Study Scope for Economic Study Request: Offshore Wind in Oregon

Request

In March of 2022, The Oregon Public Utility Commission along with the Oregon Department of Energy jointly submitted to the NorthernGrid planning region a request for both economic and reliability analysis of the impacts to the transmission system for a 3.0 GW capacity wind farm in the Oregon coastline. The high-level details of the request are listed below.

1. 3.0 GW of wind split with 1800 MW interconnected at the Fairview substation near Coos Bay, OR and 1200 MW at the Wendson substation near Florence, OR.
2. Planned in-development date of December, 2032

"This evaluation should also include an identification of transmission system upgrades necessary to accommodate the power flow capacities of key existing transmission corridors and paths (e.g., 230 kV to 500 kV) to enable the full deliverabilty of the power to load with minimal curtailment of generation due to transmission constraints."

Analysis

Both production cost and power flow analyses will be needed to evaluate this off-shore wind request.

Power Flow Analysis

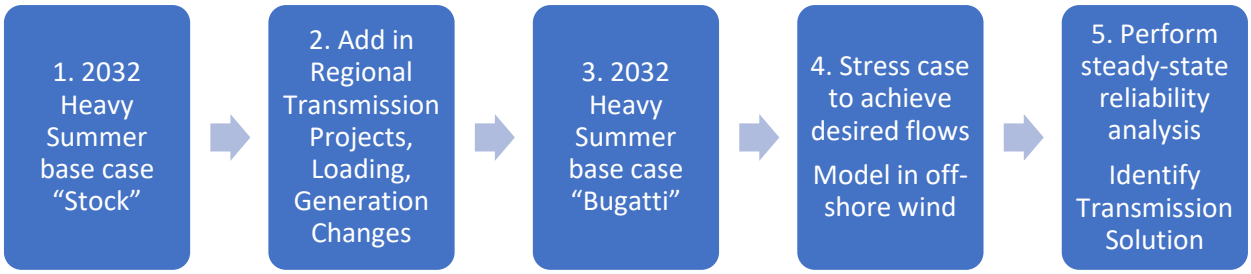

Figure 1: Power Flow Process

Figure 1: Power Flow Process depicts the process needed to determine the transmission solution that will alleviate any observed reliability violations under the conditions considered. Details pertaining to each of the steps are as follows:

1. The analysis starts with the 2032 Heavy Summer Western Electric Coordinating Council (WECC) "stock" base case.

2. The 2032 Heavy Summer case will be modified to include the changes submitted into the NorthernGrid planning region for the 2022-2023 planning cycle. Specifically, system loads will be modified to reflect the loading values submitted by the NorthernGrid participants. The generation retirements and additions will be modeled, and all the regional transmission projects will be added.
3. For the purposes of this analysis, base cases that reflect the loading, generation, and transmission submitted into the 2022-2023 planning cycle for the NorthernGrid region are referred to as "Bugatti" cases.
4. While, historically, southbound is the predominant direction through the California-Oregon Intertie, northbound flows have been observed during stressed operating conditions, so two base cases will be developed.
    a. Northbound condition. Imports from California feeding the NorthernGrid peak summer load during low hydro conditions will result in northbound flows from California up into Oregon/NorthernGrid. These northbound flows have been observed operationally during conditions when there is excess loading in Oregon/Washington/Idaho, such as during the infamous "heat dome" event in June of 2021.
    b. Southbound condition. Exports into California during the peak summer loading resulting from high hydro conditions, and the replacement of carbon-emitting resources in the I-5 corridor with renewable resources will result in southbound flows out of Oregon/NorthernGrid into California.

Once the northbound and southbound cases are created, the off-shore wind projects will be added in as outlined in Table 1: Off-Shore Wind Project Location Details.

Table 1: Off-Shore Wind Project Location Details

Total installed capacity	**Point of Interconnection**	**Wind Profile**
1.2 GW	Wendson, 230 kV substation	Coos Bay
1.8 GW	Fairview, 230 kV substation	Brookings

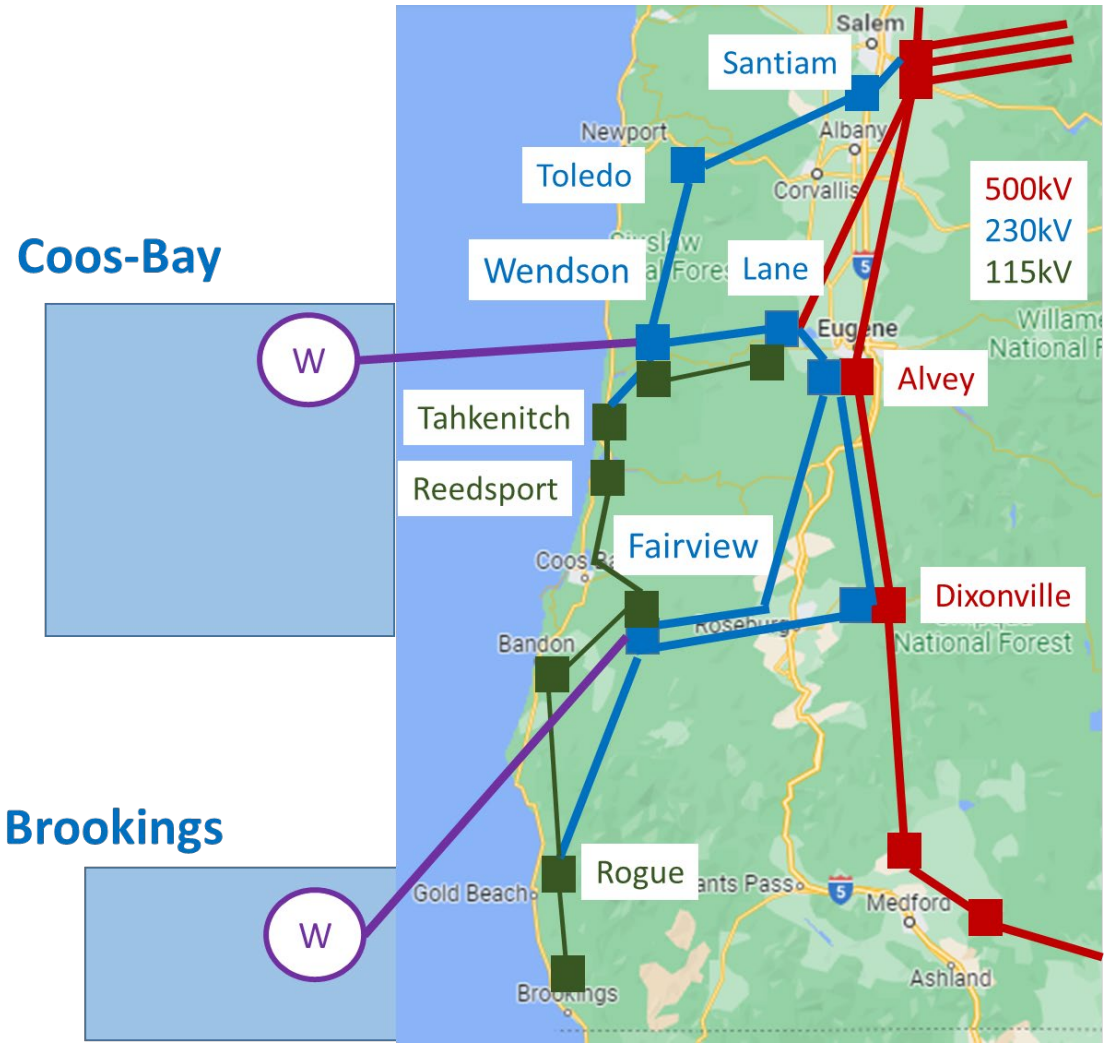

Figure 2: High-level depiction of Off-Shore wind project

The points of interconnection were selected to be the points that will allow the emphasis of the analysis to remain on the impacts to the NorthernGrid region. From a geographical perspective, the Wendson, 230 kV substation is one of the closest opportunities to interconnect to the transmission grid at the 230 kV level.

The Fairview substation, while not the "closest" geographically to the Brookings wind pocket, is the closest for the purposes of this Economic Study Request. The Rogue substation was studied as a point of interconnection in a Bonneville Power Administration TSEP program (study results may be made available by contacting BPA) and so was not selected as the southern point of interconnection for the purposes of this analysis.

5. Steady-state, post-transient contingency analysis will be performed on the four 2032 Bugatti base cases using PowerWorld, the four cases being: northbound without off-shore wind, northbound with off-shore wind, southbound without off-shore wind, southbound with off-shore wind. The contingencies will be the same as those run for the analysis needed for the Regional Transmission Plan, to allow for comparability between results. Additional

contingencies identified due to addition of resources or transmission facilities that are not part of the plan that identified reliability concerns for this analysis may be tested against the base cases used for the development of the Regional transmission Plan.

6. The Economic Study Request stakeholder group along with the technical team from the Member Planning Committee will work together to develop the transmission solution needed for steady-state reliability.

Production Cost Modeling

Production cost modeling analysis will be used to determine if the off-shore project, along with the associated transmission solution, would result in a net reduction in total production cost to supply system load or reduced congestion.

Figure 3: Production Cost Process

1. The 2032 Anchor Data Set at WECC will be the starting point for the production cost modeling analysis. The 2032 Anchor Data Set uses the 2032 Heavy Summer base case as the basis for topology and will have the expected 2032 resources and resource costs needed for production cost modeling.
2. The 2032 Anchor Data Set will be modified to include all the NorthernGrid 2022-2023 loading, generation, and transmission submittals.
3. Production cost modeling will be performed on the “Bugatti-style” Anchor Data Set to establish base line parameters.
4. The off-shore wind projects will be added in using the Coos Bay wind profile for the northern point of interconnection and the Brookings wind profile for the southern point of interconnection. The separation of the off-shore wind project into the two wind profile areas allows for the analysis to consider any wind diversity between the two areas.
5. Production cost modeling will be performed to establish changes to the parameters of interest.

Report

A report of the Economic Study Request, methodology, and findings will be complete by 3/31/23. The report will detail the modifications made to the cases and the findings with and without the off-shore wind projects, as well as the associated findings. The request for evaluation of "full deliverability of the power to load with minimal curtailment of generation due to transmission constraints" will be addressed by identifying if the upgraded transmission system is capable of accommodating the maximum expected aggregate output of the requested resources, based on the off-shore wind generation profiles for each pocket, without curtailment of the resources, during each hour. This economic study report will be a stand-alone report that will be included as an appendix to the Regional Transmission Plan. This report in no way constitutes an analysis for generation interconnection, load service, or transmission service; its findings may inform the regional transmission planning process.