PacifiCorp Comments covering
NorthernGrid Economic Study Request - Offshore Wind in Oregon

Submitted: 4/19/2023

Attachment K "Economic Study" Principals

12.1.1 Regional

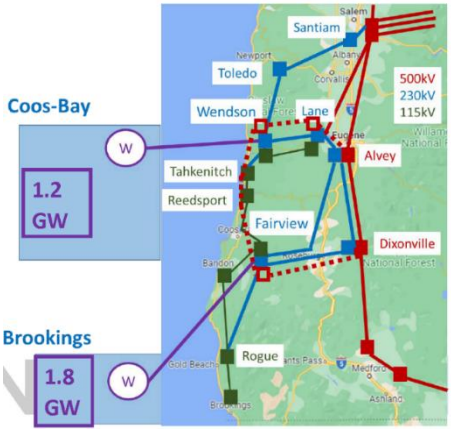
NorthernGrid, in coordination with Enrolled Parties and the Enrolled Parties Planning Committee, is to perform in accordance with this Part E of this Attachment K economic studies pursuant to requests submitted by stakeholders in accordance with Section 12.2.1 of this Attachment K related to conditions within the Enrolled Party Region.

12.2.1 Regional

A stakeholder, which includes Enrolled Parties, may request that NorthernGrid initiate a study to **examine scenarios where potential transmission solutions** or investments **could result in:**

a. net reduction in total production cost to supply system load,
b. reduced congestion; or
c. the ***integration of new resources*** and/or loads on an aggregate or ***regional basis*** (a "Regional Economic Study").

The NorthernGrid analyses were focused on connecting the 3 GW of Off-Shore Wind (OSW), split between Coos Bay and Brookings, to the 500 kV Transmission at Dixonville and Alvey as determined by the requestor in coordination with the Enrolled Parties. Because NorthernGrid represents a collection of Transmission Providers and Transmission Owners, the Economic Study evaluated the ability to integrate the OSW with the aggregate of system load and offsetting the aggregate of resources across the NorthernGrid footprint. As such, the Economic Study provides an important data point for the potential impacts and benefits of large scale OSW interconnections, in concert with additional studies performed by PNNL, BPA, PacifiCorp and others, each evaluating different flavors of possible future integration.



The NorthernGrid comprehensive reliability analyses stipulated that, "steady state contingency analysis concluded that the installation of three gigawatts of offshore wind interconnected at the 500 kV level is reliable with all pieces of equipment in service (N-0), or with the outage of any one piece of equipment (N-1). The single outages included either individual line or generation outages. This reliability finding holds true for both northbound and southbound flows on the I-5 corridor."

This analysis is effective at addressing item "c" of the three-part values from the Attachment K Principles, which if favorable, should contribute to a successful project (as is itemized under Attachment K 12.2.1). However, it is notable that additional information can be learned on the potential for net reduction in total production cost to supply system load and reduced congestion when evaluating a specific set of off-taker(s) of the OSW production.

The OPUC requested that NorthernGrid study the economic and reliability impacts to the regional bulk transmission system from a large-scale deployment of offshore wind generation into several points of interconnection along Oregon's coast… study the effects of wind development scenarios with associated transmission upgrades:

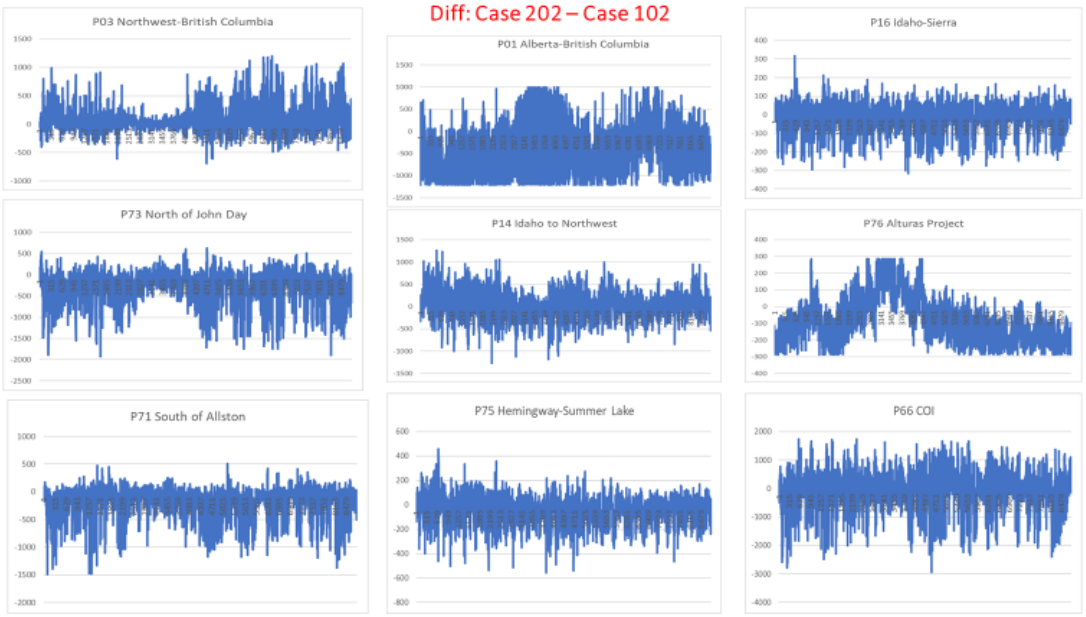
1. Total production cost to supply system load and
2. Congestion across the regional transmission system, as well as indicating additional transmission expansion needs

However, it is important to note that deliverability to individual load serving entities may have very different results than integration with the aggregate NorthernGrid footprint.

Other considerations can also be identified, using the Nodal Production Cost Model. The following is extrapolated from evaluations performed by PacifiCorp evaluating a similar Economic Study Request through its individual Attachment K process and are provided for informational purposes in support of the larger OSW discussion.

Nodal Production Cost Modeling Leads to Alternative Conclusions For Most Economic Studies

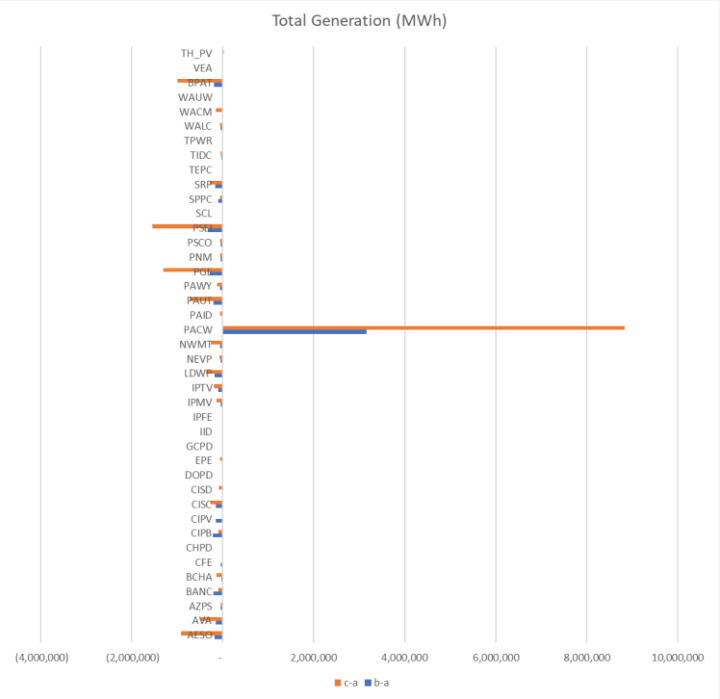
The Production Cost Model (PCM) can be used iteratively to evaluate an investment, leading to the optimal configuration. This can start by assessing the impacts of adding 3.0 GW on the interconnected system. Having just completed the PacifiCorp ESR study for adding 1.0 GW of OSW at Del Norte (Case 102), a scenario has recently been studied which envisions an added 3.0 GW (Case 202) to assess the impact on the interconnected network. OSW has relatively fuel free cost, hence would displace more costly resources (e.g., thermal resources); additional resource displacement would occur based on transmission headroom availability that would lead to serving load more economically. The following is a summary of major paths, not comprehensive but sufficient to demonstrate how far reaching the 3.0 GW would penetrate:



Total Energy Generated

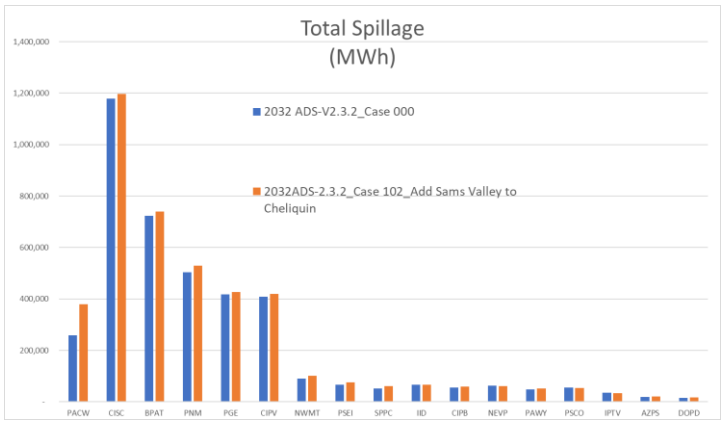
The graph to the right depicts the difference in total energy generated Case 202 minus Case 102, leading to determine where the need is; likely where the 3.0 GW – OSW is displacing thermal resources.

Given that much of the energy generated from the 3 GW – OSW is retained in PACW and given the large volume of generation interconnection requests receive in recent cluster studies, it is likely that the OSW would result in significant stresses on the underlying network. Accordingly, any transmission solutions should also consider alternatives for transmission expansion from PACW Cluster Studies and other participants interconnection requests.



Spillage

Spillage provides visibility to how the total 3.0 GW – OSW energy is utilized and if not, this is likely due to congested transmission elements (e.g., Transformers, lines, paths)



These types of analyses do not replace reliability analyses such as power flow and stability, consistent with what the standards require. However, such analyses will lead to the complete and optimal system configuration, also meeting the intended FERC Order 1000 – Attachment K principles, evaluating the project based on its merit to serve network load reliably and economically.

The Northern Grid economic study does not fully evaluate all economic benefits/drawbacks that determine the feasibility of the project. To determine the full benefits from added 3.0 GW of OSW, annual electricity costs (variable operating and maintenance costs) also need to be accounted for. PCM simulation determines annual generation costs (VOM costs) that can be added to annualized transmission capital and fixed costs; determining full economic benefits requires that all costs and

benefits be considered when evaluating a project. Understanding where the economic benefits will fall helps to identify project participants.

Attachment K, section 8.5.2 covering Evaluation of (BCR) - - "If the Benefit-to-Cost Ratio calculated for the Eligible Cost Allocation Project is greater than or equal to 1.25, such project is a "Preliminary Cost Allocation Project." In the event the Benefit-to-Cost Ratio for the Eligible for Cost Allocation Project is less than 1.25, such project is no longer eligible for cost allocation."

Request for Additional Figures in NorthernGrid Economic Study Report

The NorthernGrid Economic Study Report, Figure 21, provides a comparison of carbon-based resource outputs for the base case, 230 kV and 500 kV evaluations, focused on BPAT, PGE and PACW.

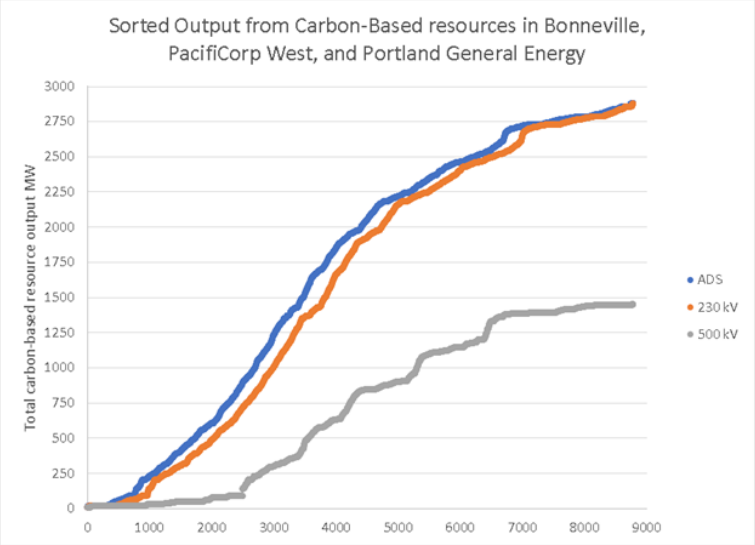


Figure 21: Sorted carbon-based output, BPAT and PACW

As NorthernGrid is comprised of several additional entities that also have thermal generating resources, it would be valuable to also include a comparison that shows the total thermal resource output for the NorthernGrid participants. The following is a summary of thermal - - total (MW) by NorthernGrid member BAA:

- AVA: 836
- PGE: 1685
- IPC: 702
- PSEI: 1619
- BPAT:3900
- PACW: 1113
- PACE: 6531
- NVE:5084