WIRAB Technical Resource: State Oversight of Inverter-Based Resources in the West

Public Webinar

December 2, 2025

WIRAB
Western Interconnection Regional Advisory Body

Webinar Logistics

Recording

This webinar is being recorded and **will be posted publicly**.

By participating, you consent to your name, voice, and image being part of the recording.

How to Participate

Use the **"Raise Hand"** feature to ask questions

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Audio Etiquette

Participants are muted.

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Materials & Follow-Up

Slides and materials will be shared after the meeting and available on the webpage.

Who is WIRAB?

WIRAB
Western Interconnection Regional Advisory Body

- **Statutory Authority:** Established in 2005, as an independent body with statutory authority under Section 215(j) of the Federal Power Act to Advise FERC, NERC, and WECC on reliability matters in the Western Interconnection.
- **Membership:** All state and provinces with load served in the Western Interconnection
- **Funding:** Assessments approved by FERC to load serving entities under Section 215 of the Federal Power Act.

WIRAB's 2025 Strategic Initiatives

WIRAB
Western Interconnection Regional Advisory Body

Transmission Planning (WestTEC)

Initiative 1: Advise WECC to work collaboratively with the Western Power Pool and Western stakeholders to develop an investment-grade transmission plan that effectively improves reliability in the Western Interconnection.

Inverter-based Resource Risk

Initiative 2: Advise WECC to work collaboratively with Western regulators and stakeholders to address and proactively mitigate risks associated with the uncoordinated interconnection of inverter-based resources in the Western Interconnection.

Inter-regional Transfer Capability

Initiative 3: Advise WECC regarding a process for ongoing assessments and prudent upgrades for inter-regional transfer capabilities in the Western Interconnection to ensure reliable power flow when the system is stressed.

Extreme Weather Event Analysis

Initiative 4: Advise WECC to conduct a systematic review of recent extreme weather events that have tested the grid, focusing on the challenges of maintaining grid reliability during increased demand, unexpected outages, system stress, and near-miss incidents in the Western Interconnection.

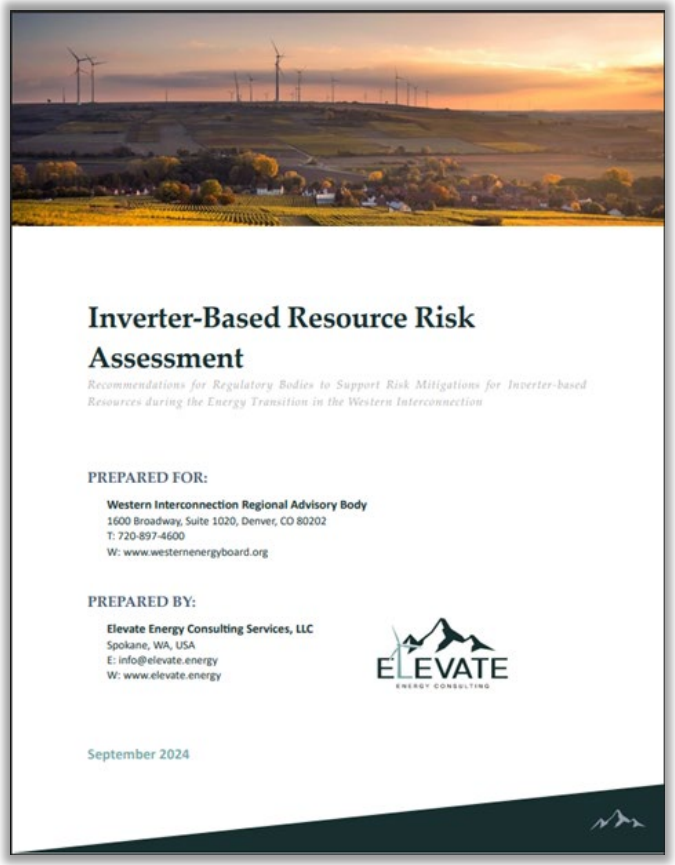
Grid Enhancing Technologies for Reliability

Initiative 5: Advise WECC to assess the reliability implications of innovative grid solutions used to maximize the potential of the existing transmission system as utilities modernize the grid in the Western Interconnection.

Inverter-Based Resource Risk Assessment Report

Western Interconnection Regional Advisory Body

- **Developed by Elevate Energy Consulting**
- **Report and Recommendations Endorsed by WIRAB in 2024.**
  - WIRAB to collaborate with WECC and other key stakeholders to prioritize and implement the recommendations outlined in this report.
- **Key Recommendation:** State utility commissioners and staff should engage in the discussion to emphasize the need for proactive enhancement of interconnection requirements for IBRs



Technical Resources for State Regulators on IBR Oversight

Western Interconnection Regional Advisory Body

Technical Resources Document available on the WIEB Website

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Technical Resource for State Regulators and Commissioners
Oversight of Inverter-based Resources

July 23, 2025

Purpose

This document is a technical resource designed to support state regulators in exercising informed oversight amid the rapid growth of inverter-based resources (IBRs) and the evolving resource mix. The guiding questions included are intended to assist regulators in engaging with utilities and stakeholders during integrated resource planning, rate cases, and other regulatory proceedings. This effort aims to help regulators protect consumers, ensure just and reasonable rates, oversee prudent utility investments, and advance public policy goals—all while maintaining a reliable and resilient electric grid in the face of accelerating technological change.

Applicability

Although state regulators have primary authority over state-jurisdictional resources, they can also play a critical role in supporting the reliability of FERC- and NERC-jurisdictional resources that directly impact local grid reliability, system operations, and ratepayers. Regulators can press utilities to explain how they are implementing NERC recommendations, adopting industry standards, and dedicating sufficient resources to meet the challenges ahead. Without adequate measures, retail customers face notable risks: inefficient processes, costly investments to offset unreliable operations, and rework caused by inaccurate data or information, driving up consumer costs. In many cases, utilities may spend unnecessary time and money fixing avoidable problems—problems that could instead be addressed through clearer requirements, modern technology, automation, and improved processes.

While the topics described in this document apply to bulk power system (BPS) resources connected to the transmission system, states should also recognize the importance of distribution-connected resources. BPS-connected IBRs are guided by IEEE 2800 while distribution-connected distributed energy resources (DERs) adhere to IEEE 1547. Both standards share similar goals but differ in technical implementation. For example, BPS resources must provide large-scale grid support functions (e.g., ride-through, dynamic response characteristics, frequency response), whereas DER standards emphasize interoperability, coordination with local systems, and safe integration at smaller scales. State regulators should understand both frameworks: most of the topics and questions raised here apply to the BPS, but parallel questions—appropriately modified—are also relevant at the distribution level. Regulators have a key role to play in staying engaged, informed, and aligned across both domains to ensure reliability for all customers (see Table 1).

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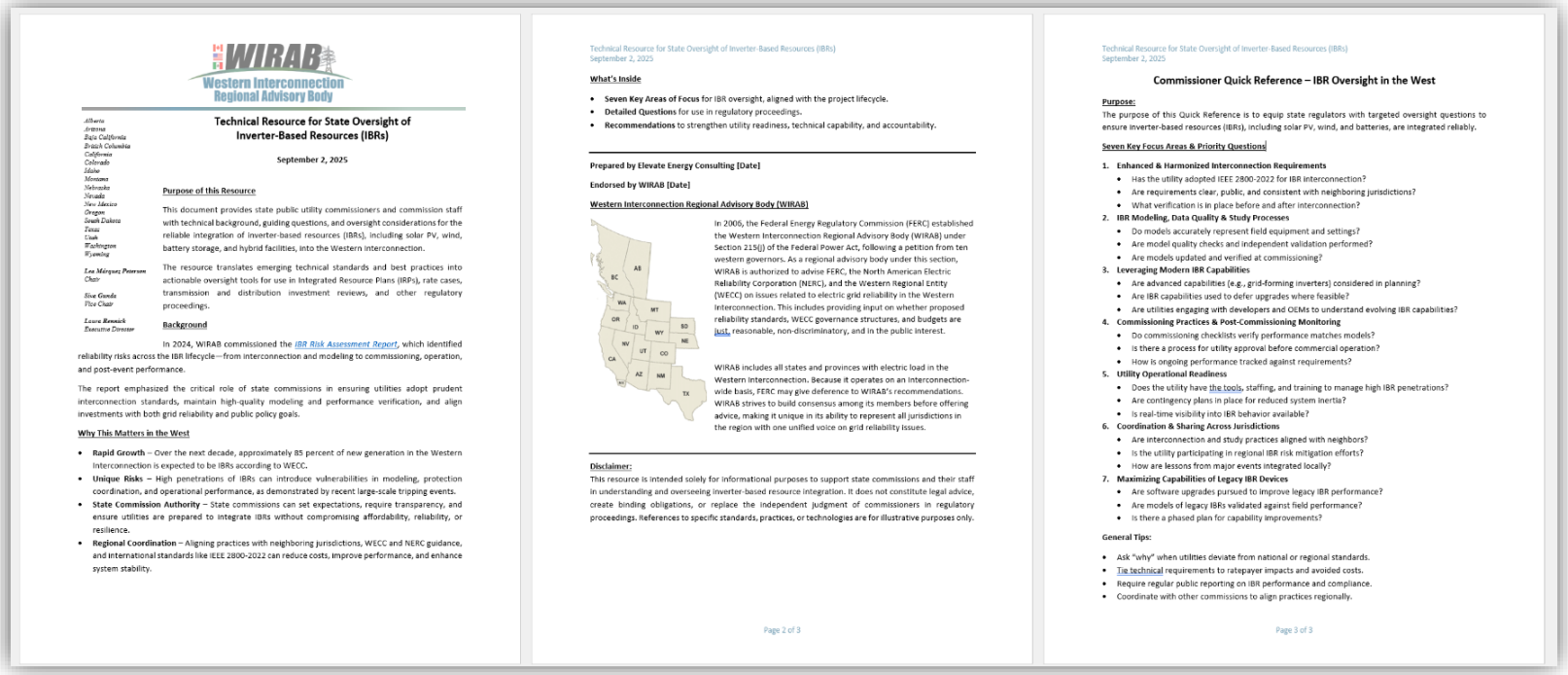

WIRAB
Western Interconnection Regional Advisory Body

Technical Resource for State Oversight of Inverter-Based Resources (IBRs)

September 2, 2025

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Purpose of this Resource

This document provides state public utility commissioners and commission staff with technical background, guiding questions, and oversight considerations for the reliable integration of inverter-based resources (IBRs), including solar PV, wind, battery storage, and hybrid facilities, into the Western interconnection.

The resource translates emerging technical standards and best practices into actionable oversight tools for use in Integrated Resource Plans (IRPs), rate cases, transmission and distribution investment reviews, and other regulatory proceedings.

Background

In 2024, WIRAB commissioned the *IBR Risk Assessment Report*, which identified reliability risks across the IBR lifecycle—from interconnection and modeling to commissioning, operation, and post-event performance.

The report emphasized the critical role of state commissions in ensuring utilities adopt prudent interconnection standards, maintain high-quality modeling and performance verification, and align investments with both grid reliability and public policy goals.

Why This Matters in the West

- **Rapid Growth** – Over the next decade, approximately 85 percent of new generation in the Western Interconnection is expected to be IBRs according to WECC.
- **Unique Risks** – High penetrations of IBRs can introduce vulnerabilities in modeling, protection coordination, and operational performance, as demonstrated by recent large-scale tripping events.
- **State Commission Authority** – State commissions can set expectations, require transparency, and ensure utilities are prepared to integrate IBRs without compromising affordability, reliability, or resilience.
- **Regional Coordination** – Aligning practices with neighboring jurisdictions, WECC and NERC guidance, and international standards like IEEE 2800-2022 can reduce costs, improve performance, and enhance system stability.

What's Inside

- **Seven Key Areas of Focus** for IBR oversight, aligned with the project lifecycle.
- **Detailed Questions** for use in regulatory proceedings.
- **Recommendations** to strengthen utility readiness, technical capability, and accountability.

Prepared by Elevate Energy Consulting [Date]

Endorsed by WIRAB [Date]

Western Interconnection Regional Advisory Body (WIRAB)

In 2006, the Federal Energy Regulatory Commission (FERC) established the Western Interconnection Regional Advisory Body (WIRAB) under Section 215(j) of the Federal Power Act, following a petition from ten western governors. As a regional advisory body under this section, WIRAB is authorized to advise FERC, the North American Electric Reliability Corporation (NERC), and the Western Regional Entity (WECC) on issues related to electric grid reliability in the Western Interconnection. This includes providing input on whether proposed reliability standards, WECC governance structures, and budgets are just, reasonable, non-discriminatory, and in the public interest.

WIRAB includes all states and provinces with electric load in the Western Interconnection. Because it operates on an interconnection-wide basis, FERC may give deference to WIRAB's recommendations. WIRAB strives to build consensus among its members before offering advice, making it unique in its ability to represent all jurisdictions in the region with one unified voice on grid reliability issues.

Disclaimer:

This resource is intended solely for informational purposes to support state commissions and their staff in understanding and overseeing inverter-based resource integration. It does not constitute legal advice, create binding obligations, or replace the independent judgment of commissioners in regulatory proceedings. References to specific standards, practices, or technologies are for illustrative purposes only.

Commissioner Quick Reference – IBR Oversight in the West

Purpose:

The purpose of this Quick Reference is to equip state regulators with targeted oversight questions to ensure inverter-based resources (IBRs), including solar PV, wind, and batteries, are integrated reliably.

Seven Key Focus Areas & Priority Questions

1. **Enhanced & Harmonized Interconnection Requirements**
   - Has the utility adopted IEEE 2800-2022 for IBR interconnection?
   - Are requirements clear, public, and consistent with neighboring jurisdictions?
   - What verification is in place before and after interconnection?
2. **IBR Modeling, Data Quality & Study Processes**
   - Do models accurately represent field equipment and settings?
   - Are model quality checks and independent validation performed?
   - Are models updated and verified at commissioning?
3. **Leveraging Modern IBR Capabilities**
   - Are advanced capabilities (e.g., grid-forming inverters) considered in planning?
   - Are IBR capabilities used to defer upgrades where feasible?
   - Are utilities engaging with developers and OEMs to understand evolving IBR capabilities?
4. **Commissioning Practices & Post-Commissioning Monitoring**
   - Do commissioning checklists verify performance matches models?
   - Is there a process for utility approval before commercial operation?
   - How is ongoing performance tracked against requirements?
5. **Utility Operational Readiness**
   - Does the utility have the tools, staffing, and training to manage high IBR penetrations?
   - Are contingency plans in place for reduced system inertia?
   - Is real-time visibility into IBR behavior available?
6. **Coordination & Sharing Across Jurisdictions**
   - Are interconnection and study practices aligned with neighbors?
   - Is the utility participating in regional IBR risk mitigation efforts?
   - How are lessons from major events integrated locally?
7. **Maximizing Capabilities of Legacy IBR Devices**
   - Are software upgrades pursued to improve legacy IBR performance?
   - Are models of legacy IBRs validated against field performance?
   - Is there a phased plan for capability improvements?

General Tips:

- Ask "why" when utilities deviate from national or regional standards.
- Tie technical requirements to ratepayer impacts and avoided costs.
- Require regular public reporting on IBR performance and compliance.
- Coordinate with other commissions to align practices regionally.

Outline

- **Opening Remarks** – *Commissioner Lea Márquez Peterson, WIRAB Chair*
- **Technical Presentation** – *Ryan Quint, Elevate Energy Consulting*
- **Commissioner Perspective** – *Commissioner Lea Márquez Peterson, AZCC Commissioner*
- **PUC Staff Perspective** – *Robin Arnold, WIEB*
- **Q&A** – *Moderated by Eric Baran*

Opening Remarks

Commissioner Lea Márquez Peterson

WIRAB Chair

Why This Resource Matters

Importance of IBR Oversight in the West

- Rapid growth of inverter-based resources across the Western Interconnection
- Increasing system complexity and new reliability challenges
- Recent disturbances show gaps in performance, coordination, and visibility

Why Now

- Accelerating resource transitions and utility-scale IBR additions
- NERC/FERC are strengthening standards, but regulatory oversight varies
- States need actionable guidance to ensure reliability keeps pace with change

Technical Presentation

Ryan Quint

Elevate Energy Consulting

Oversight of IBRs

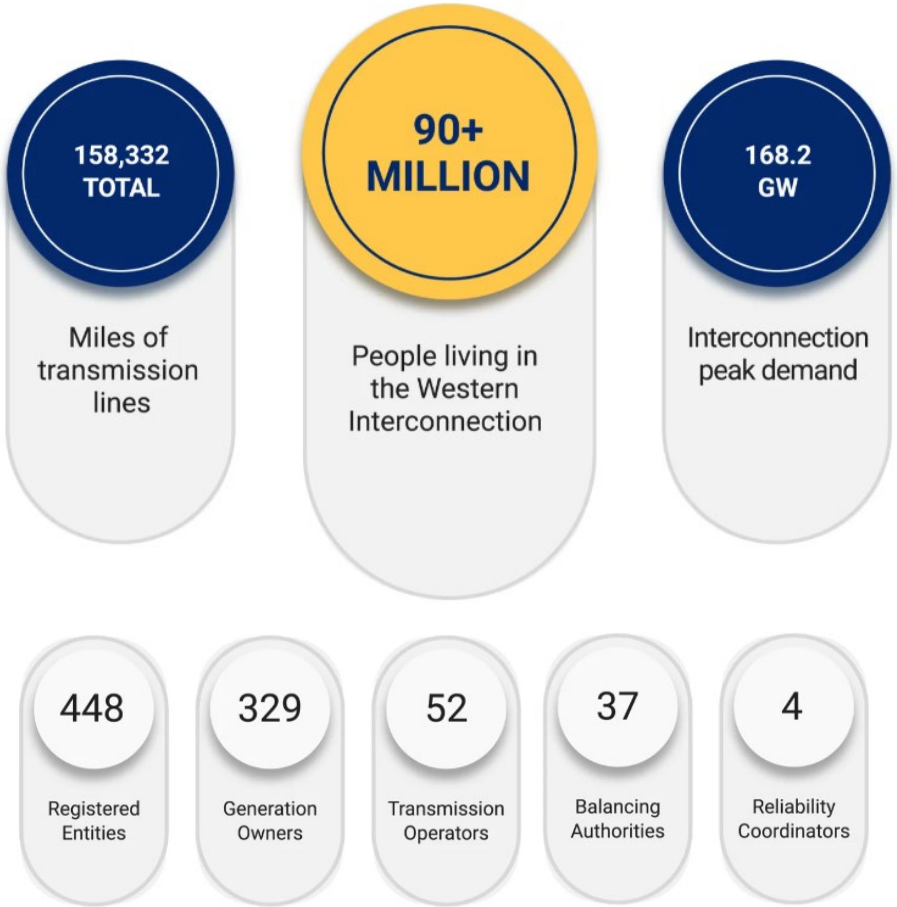
Technical Resource for Educating State Regulators and Commissions

Ryan D. Quint, PhD, PE
President and CEO

December 2, 2025

Why This Matters in the West

- **Rapid Growth:** Over next decade, ~85 percent of new generation in the West is expected to be IBRs
- **Unique Risks:** High penetrations of IBRs can introduce vulnerabilities in modeling, protection coordination, and operational performance, as demonstrated by recent large-scale tripping events.
- **State Commission Authority:** State commissions can set expectations, require transparency, and ensure utilities are prepared to integrate IBRs without compromising affordability, reliability, or resilience.
- **Regional Coordination:** Aligning practices with neighboring jurisdictions, WECC and NERC guidance, and standards like IEEE 2800-2022 can reduce costs, improve performance, and enhance system stability.



Source: WECC

Inverter-Based Resource Risk Assessment Report

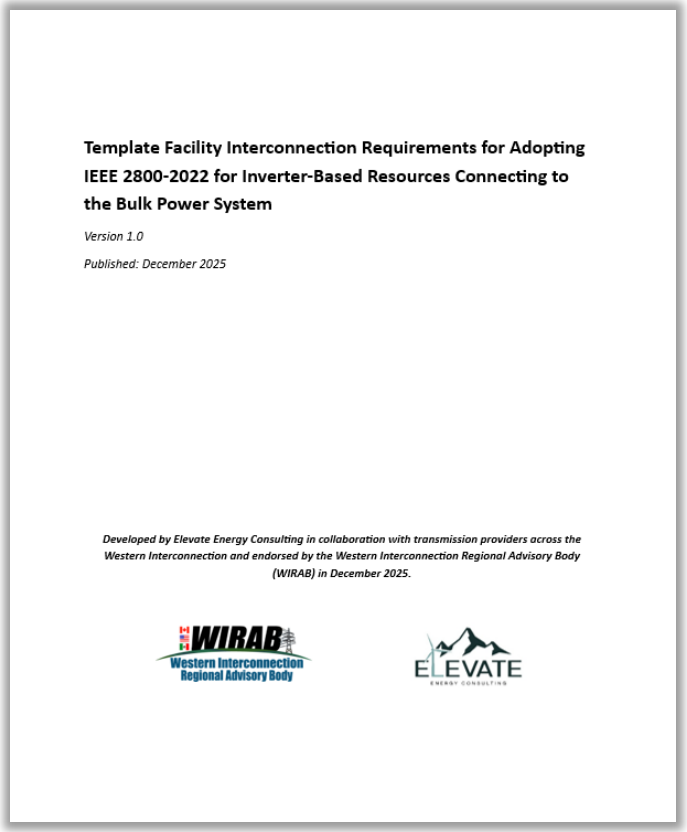
- **2024 Report and Recommendations Endorsed by WIRAB:**
  - WIRAB to collaborate with WECC and other key stakeholders to prioritize and implement the recommendations outlined in this report.
- **Key Message:**
  - Create a standardized template for FIR enhancements, ideally implementing IEEE 2800-2022 standard.

Risk Assessment Recommendations

- **Harmonize requirements for IBRs across the West**
  - Leverage IEEE 2800-2022 and latest implementation learnings
  - Enhance Facility Interconnection Requirements for IBRs
  - Produce a standardized template for requirements enhancements
- **Lead proactive, stakeholder-engaged risk mitigation efforts**
  - Conduct regional training, education, and engagement
  - Support smaller entities, allow utility/system-specific flexibility
  - Focus on both observed risks and future challenges
- **Consider developing related requirements for large loads**

Industry Advisory Group Initiative

- Forum to educate stakeholder about IEEE 2800-2022, support broader adoption of the standard
- Sharing experience and lessons learned among transmission entities
- Fostering harmonization of interconnection requirements across the West
- Supporting smaller entities or entities maybe further behind
- Publishing “template” Facility Interconnection Requirements (FIRs) appendix for entities to adopt and adapt, as needed


Template Facility Interconnection Requirements for Adopting IEEE 2800-2022 for Inverter-Based Resources Connecting to the Bulk Power System

Version 1.0

Published: December 2025

Developed by Elevate Energy Consulting in collaboration with transmission providers across the Western Interconnection and endorsed by the Western Interconnection Regional Advisory Body (WIRAB) in December 2025.

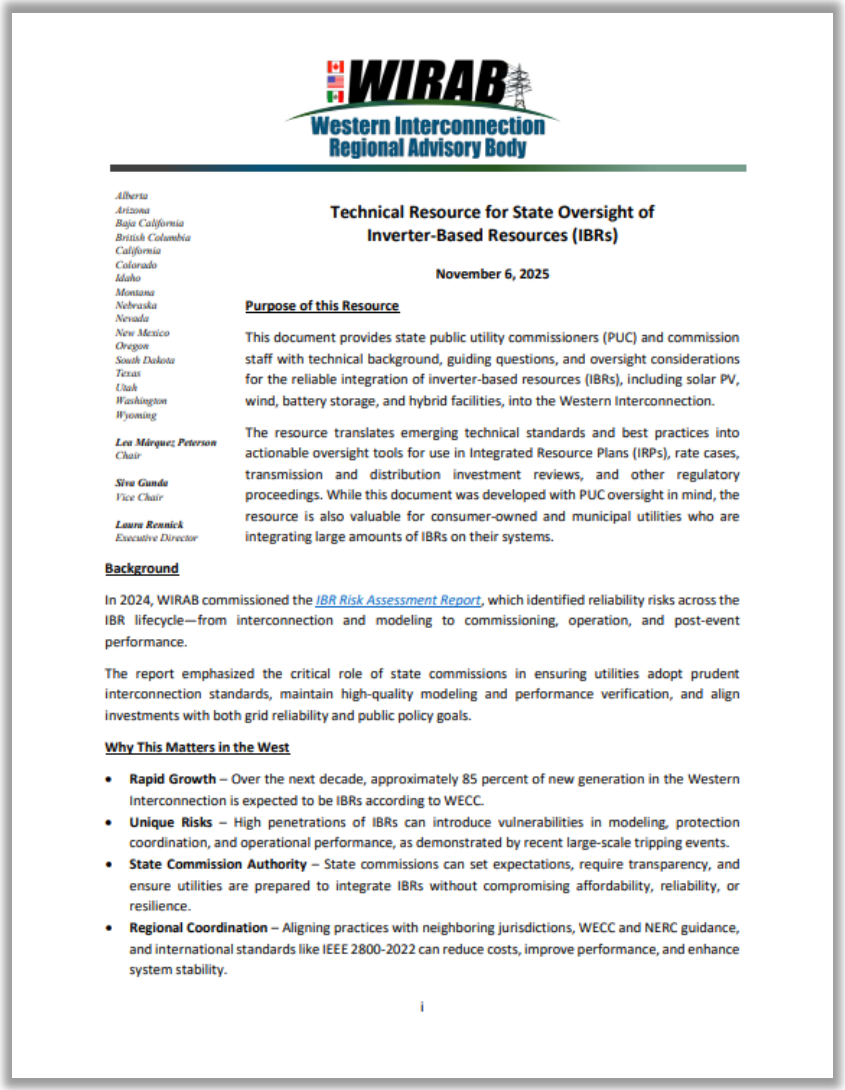
Learn more here!

Action: adopt the template and harmonize!

Resources for State Regulators on IBR Risks

What's Inside

- **Seven Key Areas of Focus** for IBR oversight, aligned with the project lifecycle.
- **Detailed Questions** for use in regulatory proceedings.
- **Recommendations** to strengthen utility readiness, technical capability, and accountability.



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Technical Resource for State Oversight of Inverter-Based Resources (IBRs)

November 6, 2025

Purpose of this Resource

This document provides state public utility commissioners (PUC) and commission staff with technical background, guiding questions, and oversight considerations for the reliable integration of inverter-based resources (IBRs), including solar PV, wind, battery storage, and hybrid facilities, into the Western Interconnection.

The resource translates emerging technical standards and best practices into actionable oversight tools for use in Integrated Resource Plans (IRPs), rate cases, transmission and distribution investment reviews, and other regulatory proceedings. While this document was developed with PUC oversight in mind, the resource is also valuable for consumer-owned and municipal utilities who are integrating large amounts of IBRs on their systems.

Background

In 2024, WIRAB commissioned the *IBR Risk Assessment Report*, which identified reliability risks across the IBR lifecycle—from interconnection and modeling to commissioning, operation, and post-event performance.

The report emphasized the critical role of state commissions in ensuring utilities adopt prudent interconnection standards, maintain high-quality modeling and performance verification, and align investments with both grid reliability and public policy goals.

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Key Focus Areas and General Tips

- Enhanced and Harmonized IBR Interconnection Requirements
- IBR Modeling, Data Quality, and Study Processes
- Leveraging Modern IBR Capabilities
- Commissioning Practices and Post-Commissioning Monitoring
- Utility Operational Readiness
- Coordination and Sharing Across Jurisdictions
- Maximizing Capabilities of Legacy IBR Devices

General Tips for State Regulators to Act:

- Ask "why" when utilities deviate from national or regional standards.
- Ensure transmission utilities are engaged in overseeing the commissioning of new IBRs.
- Tie technical requirements to ratepayer impacts and avoided costs.
- Require regular public reporting of IBR performance and compliance.
- Coordinate with other commissions to align practices regionally.

The Technical Resource provides detailed questions in each of these areas that regulators can ask to gain deeper insights and better understand potential risks.

Enhanced and Harmonized IBR Req's

- Are interconnection requirements specifying ***IBR capability and performance*** (e.g., ride-through, reactive power capability, voltage support, frequency response, protection, etc.) aligned with national standards?
- Has ***IEEE 2800-2022*** been adopted into utility facility interconnection requirements, tariff, or other requirements?
- How are utilities preparing for ***regulatory changes*** (e.g., FERC Order 901)?
- How are IBR requirements ***coordinated with neighbors*** to achieve harmonization and reduce friction for newly connecting resources?
- What ***test and verification processes*** are in place to ensure new IBRs conform to requirements?
- How are ***IBR plant models*** used to check conformity with the requirements?
- How are interconnection requirements designed to ***accommodate emerging technologies*** such as grid forming BESS or IBR fast frequency response?

Source: Unsplash

IBR Modeling, Data Quality, and Studies

- What ***modeling requirements*** have been implemented for IBRs to ensure accurate and high-fidelity models represent actual equipment planned or installed in the field?
- Do modeling requirements adequately and sufficiently address ***power flow, phasor domain transient, short-circuit, and EMT models***?
- What ***model quality requirements*** and ***model quality checks*** are in place pre- and post-commissioning to ensure IBR projects meet established requirements?
- What ***supporting documentation*** is required (e.g., model user guides, IBR unit or supplemental IBR device test reports, block diagrams, as-planned/as-left settings) to verify submitted models match planned or actual site configuration?
- How are ***model deficiencies*** addressed and how is the utility ensuring fairness and transparency throughout that process?
- Is ***model benchmarking*** across platforms required?
- Have utilities incorporated ***industry-recommended modeling practices*** such as IEEE P2800.2 into their interconnection or study requirements? If not, what is the timeline or rationale for deviation?
- Are utilities ***standardizing modeling data formats and submission protocols*** to ensure consistency and reduce interconnection delays?
- How is the utility ***minimizing the burdens on IBR developers*** in terms of modeling requirements and checks by ***leveraging automations*** or other tools?

Leveraging Modern IBR Capabilities

- Are ***grid forming batteries*** evaluated to support ***high IBR or weak grid conditions*** alongside other conventional alternatives?
- Are IBR performance capabilities (e.g., ride-through, GFM, blackstart, etc.) being leveraged to reduce or ***defer infrastructure upgrades*** where technically feasible? Or to act as a ***bridge solution*** until longer-term solutions can be deployed?
- Are ***utilities engaging with developers and OEMs*** to understand evolving IBR technologies and how these capabilities can be integrated into grid support functions?
- To what extent are planning studies considering ***hybrid or multi-solution pathways*** that integrate both long-term infrastructure and near-term IBR-based grid support strategies?

Source: Unsplash

Commissioning and Monitoring

- How are utilities ***verifying that IBR plants are commissioned with settings and controls that match the models*** and assumptions used in interconnection studies?
- Are utilities requiring and reviewing ***standardized commissioning checklists*** that confirm key control parameters, protection settings, and ride-through capabilities prior to COD?
- What ***documentation*** (e.g., parameter verification reports, test results, commissioning summaries) are developers required to submit, and how is this information validated by the utility?
- Is there a formal process for utility ***approval of commissioning documentation*** before allowing commercial operation of the IBR facility?
- How are utilities ***handling discrepancies between modeled and observed performance***, and what corrective actions are enforced?
- Are utilities conducting ***on-site inspections or remote verification*** of critical IBR performance characteristics during or after commissioning?
- What ***post-commissioning monitoring*** is in place to ensure IBRs continue to perform in accordance with study assumptions over time?
- How are lessons from commissioning and early operations being captured and used to improve future interconnection modeling, studies, and performance expectations?

Utility Operational Readiness

- What ***enforcement mechanisms*** does the utility have in place to ensure noncompliance with requirements is identified and addressed?
- How are compliance issues identified and resolved when field behavior deviates from modeled or expected behavior?
- What ***tools and situational awareness*** are the utility using to monitor and manage high penetrations of IBRs in real time?
- Do utility operators have access to ***high-fidelity visibility*** into IBR behavior across their system?
- What ***internal training, staffing, or operational readiness*** are in place to ensure staff are equipped to manage high IBR grids?
- What ***forward-looking studies beyond conventional long-term transmission planning*** studies are conducted by the utility and/or transmission planner to identify high-IBR risk issues and develop solutions to address those future challenges?
- How are utilities ***adapting operational practices*** (e.g., frequency/voltage control protocols, protection coordination, operating procedure development) to address unique characteristics of IBRs?
- Are system stability assessments being updated to account for ***reduced synchronous inertia, oscillatory risks and control interactions, and abnormal tripping of IBRs*** as observed in NERC reports?

Coordination and Data Sharing

- How are utilities ***coordinating IBR requirements and study practices*** with neighbors across the region?
- What mechanisms exist to facilitate ***cross-jurisdictional collaboration*** on IBR modeling, standards, and operational readiness?
- Are utilities and transmission planners actively participating in ***Western Interconnection-wide initiatives*** focused on IBR risk mitigation?
- How are ***lessons learned from grid events*** (e.g., Iberian Peninsula blackout) being shared and integrated into local planning, protection, and operational practices?
- To what extent are ***joint scenario analyses or region-wide stability studies*** being conducted?
- What ***data is being shared with regulators*** for tracking IBR performance and is this data being shared with other relevant state agencies and stakeholders to ensure transparency of IBR performance?

Maximizing Capabilities of Legacy IBRs

- How are utilities assessing and enhancing the ***performance of existing legacy IBRs***, particularly ride-through capabilities?
- Are generator owner/operators of existing IBRs encouraged or required to ***implement software-based upgrades*** to improve performance?
- How are utilities and planners identifying ***legacy IBR performance gaps*** that could pose reliability risks and prioritizing upgrades based on risk, cost, and technical feasibility?
- Is there a formalized, phased approach in place to ***improve legacy IBR capabilities over time, balancing cost with reliability need***?
- What incentives or compliance mechanisms are being considered to drive upgrades of legacy IBR systems without requiring costly hardware replacements?
- How are legacy ***IBR improvements tracked and integrated*** into broader grid planning and operational models to reflect evolving resource capabilities?

IBR Jurisdiction Comparison Table

	STATE-JURISDICTIONAL DISTRIBUTION-CONNECTED	FERC/NERC-JURISDICTIONAL BPS-CONNECTED
REGULATORY AUTHORITY	State PUCs, local regulators	FERC and NERC
APPLICABLE TECHNICAL STANDARDS	IEEE 1547 and other distribution utility requirements	IEEE 2800 and transmission utility requirements
SYSTEM SCALE	Typically < 20 MVA (e.g., rooftop solar, distributed storage, etc.)	Typically > 20 MVA, often 100's of MWs per site
PRIMARY GOALS	Safety, reliability, and power quality at local distribution level	Reliability and stability of the BPS; ensuring grid services
GRID SERVICES	Fairly limited – ride-through, protection coordination, voltage/reactive power, interoperability	Comprehensive – ride-through, frequency response, voltage control, dynamic response, fault current injection, etc.
INTERCONNECTION PROCESS	State/utility-led processes; varies by jurisdiction; generally streamlined but less standardized	FERC-jurisdictional LGIP; standardized, technical with detailed modeling and studies
REGULATORY LEVERAGE	States shape DER interconnection rules, resource aggregation policies, and incentives	FERC/NERC set mandatory standards; entities subject to ongoing compliance, audits, and penalties
STATE REGULATORY ROLE	Actively shape DER interconnection requirements; direct oversight of DER connections	Engage in discussions with utilities; ensure alignment with industry best practices; drive minimization of risks and reduced costs for ratepayers

Key Recommendations (1 of 2)

1. **Adopt and Enforce Modern Interconnection Standards:** Inquire/encourage utilities adoption of IEEE 2800; leverage their Facility Interconnection Requirements per the existing NERC FAC-001 requirements.
2. **Review Utility Interconnection Requirements:** Ensure utility interconnection requirements are public, accessible, clear, and consistent; establish clear expectations for IBR developers; update regularly.
3. **Require Verified and Transparent Modeling Practices:** IBR modeling requirements (quality checks, verification, validation); post-commissioning model true-up.
4. **Require Data Access and Transparency from IBR Developers:** IBR owners and operators provide utilities and regulators with technical documentation, settings, and operating data to support studies and post-event analysis.
5. **Integrate IBR Reliability Considerations into Planning Proceedings:** IRPs/ISPs to evaluate whether utilities adequately accounting for IBR performance, impacts, and system support requirements; consider IBR solutions as effective alternative/supplement to long-term solutions.

Key Recommendations (2 of 2)

1. **Due Diligence during Commissioning / Performance Accountability:** Utilities actively ensure IBRs commissioned to meet requirements; align requirements with demonstrating continuous compliance with requirements; enable effective utility enforcement mechanisms when noncompliance identified.
2. **Post-Commissioning Performance Monitoring:** Utilities monitor and approve IBR plant performance after commissioning; conformance with requirements and alignment with interconnection study models.
3. **Utility Technical Capabilities and Resource Needs:** Utility effectiveness addressing risks of increasing IBRs (transmission and distribution); sufficient internal technical capabilities, capacity, resources, tools, systems to oversee IBR interconnections, modeling, and operations; investment in training and support, where needed.
4. **Regional Coordination:** Promote alignment of interconnection requirements, study practices, model expectations, and operational procedures with neighboring jurisdictions, WECC guidance, and regional planning entities.
5. **Compliance with Reliability Standards:** Utilities comply with Reliability Standards to address risks; proactively prepare for incoming Standards.

Thank You

Ryan Quint, PhD, PE
President and CEO
ryan.quint@elevate.energy

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Commissioner Perspective

Commissioner Lea Márquez Peterson

Arizonia Corporations Commission

WIRAB

Western Interconnection Regional Advisory Body

PUC Staff Perspective

Robin Arnold

Western Interstate Energy Board

Questions?

Use the chat

or

Raise your hand

Technical Resources for State Regulators on IBR Oversight

Western Interconnection Regional Advisory Body

Technical Resources Document and Recording available on the [WIEB Website]

Technical Resource for State Regulators and Commissioners
Oversight of Inverter-based Resources

July 23, 2025

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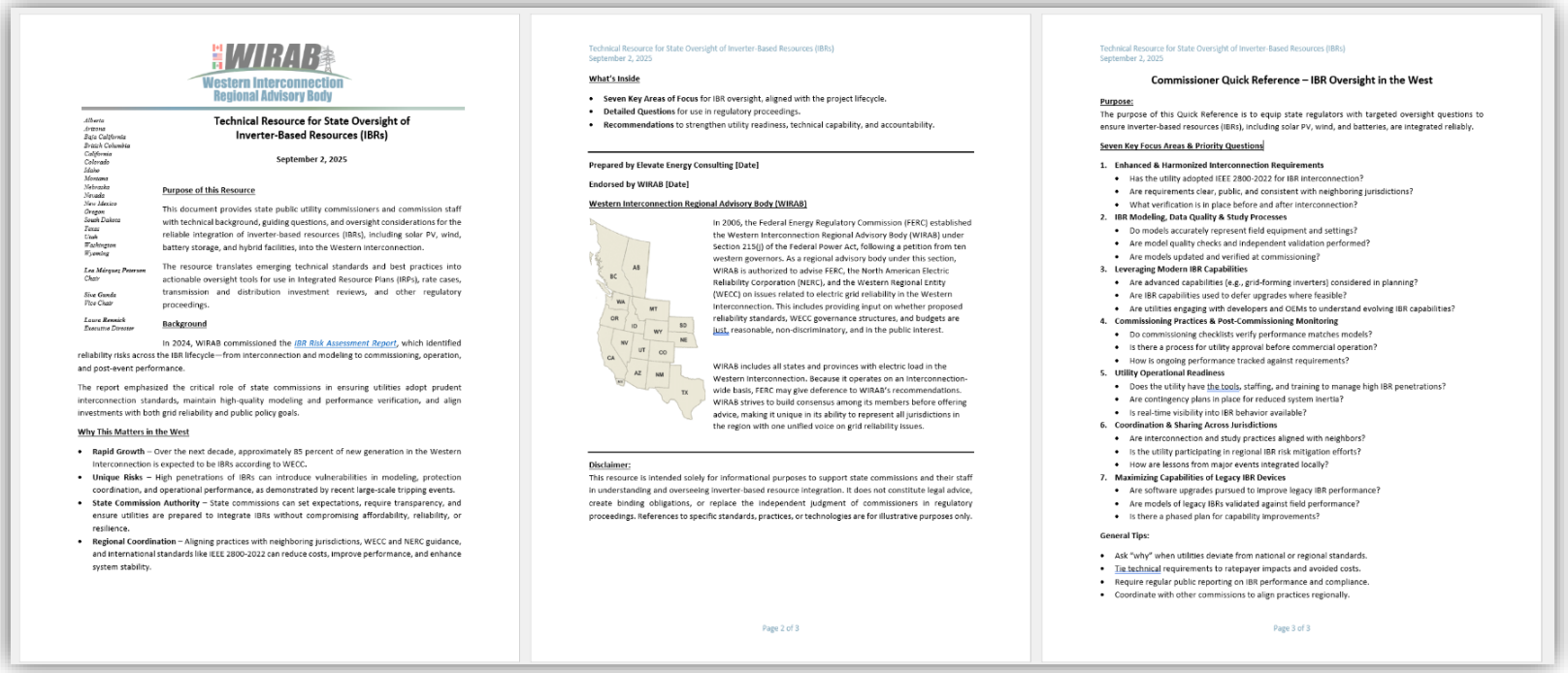
Applicability

Although state regulators have primary authority over state-jurisdictional resources, they can also play a critical role in supporting the reliability of FERC- and NERC-jurisdictional resources that directly impact local grid reliability, system operations, and ratepayers. Regulators can press utilities to explain how they are implementing NERC recommendations, adopting industry standards, and dedicating sufficient resources to meet the challenges ahead. Without adequate measures, retail customers face notable risks: inefficient processes, costly investments to offset unreliable operations, and rework caused by inaccurate data or information, driving up consumer costs. In many cases, utilities may spend unnecessary time and money fixing avoidable problems—problems that could instead be addressed through clearer requirements, modern technology, automation, and improved processes.

While the topics described in this document apply to bulk power system (BPS) resources connected to the transmission system, states should also recognize the importance of distribution-connected resources. BPS-connected IBRs are guided by IEEE 2800 while distribution-connected distributed energy resources (DERs) adhere to IEEE 1547. Both standards share similar goals but differ in technical implementation. For example, BPS resources must provide large-scale grid support functions (e.g., ride-through, dynamic response characteristics, frequency response), whereas DER standards emphasize interoperability, coordination with local systems, and safe integration at smaller scales. State regulators should understand both frameworks: most of the topics and questions raised here apply to the BPS, but parallel questions—appropriately modified—are also relevant at the distribution level. Regulators have a key role to play in staying engaged, informed, and aligned across both domains to ensure reliability for all customers (see Table 1).



WIRAB Western Interconnection Regional Advisory Body

Technical Resource for State Oversight of Inverter-Based Resources (IBRs)

September 2, 2025

Alberta, Arizona, Baja California, British Columbia, California, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, Oregon, South Dakota, Texas, Utah, Washington, Wyoming

Lee Márquez Pearson, Chair

Sive Gonda, Vice Chair

Laura Rencsok, Executive Director

Purpose of this Resource

This document provides state public utility commissioners and commission staff with technical background, guiding questions, and oversight considerations for the reliable integration of inverter-based resources (IBRs), including solar PV, wind, battery storage, and hybrid facilities, into the Western interconnection.

The resource translates emerging technical standards and best practices into actionable oversight tools for use in Integrated Resource Plans (IRPs), rate cases, transmission and distribution investment reviews, and other regulatory proceedings.

Background

In 2024, WIRAB commissioned the *IBR Risk Assessment Report*, which identified reliability risks across the IBR lifecycle—from interconnection and modeling to commissioning, operation, and post-event performance.

The report emphasized the critical role of state commissions in ensuring utilities adopt prudent interconnection standards, maintain high-quality modeling and performance verification, and align investments with both grid reliability and public policy goals.

Why This Matters in the West

- **Rapid Growth** – Over the next decade, approximately 85 percent of new generation in the Western Interconnection is expected to be IBRs according to WECC.
- **Unique Risks** – High penetrations of IBRs can introduce vulnerabilities in modeling, protection coordination, and operational performance, as demonstrated by recent large-scale tripping events.
- **State Commission Authority** – State commissions can set expectations, require transparency, and ensure utilities are prepared to integrate IBRs without compromising affordability, reliability, or resilience.
- **Regional Coordination** – Aligning practices with neighboring jurisdictions, WECC and NERC guidance, and international standards like IEEE 2800-2022 can reduce costs, improve performance, and enhance system stability.

What's Inside

- **Seven Key Areas of Focus** for IBR oversight, aligned with the project lifecycle.
- **Detailed Questions** for use in regulatory proceedings.
- **Recommendations** to strengthen utility readiness, technical capability, and accountability.

Prepared by Elevate Energy Consulting [Date]

Endorsed by WIRAB [Date]

Western Interconnection Regional Advisory Body (WIRAB)

In 2006, the Federal Energy Regulatory Commission (FERC) established the Western Interconnection Regional Advisory Body (WIRAB) under Section 215(j) of the Federal Power Act, following a petition from ten western governors. As a regional advisory body under this section, WIRAB is authorized to advise FERC, the North American Electric Reliability Corporation (NERC), and the Western Regional Entity (WECC) on issues related to electric grid reliability in the Western Interconnection. This includes providing input on whether proposed reliability standards, WECC governance structures, and budgets are just, reasonable, non-discriminatory, and in the public interest.

WIRAB includes all states and provinces with electric load in the Western Interconnection. Because it operates on an interconnection-wide basis, FERC may give deference to WIRAB's recommendations. WIRAB strives to build consensus among its members before offering advice, making it unique in its ability to represent all jurisdictions in the region with one unified voice on grid reliability issues.

Disclaimer:

This resource is intended solely for informational purposes to support state commissions and their staff in understanding and overseeing inverter-based resource integration. It does not constitute legal advice, create binding obligations, or replace the independent judgment of commissioners in regulatory proceedings. References to specific standards, practices, or technologies are for illustrative purposes only.

Commissioner Quick Reference – IBR Oversight in the West

Purpose:

The purpose of this Quick Reference is to equip state regulators with targeted oversight questions to ensure inverter-based resources (IBRs), including solar PV, wind, and batteries, are integrated reliably.

Seven Key Focus Areas & Priority Questions

1. **Enhanced & Harmonized Interconnection Requirements**
   - Has the utility adopted IEEE 2800-2022 for IBR interconnection?
   - Are requirements clear, public, and consistent with neighboring jurisdictions?
   - What verification is in place before and after interconnection?
2. **IBR Modeling, Data Quality & Study Processes**
   - Do models accurately represent field equipment and settings?
   - Are model quality checks and independent validation performed?
   - Are models updated and verified at commissioning?
3. **Leveraging Modern IBR Capabilities**
   - Are advanced capabilities (e.g., grid-forming inverters) considered in planning?
   - Are IBR capabilities used to defer upgrades where feasible?
   - Are utilities engaging with developers and OEMs to understand evolving IBR capabilities?
4. **Commissioning Practices & Post-Commissioning Monitoring**
   - Do commissioning checklists verify performance matches models?
   - Is there a process for utility approval before commercial operation?
   - How is ongoing performance tracked against requirements?
5. **Utility Operational Readiness**
   - Does the utility have the tools, staffing, and training to manage high IBR penetrations?
   - Are contingency plans in place for reduced system inertia?
   - Is real-time visibility into IBR behavior available?
6. **Coordination & Sharing Across Jurisdictions**
   - Are interconnection and study practices aligned with neighbors?
   - Is the utility participating in regional IBR risk mitigation efforts?
   - How are lessons from major events integrated locally?
7. **Maximizing Capabilities of Legacy IBR Devices**
   - Are software upgrades pursued to improve legacy IBR performance?
   - Are models of legacy IBRs validated against field performance?
   - Is there a phased plan for capability improvements?

General Tips:

- Ask "why" when utilities deviate from national or regional standards.
- Tie technical requirements to ratepayer impacts and avoided costs.
- Require regular public reporting on IBR performance and compliance.
- Coordinate with other commissions to align practices regionally.

Upcoming Meetings

WIRAB Monthly Meeting

First Thursday of the Month at 2:00 PM MT

Next Meeting: December 4, 2025 at 2:00 PM MT

Spring 2026 Joint CREPC-WIRAB Meeting

May 12-14, 2025 in San Diego, CA

https://www.westernenergyboard.org/meeting-calendar/

Thank You!

Eric Baran

ebaran@westernenergyboard.org

720-897-4600 x 207

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