Stakeholder Comment on the Western Transmission Expansion Coalition Study Plan

RMI

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Introduction

RMI is excited by the Western Power Pool's, committees', and study teams' ("the WestTEC team") efforts to produce a West-wide actionable transmission study that is focused on the interregional and interstate transmission expansion needs of the West. RMI looks forward to taking part in the stakeholder process and providing meaningful feedback over the course of the study. In these comments, we focus on two aspects of the study plan, 1. Potential data sources for accelerated load growth assumptions and 2. Considerations for least-cost capacity expansion modeling of generating resources.

Potential data sources for accelerated load growth

Pertain to sections:

- Reference Case: Assumptions and Data Sources
- Planning assessment & methodology: Step 2: Develop Resource Plan

We are excited that the WestTEC team intends to include "Load growth forecasts that capture the increasing demand for electricity due to electrification and emerging loads such as data centers and hydrogen production". From the study scope, we understand that the WestTEC team intends to model load using load forecasts from the WECC 2034 anchor dataset, utility integrated resource plans, and state agency data. **Based on familiarity with numerous load forecasts in the West, we believe these load projections may be conservative. We suggest that the WestTEC team use more aggressive load forecasts in the Reference Case or** include **at least one scenario that assumes more aggressive load growth.**

As summarized recently by Grid Strategies, new loads from data centers and manufacturing could grow demand beyond even what could occur from expected electrification.[1] As noted by Grid Strategies, "in just one year, the forecast of cumulative electricity growth over the next five years increased from 2.6% to 4.7%". In the West, Arizona Public Service's 2028 peak load projection grew by over 10% between 2022 and 2023. Therefore, we expect that the WECC 2034 anchor dataset and utility integrated resource plans might quickly become out of date with the rise of electrification, industrial loads, and datacenters.

Given that a handful of Western states have economy-wide decarbonization targets by 2050, it's imperative that the load forecasts reflect these policies. **We suggest that the WestTEC team should use NREL's *high electrification* scenario from the Cambium 2023 dataset for states with economy wide**

[1] John D. Wilson and Zach Zimmerman (Grid Strategies), "The Era of Flat Power Demand is Over", December 2023, accessed at https://gridstrategiesllc.com/wp-content/uploads/2023/12/National-Load-Growth-Report-2023.pdf.

decarbonization targets or an equivalent aggressive load forecast that is aligned with these states' targets. The NREL data includes an 8,760 hourly forecast for each state and U.S. balancing authority (no data for BC and Alberta). The high electrification scenario is aligned with economy-wide decarbonization.

NREL source link: https://scenarioviewer.nrel.gov/?project=0f92fe57-3365-428a-8fe8-0afc326b3b43&mode=download&layout=Default

Another data source that would be helpful to use is Energy Innovation's energy policy simulator. For all eleven Western states (no data for BC and Alberta), the platform has both a business-as-usual scenario and an economy wide decarbonization scenario load forecast by sector between now and 2050. Unfortunately, Energy Innovation's data does not include an 8,760 hourly forecast. That said, the data does have total annual demand that could be helpful to compare any chosen load forecast to ensure they align with economy wide decarbonization goals.

In RMI's States in Sync report, which uses Energy Innovation data, we found the following projections:

- If all eleven Western states pursued the economy-wide decarbonization scenario, electricity load would increase by 128% by 2050 (3.4% annually).
- If only the states with economy-wide decarbonization policies followed this scenario, electricity load would increase by 105% by 2050 (2.9% annually).
- If all states pursued the business-as-usual scenario, electricity load would increase by 51% by 2050 (1.6% annually).

We hope this data will provide an important benchmark for any future load forecast. However, we believe the West might see even more significant load growth as it attracts new industries (like data centers and computer chip manufacturers) and continues to be a leader in decarbonization policies. Note that data centers and new industry are not included in the Energy Innovation energy policy simulator projections.

Energy Innovation energy policy simulator link: https://energypolicy.solutions/us-states

Considerations for least-cost capacity expansion modeling of generating resources

Pertain to sections:

- Reference Case: Assumptions
- Data Sources and Planning assessment & methodology: Step 2: Develop Resource Plan

We agree with the WestTEC team's assessment that "With little transmission capacity left on today's grid, where we connect new generation, and in what amounts and time horizons, will be a critical driver of transmission needs". We also agree with the framework designed to develop resource plans for the 10-year and the 20-year study horizon summarized on page 11 of the study scope. Our comments below pertain to the expansion resources for the 20-year study that will allow the capacity expansion model to select the lowest-cost generation portfolio.

First, we agree that a capacity expansion model is the correct tool to pick the lowest-cost portfolio for the Reference Case to meet the West's reliability, environmental, and economic needs of 2045 and beyond. **However, we caution the WestTEC team against over-relying on what a model says is simply the most economic portfolio.** If we explore the near-optimal solution space (where "optimal" is lowest cost), we will

likely find that there are multiple different portfolios of generation resources that can meet the needs of the West with minor difference in total costs[2]. For example, the results will likely be insensitive to locating an increment of 1 GW of wind capacity in either Colorado, Wyoming, Montana, or New Mexico, as all four states have relatively significant wind resources. Furthermore, some of these near-optimal portfolios might in fact be preferred solutions when we explore questions beyond simply "what is the lowest cost".

One example of a study that has shown how the West could pursue multiple different portfolios with small difference in costs is The Nature Conservancy's Power of Place West study[3]. In that study, they looked at three different environmental sensitivities levels (ranging from least exclusive siting to most exclusive siting). They found that the most exclusive siting scenario only increased costs by 3% while protecting environmentally sensitive areas of the West. This study shows how capacity expansion modeling can be used to answer questions like "how can we reduce environmental land use impacts".

One example of taking caution when exploring the most economic portfolio occurred in the Colorado Electric Transmission Authority's transmission expansion plan this past year. In the preliminary capacity expansion results, the model initially picked wind resources on the Western slopes of Colorado, where there was no developer interest and sub-par wind resources. As expected, the stakeholders of the transmission planning process were confused by the result. In response, the CETA team updated the portfolio to move those wind resources to the eastern plains of Colorado where there were high quality wind resources with significant developer interest.

While we do not suggest that the WestTEC team explores every possible question that could be asked of a capacity expansion model. **We would encourage the WestTEC team to explore this near-optimal solution space and get feedback from the REC committee and other stakeholders on different sub-state energy zones throughout the West.** A potential negative result from this study is significant amounts of generation being sited in a location that no one has an interest in developing or local communities and tribes hold significant value to.

Energy zones are a common concept used by transmission and resource planners throughout the West and are currently being used in states like Colorado[4], New Mexico[5], and Washington[6] for utility and state planning and federal agencies like the Bureau of Land Management[7] for federal land lease planning. In addition, the concept has previously been used by the Western Renewable Energy Zones initiative lead by the Western Governors Association and the Department of Energy from 2008-2012.

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[2] There is well documented evidence of how to approach the near-optimal solution space by using a modeling technique called modeling to generate alternatives. See more here, Joseph F. DeCarolis, "Using modeling to generate alternatives (MGA) to expand our thinking on energy futures, March 2011, accessed at https://www.sciencedirect.com/science/article/abs/pii/S0140988310000721

[3] The Nature Conservancy, "Power of Place – West", August 2022, accessed at https://www.nature.org/en-us/what-we-do/our-priorities/tackle-climate-change/climate-change-stories/power-of-place/

[4] Colorado Senate Bill 07-100 requires utilities to designate energy resource zones in the state of Colorado. There are currently 5 wind and solar zones throughout the state. See more on pages 77-79 here, https://www.transmission.xcelenergy.com/staticfiles/microsites/Transmission/Files/PDF/Planning/PSCO/2020-PSCO-10-Year-Report.pdf

[5] New Mexico has mapped the state for areas of high wind and solar potential and land-use restrictions in New Mexico's Renewable Energy Transmission Authority 2020 and 2022 transmission studies, see more here https://nmreta.com/nm-reta-transmission-study/

[6] Washington's department of natural resources created a geothermal favorability model of the state based on permeability potential, elevation restrictions, and land-use restrictions. See more here, https://www.dnr.wa.gov/publications/ger_presentations_gsa_2014_boschmann.pdf

[7] BLM, "2023/2024 Solar Programmatic EIS", https://blmsolar.anl.gov/solar-peis-2023/

By identifying energy zones, **the WestTEC team could collect data on critical aspects of what makes transmission expansion actionable** like interest to construct resources in that zone from developers and utilities, interest to sign purchase power agreements with resources in that zone from utilities, interest to have that zone developed from an economic development standpoint from state governments and energy offices, concerns about the environmental and cultural impacts of resources in that zone from conservation groups and tribes, and local interests from communities on the ground, amongst other things. This data could be layered into a decision-making process that explores the near-optimal solution space to ensure that the transmission need that comes from new generation capacity is both actionable by the industry and wanted by the community.

For example, the Western Renewable Energy Zones initiative effort did a form of this type of planning by asking utilities in the West which energy zones they were most interested in. By going through this process there was a surprising amount of consolidation to a few locations of high interest. On page 6 of the Phase 3 report, utilities in the West identified some of those regions like Southern Washington, Southern California, Northeast Oregon, and Northeastern New Mexico.[8]

A potential approach for gathering feedback and interest on issues beyond the lowest cost:

1. The WestTEC team could first publish the preliminary resource portfolio guided by lowest cost, the results would be organized by Western energy zone.
2. Next, the team could solicit feedback from committee representatives, utilities, state representatives, tribes, and other stakeholders on each Western energy zone.
3. Finally, the team could consolidate this feedback and reassess the reference case to develop a new near-optimal portfolio that incorporates the insights gained in stage 2.

[8] Department of Energy, "Renewable Resources and Transmission in the West: Interviews on the Western Renewable Energy Zones Initiative: WREZ Phase III Report to the Western Governors: Executive Summary", February 2012, https://westernenergyboard.org/wp-content/uploads/2014/11/02-2012WGA-Renewables-Transmission-in-the-West-Interviews.pdf.