WIRAB Advice to WECC on the Preliminary 2024 WECC Reliability Risk Priorities

April 29, 2024, updated May 29, 2024

Introduction:

The Western Interconnection Regional Advisory Body (WIRAB) appreciates the opportunity to submit advice to the WECC Board of Directors on the organization's proposed 2024 Reliability Risk Priorities (RRP).

Background:

In 2023, WECC and the Reliability Risk Committee (RRC) established a process to identify and analyze risks to the Western Interconnection. This led to the creation of the WECC Risk Register, a matrix categorizing and assessing risks, which was used as the foundation for the Reliability Risk Priorities process.

On February 29, 2024, WECC hosted a Reliability Risk Priorities Workshop, where WECC staff engaged stakeholders in discussions and exercises on reliability risks within the Western Interconnection. Participants were asked to prioritize risks during the workshop.
WECC staff took the information it collected from the workshop and created a prioritized list of risks based on three considerations: 1) relevance to the Western Interconnection, 2) potential for unique work, and 3) the opportunity for significant impact. WECC invites stakeholders to comment on the preliminary list in preparation for the WECC Board's Workshop on April 29, 2024.

Specifically, WECC is seeking feedback on two general questions for each preliminary RRP:

- Given the considerations listed above, should the risk be included as a 2024 RRP?
- What kind of unique and valuable work can WECC do to understand the risk? What kind of work does or can WECC do to make a significant contribution to addressing and mitigating this risk?

These RRPs are important because they guide WECC's efforts to address emerging reliability risks in the Western Interconnection.

Preliminary List of Reliability Risk Priorities:

1. **Aridification and associated natural events: drought, heat events, and wildfires**
2. **Changes in load from electrification**
3. **Cybersecurity interruption to operations**
4. **Inverter-based Resources**

5. **Lack of coordinated planning for building out resources and transmission**
6. **Impacts of large loads**
7. **Modeling quality and input validation**
8. **Physical damage or compromise of system assets**
9. **Potential effects of energy policies in the West**
10. **Supply chain**

WIRAB Comments

WIRAB reviewed the risks based on two key principles:

- Is the risk unique to the Western Interconnection?; and
- Can WECC effectively address and mitigate the risk?

All preliminary RRPs are important, and industry stakeholders, WECC, and other entities must assess and minimize these risks. WECC has made progress on addressing RRPs in the past, so prioritizing RRPs that will have the greatest impact on Western Interconnection reliability is essential.

WIRAB Advises the Board to elevate the following RRPs in 2024, based on WIRAB's key principles:

1. **Aridification and associated natural events: drought, heat events, and wildfires**

   What makes this risk unique to the West?
   Aridification and natural events, such as drought, heat waves, and wildfires, present significant risks to the Western Interconnection due to the region's climate. The scarcity of water in much of the region requires careful resource management to meet the demands of the economy, environment, and population.

   The Western Interconnection relies heavily on hydroelectric power, which provides nearly 27% of its total capacity. Weather-dependent resources such as wind and solar account for another 18%. The performance of these resources is closely tied to precipitation and weather patterns, affecting the reliability of the system.

   Climate change is altering temperature, precipitation, and other patterns, leading to potential reliability risks that impact bulk power system planning and operations. Severe droughts, heat waves, and wildfires can immediately disrupt system reliability.

   How can WECC contribute to mitigating this risk?
   Although WECC cannot control aridification and natural events, it can support the industry in preparing for and understanding the long-term effects and planning for extreme events related to aridification. To address this risk, WECC could study changing trends and assess how long-term patterns should be considered in WECC's reliability assessments.

WECC can collaborate with members and stakeholders, such as the National Labs, to analyze comprehensive datasets on temperature and precipitation trends in the Western Interconnection. Through its stakeholder process, WECC can verify regional changes and update assessment models to evaluate current and future reliability impacts more accurately.

Using this information, WECC should ensure its assumptions are current in the Western Assessment of Resource Adequacy and Reliability Assessment Committee studies to account for climate pattern changes linked to aridification.

Finally, WECC should share its findings with stakeholders across the West to encourage entities to review their weather-sensitive resource planning and operational assumptions. This would enable them to reassess existing models for operations and planning more effectively.

4. Inverter-based Resources

What makes this risk unique to the West?
The Western electric system has a large and growing share of Inverter-Based Resources (IBRs), including wind, solar photovoltaics (PV), and battery storage. These resources account for over 20% of the installed capacity in the Western Interconnection, compared to just 6% in the East. As traditional thermal generation decreases, IBRs are crucial in grid operations, raising questions about reliability.

Joint WECC and NERC reports have identified reliability issues caused by solar PV resources during system disturbances. These reductions were due to factors such as inverter and plant-level controls.

Until recently, NERC Reliability Standards did not include specific requirements for these resources, but FERC Order 901 directed NERC to address the gap. It is important to establish technical requirements for bulk power system reliability.

However, active interconnection and commissioning requirements may lack clarity for IBRs. Ensuring the interconnection process correctly integrates resources into the grid is essential for system reliability.

How can WECC contribute to mitigating this risk?
WIRAB is working on a project assessing the IBR-related risks and potential gaps in the Western Interconnection. This work aims to identify proactive measures that industry stakeholders, including utilities, system operators, WECC, state regulators, and policymakers, can take. WIRAB hopes to partner with WECC in this project to address gaps. WECC can also play a key role in supporting national efforts led by NERC by making sure the Western region has a strong voice in developing NERC standards revisions. In addition, WECC could go beyond national efforts by initiating specific measures tailored to the Western region.

WECC should work with developers and operators to clarify guidelines and ensure inverter-based resource owners follow through on them. It can lead the effort to establish coordinated interconnection requirements for transmission-connected inverter-based resources, ensuring these reliability standards are met during the initial interconnection phase rather than having to address them later through NERC performance standards.

By providing recommendations and support, WECC can help inverter-based resource developers and operators contribute to grid reliability.

5. **Lack of coordinated planning for building out resources and transmission**

What makes this risk unique to the West?
The Western Interconnection faces challenges from a lack of coordinated planning across transmission and resource planning, as well as operational functions. Unlike other regions, the West does not have Regional Transmission Organizations (RTOs), resulting in separate resource adequacy programs, competing day-ahead and real-time markets, individual balancing authorities, and isolated transmission planning entities.

The region's complex regulatory landscape includes three separate FERC Order 1000 regions and different state policies on resource mixes and greenhouse gas emissions.

Historically, transmission and resource planning in the West have been conducted independently, leading to inefficiencies and missed opportunities for optimal system development. This siloed approach can hinder the creation of a cohesive system that manages diverse regional needs effectively.

Coordinated planning is essential for interconnection-wide analysis and efficient, effective system design. It enables better resource integration, more accurate load forecasting, and improved reliability while supporting the energy transition.

How can WECC contribute to mitigating this risk?
WECC can support coordinated planning across the Western Interconnection, enhancing resource adequacy and system development. As the interconnection-wide model builder, WECC can facilitate comprehensive planning by addressing gaps or inaccuracies in information provided to build interconnection-wide models.

WECC can support the WestTEC effort, aimed at improving transmission expansion and coordination, benefiting the entire region.

Additionally, WECC can increase its capacity to assess resource adequacy in the West, expanding its work in the Western Assessment of Resource Adequacy. WECC may need to assess resource

adequacy during non-binding periods for the Western Resource Adequacy Program (WRAP). This assessment would help manage potential resource shortfalls even when the program is not fully in place.

Evaluating the risks associated with entities choosing not to join WRAP or other resource adequacy programs can provide insights into potential gaps in regional coordination and resource planning. Understanding these risks helps guide entities and inform states on collaborative solutions that enhance reliability and efficiency.

Through its expertise in reliability assessments, WECC can bridge information gaps and support coordinated system assessment capabilities. This leads to a stronger, more resilient electric grid that can meet the region's evolving energy needs.

7. **Modeling quality and input validation**

What makes this risk unique to the West?
The Western Interconnection's high level of interdependence makes accurate modeling across the region essential for overall system reliability. As the grid transitions from traditional thermal synchronous generation to higher penetrations of inverter-based resources, understanding how these assets perform under different conditions is critical.

Unpredictable performance of inverter-based resources has caused large-scale disturbances on the bulk power system, leading to unexpected generation loss and potential outages. These disturbances often stem from improper modeling and validation of inverter-based resources due to manufacturers' reluctance to share data and lack of mandatory reporting.

Emerging grid-enhancing technologies like long-duration energy storage, dynamic line ratings, and HVDC systems are being integrated into the Western electric system. These technologies require new approaches to assess their impact on bulk power system reliability.

How can WECC contribute to mitigating this risk?
WECC can help mitigate the risk by becoming the go-to source for high-quality, vetted models that entities trust for reliability assessments. WECC can work with IBR developers to gain insight into IBR design and operation under real system conditions.

Standardizing inputs for generation and load/demand forecasts can improve accuracy across entities. WECC can continue improving modeling of behind-the-meter solar and storage and exploring challenges related to long-duration energy storage. WECC can also focus on techniques to model dynamic line ratings and other grid-enhancing technologies.

In May 2024, WECC staff provided their recommendations on the Reliability Risk Priorities. In addition to the four priorities WIRAB has identified above, WECC staff recommended the inclusion of *Potential Effects*

of Energy Policies in the West, as a fifth priority for WECC in the coming year. WIRAB did not include *Potential Effects of Energy Policies in the West* as one of its top priorities for WECC in the coming year, however WIRAB provides the following comments to the Board for consideration:

9. Potential Effects of Energy Policies in the West

What makes this risk unique to the West?
The Western Interconnection faces unique challenges due to its vast and varied landscape, encompassing multiple states with diverse climates, resources, and energy demands. This diversity extends to a broad spectrum of energy policies, ranging from advanced renewable energy initiatives to the maintenance of traditional energy infrastructures. The interplay between these policies not only influences energy development but also impacts regulatory compliance, economic incentives, and technological adoption, presenting a complex scenario for aligning varied approaches within a coherent framework that supports both regional and national energy goals.

Efficient management and adaptation of these policies are critical for ensuring grid stability, particularly in the face of demands for increased integration of variable energy resources and aging infrastructure. Policies that enhance grid resilience, improve energy efficiency, and facilitate technology upgrades are vital in maintaining an uninterrupted power supply, even more so during extreme weather events. These strategic policies require not only technical solutions but also a regulatory environment that supports efficient and stable energy distribution across diverse jurisdictions.

Strategic inter-state coordination is essential for mitigating potential risks associated with diverse policy and to fully leverage the diverse energy resources of the region. This underscores the importance of developing custom, region-specific strategies which are designed to meet the distinct needs and conditions of the Western Interconnection.

How can WECC contribute to mitigating this risk?
WECC can leverage its analytical capabilities to provide support in understanding and predicting the impacts of diverse energy policies on grid reliability and resiliency. This includes developing comprehensive assessments that help visualize how varying energy policies interact and affect the grid's performance. It is crucial, however, that WECC retain its impartiality as it analyzes the impact of energy policy on grid performance.

WECC can play a crucial role in formulating a set of risk management frameworks that aid in the integration of renewable and traditional energy sources. These frameworks ensure that energy policies across the region not only support grid reliability but allow for common understanding between varying state entities.

Conclusion:

WIRAB believes that all preliminary RRPs identified by WECC staff are important, and efforts should be made to mitigate these risks across the industry. Not everything can be a priority, thus WIRAB recommends focusing on the most unique and impactful risks to the West that WECC can effectively evaluate and help mitigate.

Therefore, WIRAB advises the Board to prioritize the following RRPs in 2024:

1. **Aridification and associated natural events: drought, heat events, and wildfires**
4. **Inverter-based Resources**
5. **Lack of coordinated planning for building out resources and transmission**
7. **Modeling quality and input validation**