



WECC

**2024 Reliability Risk Priorities
Staff Recommendation**

May 2024

Background

WECC staff recommends the five risks outlined in this document for approval as the 2024 WECC Reliability Risk Priorities (RRP). Staff arrived at this recommendation through two means:

1. Evaluating the risks based on three considerations: 1) pertinence and applicability to the Western Interconnection; 2) possibility for unique, non-duplicative work; and 3) opportunity for WECC to make a significant contribution.
2. Input from various sources, including: the WECC Board of Directors, WIRAB, the Member Advisory Committee (MAC), and WECC stakeholders at large through the stakeholder workshop and comment period.

Input

WECC provided multiple opportunities for stakeholders to give input on the 2024 RRP.

- February 29 Stakeholder Workshop: WECC shared the top 30+ risks for discussion with stakeholders.
- April Comment Period: WECC narrowed the list of risks to the top 10 and posted those for comment by stakeholders.
- April 29 WECC Board of Directors Workshop: WECC's Board discussed the top 10 risks and took input from WIRAB and the MAC.

Given the input and prioritization considerations, and taking into account WECC's capabilities to undertake work to address the risks, staff has narrowed the list of RRP to five and recommends to the Board of Directors that it adopt these five risks as the 2024 WECC RRP.

- Aridification and associated natural events: drought, heat events, and wildfires
- Impact of inverter-based resources
- Lack of coordinated planning for building out resources and transmission
- Modeling quality and input validation
- Potential effects of energy policies in the West

Aridification and Associated Natural Events

Aridification is the gradual, permanent change of a region from a humid or wetter climate to a drier climate. Aridification is a long-term phenomenon with a timespan beyond our current system planning horizons; however, natural events associated with aridification have a more immediate and tangible effect. Drought, heat events, and increased wildfire activity challenge the planning and operation of the system in the West. Aridification is a challenge that is largely distinctive to the West. While changes in climate are experienced across the continent, the changes associated with aridification are particular to and highly concentrated in the West. Because of the configuration and operation of the system in the West, the effects of natural events related to aridification affect the entire interconnection, making this a West-wide risk.

Potential WECC Contribution

WECC can help the industry better understand the nature and likelihood of these events and their potential impact on reliability. Through modeling, data gathering, and analysis, WECC can help improve planning and operational practices and provide studies to better account for risks associated with aridification. Through its stakeholder engagement function, WECC can gather experts, decision-makers, and others to discuss the risks, share study techniques, evaluate solutions and mitigation strategies, and create networks.

Inquiries

WECC sees value in pursuing inquiries like:

- What are the long-term effects of a reduction in hydro capacity across the interconnection, particularly in areas dependent on hydro?
- With the past no longer a dependable predictor of future weather patterns, how can system planning better account for unpredictable weather? What improvements need to be made to models and data to ensure weather is reflected more accurately in system models?
- How resilient is the system? Is it prepared to withstand and recover from extreme heat events and wildfires? What needs to be done to increase resilience? What lessons have we learned and implemented from recent extreme heat events and wildfires?
- How have the effects of aridification changed over the last few years, and how are they expected to look in the future based on those trends? How might those trends affect the reliability of the Western Interconnection?
- What are the potential effects of aridification in the long-term, i.e., 10+ years in the future?

Current Work

- Oversight and Enforcement:



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- EOP-011-2 – Emergency Preparedness and Operations is prioritized in oversight planning and monitoring activities.
- FAC-008-5 – Facility Ratings: WECC is identifying trends and themes and sharing observations and best practices through stakeholder outreach.
- Reliability Assessments and Modeling—WECC is working with the Pacific Northwest National Laboratory (PNNL) to enhance its ability to model hydro resources. This work influences the base cases as well as the production cost model.
- Reliability Risk Management—Maintaining awareness of wildfires through the WECC Wildfire Dashboard and their possible effects on BES facilities.

Potential Work

- Oversight and Enforcement:
 - FAC-003-5 – Transmission Vegetation Management: Outreach opportunity to involve asset owners for challenges and successes (managed vegetation corridors acting as firebreaks).
- Reliability Assessments and Modeling—WECC can set the scopes potential reliability assessments focused on aridification and extreme natural events.
- Standards—Support changes to standards to address the risk (e.g., EOP, TOP, TPL).
- Reliability Risk Management—Examine other potential dashboards that can be used by industry like the WECC Wildfire Dashboard (e.g., drought).
- Reliability Risk Management—Promote best practices for reliability-enhancing technology in monitoring the power system for events like wildfires.

Impact of Inverter-based Resources

Inverter-based resources (IBR) include wind turbines, solar photovoltaic, and battery energy storage systems. IBRs are facilities connected to the bulk power system that convert DC electricity from renewable sources into AC electricity, which allows power to flow into the grid. Over the next decade, entities in the West plan to add more than 100 GW of IBRs to the system to meet demand under clean and green energy policies.

Potential WECC Contribution

WECC currently leads and supports a range of work on IBRs, including events analysis of IBR-related events, NERC efforts to better understand and share information about the potential risks associated with IBRs, facilitated discussions about IBRs and their role in the system, evaluation and implementation of new IBR registration requirements and reliability standards.



Inquiries

WECC sees value in pursuing inquiries like:

- What kinds of data and modeling are necessary to accurately study the potential effects of IBRs on system stability in the 10- and 20-year futures? What can WECC do to ensure the data and models are collected and built?
- What kind of resource adequacy and essential reliability service concerns result from large increases in IBRs on the system in the near- and long-term future?
- How might grid-forming technology, deployed at different levels, help or hinder the system? What are the obstacles to implementing grid-forming technology, and is there a role for WECC in addressing the obstacles?
- Are the lessons learned from events related to IBRs being fully applied by the industry? If not, what are the residual risks to the system?

Current Work

WECC is engaged in work on IBRs, including the following:

- Standards—Standards development.
- Oversight and Enforcement—Registration changes (e.g., no longer have a Commercial Operation Date in favor of first-sync date with phased-in implementation plan for Compliance).
- Reliability Assessments and Monitoring—Reliability assessments on inverter technology.
- Reliability Assessments and Modeling—Event analysis of IBR-related system events. As part of this process, WECC staff works with the plants to optimize their settings for improved performance.
- Reliability Assessments and Modeling—Ongoing model development to capture capabilities and protection.
- Reliability Risk Management—Outreach to GOs of IBR facilities with specific inverters to enhance performance during system events.

Potential Work

- Oversight and Enforcement—Focus on implementation (Registration) for Compliance to reduce the likelihood of noncompliance later.
- Reliability Assessments and Modeling—Build on prior WECC Reliability Assessments focused on IBRs to answer additional reliability questions and continue to improve dynamic models for IBRs.
- Standards—Support changes to standards to address the risk (e.g., MOD, TPL).
- Reliability Assessments and Modeling—Assess Western Interconnection oscillations and other frequency events involving large penetrations of IBRs. Share lessons learned with industry.



Lack of Coordinated Resource and Transmission Planning

Historically, transmission planning and resource planning have occurred separately. While some entities combine the two types of planning, this is not the case on regional or interconnection-wide levels. Recent events and analyses related to resource adequacy show that resource adequacy is as much a question of transmission as it is of resources. A heat wave in August 2020 and the Bootleg Fire in 2021 showed that, under certain circumstances, the ability to move power can be as limiting as the availability of that power. Resource and transmission planning are inextricably linked and should be considered jointly on an interconnection-wide basis.

Potential WECC Contribution

As the designated model builder under the MOD-032-1, Data for Power System Modeling and Analysis standard, WECC has a stake in ensuring the West can conduct coordinated system planning. Through its analytical, data gathering, and modeling capabilities, WECC can lead the West toward more coordinated planning practices. WECC can facilitate stakeholder discussions about planning among entities across the entire interconnection, providing a neutral, reliability-focused, West-wide presence in conversations that will shape planning in the West for decades.

Inquiries

There are several inquiries WECC can help address to reach this goal:

- How can the West address gaps or inaccuracies in information provided to WECC to build interconnection-wide models?
- What needs to happen to create a West-wide coordinated system planning capability?
- What additional models and cases, or changes in developed models and cases, are needed to help with system planning?

Current Work

- Oversight and Enforcement—TPL-001-5.1 Transmission System Planning Performance Requirements, MOD-032-1 Data for Power System Modeling, and MOD-033-2 Steady-State and Dynamic System Model Validation are being focused on for entity monitoring.
- Reliability Assessments and Modeling—WECC is working with the ERO to complete the Interregional Transfer Capability Analysis, which will highlight nationwide opportunities for prudent reliability additions and expand WECC's ability to perform similar studies.
- Reliability Assessments and Modeling—WECC is examining how it can better help industry by evaluating which additional longer-term models are needed to coordinate future system development.
- Reliability Assessments and Modeling—WECC is following and engaged in several coordinated planning efforts such as WestTEC.



Potential Work

- Oversight and Enforcement—TPL-001-5.1, MOD-032-1, and MOD-033-2 have had incorrect past-studies. The new focus is on correcting at implementation (Registration).
- Standards—Support changes to standards to address the risk (e.g., TPL).
- Reliability Risk Monitoring—Identify Western Interconnection power flow changes and associated reliability risks due to the changing resource mix and extreme weather events.

Modeling quality and input validation

Modeling is the process of building computer models of energy systems to analyze and better understand them. Studying how assets on the grid will respond to disturbances or other changes (e.g., demand growth) helps prevent reliability issues on the bulk power system. With rapid changes occurring on the system, up-to-date, accurate models and data are critical to planning and operating the system.

Potential WECC contribution

WECC creates various system-wide models to help stakeholders and staff perform reliability assessments and planning studies. With its ability to gather data through various means, and its ability to gather experts and inform decision-makers, WECC can make a material impact on the quality of models and data in the West.

Inquiries

WECC sees value in addressing inquiries such as:

- What does the interconnection need to improve the quality of IBR modeling? How quickly can these models be improved?
- What improvements to existing model building processes are necessary to ensure the accuracy of models?
- How can demand forecasts be improved? How can weather information in the models be improved to better reflect the changes in climate experienced across the West?
- How can actual system operating conditions that more accurately reflect the changes caused by grid transformation be used in the transmission model development process?
- What kind of electromagnetic transient (EMT) models and standardized modeling practices (data collection, model quality checks, etc.) are needed in the West?

Current Work

- Monitoring MOD-032-1 and MOD-033-2 on current entities with the highest risk for inclusion in future audit.



- Reliability Assessments and Modeling—WECC has contracted with Elevate Energy Consulting to develop a strategy about EMT to establish how WECC can best enhance the industry’s ability to use these sophisticated tools to maintain the reliability of the interconnection.
- Reliability Assessments and Modeling—WECC and its committees evaluate and discuss the quality of model submissions and the consistency of assumptions as they are provided.
- Reliability Assessments and Modeling—WECC and its committees are examining and evaluating changes in power system use, such as changes in flows during certain seasons and working with stakeholders to refine the models being developed.

Potential Work

- Standards—Support changes to standards to address the risk (e.g., MOD).
- Reliability Assessments and Modeling—Evaluate the accuracy of load models and identify needed enhancements to account for the increase in large loads (e.g., data centers, cryptocurrency facilities).
- Reliability Risk Management—Analyze IBR performance during system events and compare to current models to identify deficiencies.

Potential effects of energy policies in the West

The West is a patchwork of different, sometimes contradicting, energy policies. These include policies on topics ranging from energy efficiency to building codes and clean energy mandates to protection of legacy energy generation types. These policies can drive changes to the operation and planning of the bulk power system and create an environment that introduces risks to reliability and resilience. In addition, the varied nature of the policies across the West, and federally, creates complexity that may also introduce risk to the system. It is critical that policymakers understand the potential impacts of their decisions to avoid inadvertent reliability risks.

Potential WECC contribution

WECC’s policy analysis function tracks and monitors the status of energy policies in the West and at the federal level. Combined with its analytical capabilities, WECC can look at the potential effects of some energy policies on the reliability and resilience of the West. Through its stakeholder engagement activities, WECC can share this information and educate policymakers about these potential risks.

Inquiries

- How might the combination of existing policies create risk to the system, particularly those with future target dates? How far-reaching are the policies in one state? How do the policies in one state interact with policies in other states, in terms of the potential effects on the power system, which crosses state borders?



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- What are the potential effects of federal legislation and funding for energy projects?
- What concerns with forecasting do these policies create?
- How have these policies affected the performance of the bulk power system? How might that change in the future?
- What policy changes could be on the horizon that have the potential to affect reliability and resilience?
- How can WECC help inform policymakers about how aggressive energy policies affect reliability?

Current Work

- Oversight and Enforcement—Registered Entities based in Colorado are scheduled to phase out coal completely by the end of 2030 and will rely on renewable energy sources to meet the demand. WECC Oversight Planning has prioritized reviewing long-term planning studies to gain understanding on how entities are planning for wind and solar generation and whether the planning studies are adjusted for the changing resource mix, the impact of new generation, etc.
- Reliability Assessment and Modeling—WECC’s assessments, including the Western Assessment of Resource Adequacy, are intended to provide a resource to state and provincial energy officials, regulators, and legislators as they contemplate policies or decisions that affect the future resource mix.
- Strategic Engagement—WECC is working to increase its outreach not only to state and provincial energy officials and regulators but also to legislators, to better understand future policy changes and their implications.
- WECC continues to foster cooperation among policymakers and the industry to promote understanding and address emerging reliability risks.

Potential Work

- Reliability Assessment and Modeling—WECC can study the potential effects of energy policies on reliability in the West.
- Strategic Engagement—WECC can use its position as a resource-neutral and interconnection-wide organization to facilitate discussion among state and provincial officials, regulators, and legislators that is focused on the reliability implications of policy goals.

