



WECC

**WECC Member
Advisory Committee**

**NERC 2022 State of
Reliability**

**Duncan Brown – Class 3
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2022 State of Reliability: Reliability Risks

Link to NERC Report: [2022 State of Reliability](#)

Six areas of potential reliability risk are identified as Key Findings in the report. These are based on events experienced by the North American grid in 2021. In addition to identifying areas of risk, the report discusses current efforts to mitigate these risks.

All of the **Key Findings**-identified pose an existing or potential risk to the reliability of the Western Interconnection:

- At least two of the **Key Findings** were identified as being responsible for reliability challenges in the West in 2021;
- The remaining **Key Findings** could all have a significant impact on the West's reliability in the future.



2022 State of Reliability: Adequate Level of Reliability

The ERO's methods for analyzing and tracking the effects of major events are evolving:

- Traditional reliability criteria indicated sufficient margins in 2021, but advanced seasonal analysis, accounting for more extreme conditions, identified insufficiencies across a significant portion of the North American Bulk Power Systems (BPS).
- The ERO Enterprise has begun reassessing how best to measure the overall reliability performance objectives for the industry and has developed the definition of "Adequate Level of Reliability (ALR)."
- The report introduces methods for evaluating restoration events as a first step toward developing formal resilience metrics.

WECC appears to be ahead of the curve with its sufficiency analytics



Key Finding 1 – Cold Weather

The February cold weather event demonstrated that a significant portion of the generation fleet in the impacted areas was unable to supply electrical energy during extreme cold weather.

- Generating units that were unprepared for cold weather failed in large numbers.
 - An extensive effort has been undertaken to update and/or create standards that require generation units to be effectively weatherized.
- Cold weather-induced natural gas production (and processing) declines reduced fuel availability.



Key Finding 2 – Interdependencies

Electricity and natural gas interdependencies are no longer emerging risks but require immediate attention, including implementation of mitigating approaches.

Natural-gas-fired generation has become a necessary balancing resource to reliably integrate intermittent generation into the dispatch:

- Improvements in the mutual understanding of electricity and natural gas interdependencies enable operators in both industries to enhance reliability across energy delivery systems and reduce end-use customer exposure to energy shortfalls during extreme weather events.
- Growing reliance on natural gas as an electricity generation fuel source increases the potential for common-mode failures that have widespread reliability impacts.
- Fuel delivery curtailment **risk** is elevated for the many natural gas generators that do not contract for firm natural gas transportation

NERC continues to recommend that registered entities conduct studies to model plausible and extreme natural gas supply disruptions.



Key Finding 3 – Extreme Weather

As climate change increases extreme weather event intensity and frequency, severe weather again challenged the BPS putting grid resilience (the ability to withstand and recover from extreme events) into focus.

- Extreme scenarios such as long-duration extreme weather events impacting wide areas need to be considered in resource adequacy and energy sufficiency planning.
- A shortage of fuel-assured, weatherized dispatchable generation is increasing the risk of energy shortfalls in extreme weather in many areas.
 - Massive cold weather-induced natural gas declines in production were experienced in the 2021 cold weather event, making generation unavailable.



Key Finding 4 – Geopolitical/Cyber

Geopolitical events, new vulnerabilities, new and changing technologies, and increasingly bold cyber criminals and hacktivists presented serious challenges to the reliability of the BES.

- Suspicious cyber incidents (including vulnerability exposure, phishing, malware, denial of service, and other cyber-related reports) increased.
- Nation-states and sophisticated organized criminals are targeting supply chains and indicating the willingness and ability to disrupt essential infrastructure.

Physical and Cyber protections need to be integrated with all aspects of power system planning, operations, design, and restoration practices.



Key Finding 5 – Inverter Based Resources

Large assessment areas have become dependent upon renewable resources to meet peak loads, but multiple loss of solar events in Texas and California in 2021 confirm that unaddressed inverter issues increased reliability risk.

- Widespread solar photovoltaic (PV) loss events (two in Texas and four in California) **demonstrated that:**
 - Reliability was maintained, but
 - The industry needs to reliably integrate the rapidly growing fleet of inverter-based resources (IBRs), including solar PV and energy storage.

NERC **interconnection requirements** guidelines have been developed and are being actively promoted

NERC has begun the process of developing mandatory Reliability Standards based on those guidelines

- Renewed focus on establishing and improving interconnection studies and requirements and developing a comprehensive inverter ride-through standard.



Key Finding 6 – Data

Additional data types are needed to enable more complete analysis of Adequate Level of Reliability performance objectives.

- As the ERO continues to develop new metrics related to defining an ALR, that process also will identify additional data requirements, particularly as they relate to extreme events and the capabilities of non-dispatchable resources.
 - Data relating to the interrelation between fuel supply, extreme weather and grid reliability will be needed
 - Data pertaining to grid restoration after extreme events.

