measuring the capacity contribution of energy resources, it is also computationally intensive and may not be a practical manner by which to assess capacity for different resources across all use cases. However, several simplified alternatives or heuristics exist that can be used to approximate ELCC. The following sections describe several common heuristics, including their advantages, limitations, and appropriateness for different use cases."*

Swan Lake does not recommend a heuristic approach to ELCC modeling or compensation. The minor benefits of heuristic modeling (less computational time) are substantially outweighed by the value provided by the more robust, ELCC models. The simplified heuristic methods do not accurately capture the hourly operations of utilities' energy systems and may over/under compensate resources based on approximations of capacity need. Additionally, heuristic approaches primarily work for generation only resources, not storage resources. While more computationally intensive, the ELCC models capture more years of data and provide a means to more accurately estimate the capacity contribution of energy limited resources such as storage, in addition to other intermittent generation resources.

5. *The E3 Report at p. 7-8 states, "Separately, use of the hourly LOLP heuristic as an approximation for ELCC is not as well-suited for energy storage and other energy-limited*

resources, given that the length (duration) of loss-of-load events is not captured directly in hourly LOLP values. For example, while there may be LOLP values across six consecutive hours for a given month (e.g., 4-10pm), this does not necessarily imply that loss-of-load from a single event is causing that entire span of LOLP values. The earlier portion of the LOLP in that timespan (e.g., 4-8pm) could be due to one loss-of-load event, while the later portion of the LOLP (e.g., 6-10pm) could be due to a separate, independent loss-of-load event on a different day. This would mean that a resource capable of providing capacity for four hours, rather than the six-hour period reflected in the LOLP values, would be sufficient to provide 100% ELCC. The use of the hourly LOLP heuristic rather than ELCC directly does not reflect this."

To accurately evaluate the potential capacity contribution of a given resource, it is critical to use ELCC models that optimize in a time sequential manner and over a longer time horizon (at least one week.). When an ELCC model does not optimize in a time sequential manner (*i.e.*, the model selects certain time hours in certain months, instead of all hours (8,760) in a given year), the model fails to capture the system continuity needed for energy limited resources such as energy storage. Storage devices can charge and discharge during different hours of the day and hold charge for several days (if necessary) to meet capacity needs. When the time window is not long enough in an optimization (*i.e.*, the time window is limited to, for example, 24 hours), storage is forced to arbitrarily discharge and charge daily for modeling purposes. For longer duration storage, this artificially limits the capability to hold more charge for sustained periods of capacity need in the future and limits the charging time windows allowed to meet full charge. Thus, any ELCC model should optimize over a longer time period (at least a week) in order to give storage resources the optionality for charging, discharging, and holding charge that more accurately reflects their real-world operational capabilities.

6. *The E3 Report at p. 10, Fig. 9, demonstrates a calculation of the net resource cost.*

Swan Lake notes that, in Figure 9 of the E3 Study, the net cost of capacity ($/kw-mo) is characterized as gross cost of capacity ($/kw-mo) minus the ancillary and energy benefits ($/kw-mo). Swan Lake recommends that intra-hour flexibility benefits be incorporated into the net cost of capacity formula. In addition, the true net cost of capacity should consider the impact of the ELCC value. For example, assume a 100 MW resource has a gross cost of capacity of $12/kw-mo, an ELCC of 50%, and a benefit value of $7/kw-mo. The net cost of system nameplate capacity would be $5/kw-mo. This is the same as $12/kw-mo (gross cost) minus the benefits ($7/kw-mo). However, the cost of "firm capacity" is really $10/kw-mo, or $5/kw-mo divided by the 50% ELCC.

7. *The E3 Report at p. 21 states, "Hybrid resources share characteristics of two distinct individual resources: renewables and storage. This presents the option of compensating such resources for their capacity contribution based on the generating resource (i.e., renewable portion), or separately compensating the components based on their individual characteristics. The decision as to which compensation framework is more appropriate can be made either by the resource owner or by the utility."*

Hybrid resources should be assessed based on the point of interconnection ("POI") rating and not the system nameplate value. For example, say a hybrid resource (100 MW solar + 100 MW/4hr storage) is connected to a substation with a POI rating of 100 MW. Additionally, assume the peak capacity contribution of the solar and storage system is 60 MW. Using the traditional ELCC formula (Peak capacity contribution/system nameplate), the ELCC value would be 30%. However, the system is being optimized behind a 100 MW POI, so to the grid, the maximum amount of capacity being discharged is 100 MW. Thus, the ELCC value should be 60% based on the POI. If the POI for the hybrid system was 200 MW, then the ELCC would be 30% since there is less efficient usage of the transmission infrastructure. Using the POI, instead of a resource's nameplate capacity, for ELCC should also be considered for overbuild of wind, solar, and storage in general.

8. *General Comments regarding ELCC and capacity values.*

In addition to the comments presented above, Swan Lake would offer the following, general observations that are relevant to the issues being investigated in this docket:

- As part of their respective IRP processes, the Commission should consider directing all utilities to become more transparent with their respective ELCC degradation curves when incremental capacity additions are made. By way of example, Portland General Electric ("PGE") has done an excellent job in its IRP of showing how the ELCC value of different resources degrade, once more incremental capacity is added to their system. For storage specifically, PGE has shown that, at larger capacity addition increments (+300 MW), longer duration storage has a much flatter ELCC degradation curve as compared to other types of storage resources, like batteries. These ELCC curves send important signals to developers and lawmakers and make clear which resources provide the best capacity for the utility's service territory.
- This proceeding comes at a critical time for the Pacific Northwest and its energy markets. Recent reliability incidents in Texas and California dramatically illustrate that extreme weather events are occurring much more frequently than has historically been the case, which is affecting the entire electric utility industry. For example, the California Public Utility Commission ("CPUC") is now considering not only ordering California load serving entities to acquire an additional 7,500 MW of generating resources by 2025 (beyond the 3,300 MW the CPUC ordered acquired in 2019), but also increasing its reliability planning reserve margin ("PRM") from 15 to 20.7 percent under certain circumstances. This pending action is being mirrored by other WECC balancing area authorities ("BAAs"). For example, NV Energy will soon increase the PRMs for its two subsidiary utilities, Nevada Power and Sierra Pacific Power from 12 to 18 percent and from 15 to 18 percent, respectively. Collectively, these actions by utilities and regulators in the Western Interconnection are likely to result in an even

greater need for additional, flexible capacity resources. This need would be in addition to the thousands of MWs Pacific Northwest utilities are already showing in their respective IRPs.

- These recent, extreme weather events point to a need for the utilities in the Western Interconnection to increase their near-term acquisition of additional capacity resources, especially long duration capacity resources like pumped storage, to handle these more frequent, extreme weather events and simultaneously manage the increased planning and operational uncertainty that comes with greater penetration of intermittent renewable resources on their systems. The latter dynamic was most vividly demonstrated during the August 2020 California outages where the California Independent System Operator ("CAISO") needed to manage its early evening load, not to the traditional gross peak, but to the much less predictable net peak created by its high penetration of solar resources. With CETA for Washington State utilities, and likely future increased renewable acquisition requirements for Oregon utilities, plus retiring coal plants, Pacific Northwest utilities will undoubtedly face similar reliability management challenges, particularly in the post-2025 timeframe. Such problems can only be avoided if the Commission acts quickly to ensure utilities are acquiring sufficient raw capacity and operational flexibility to meet their future needs while maintaining system reliability.

II. CONCLUSION

Swan Lake appreciates the opportunity to provide input on the important topic of ELCC values and the findings contained in the E3 Study. Appropriate and accurate ELCC modeling is essential to ensuring the future electric grid is reliable and has the flexibility needed to reach various state renewable energy policy goals and to reduce the potential for overbuilding generation resources. Swan Lake continues to believe pumped storage will play an invaluable role in this future. However, the current, utility planning paradigm (including ELCC values attributed to storage resources) undermines the ability of these beneficial resources to fairly compete in existing utility IRP processes. Swan Lake commends the Commission and Commission Staff for initiating a robust discussion on these capacity contribution and resource adequacy issues and looks forward to continued participation in the future.

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Respectfully Submitted,

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