Advice of the Western Interconnection Regional Advisory Body to the NERC Board of Trustees on the ERO Reliability Risk Priorities 2017 Report

January 24, 2018

Via NERC Board of Trustees Policy Input Package

The Western Interconnection Regional Advisory Body ("WIRAB") appreciates the opportunity to submit advice to the North American Electric Reliability Corporation ("NERC") Board of Trustees on the Electric Reliability Organization ("ERO") Reliability Risk Priorities report, prepared by the NERC Reliability Issues Steering Committee ("RISC"). WIRAB is a regional advisory body created on petition by the Governors of the Western States and pursuant to Section 215(j) of the Federal Power Act. WIRAB is authorized under Section 215(j) to provide advice to the Federal Energy Regulatory Commission ("FERC" or "Commission"), the ERO, and the Western Electricity Coordinating Council ("WECC") on reliability standards and associated matters in the Western Interconnection. WIRAB's state and provincial representatives are primarily Public Utility Commissioners and state Energy Office Directors who understand the importance of interconnection-wide reliability and who are deeply engaged in studying and responding to potential reliability implications associated with the rapidly changing resource mix in the West.

WIRAB commends the RISC for developing an important and comprehensive report that identifies nine key Risk Profiles, which summarize key risks and potential impacts to the reliable operation of the Bulk Power System ("BPS"). WIRAB agrees with the RISC's assignment of each of the nine Risk Profiles to a "high," "moderate," or "lower" risk category. WIRAB agrees that all of the identified Risk Profiles, regardless or ranking or classification, identify a real threat to the reliable operation of the BPS and that the fast pace of change in the industry can quickly raise the significance of a particular risk. WIRAB further commends the RISC for identifying the "high" priority Risk Profiles as Focus Areas to concentrate efforts by the industry to improve BPS reliability.

WIRAB also commends the RISC for developing a comprehensive list of specific recommendations for mitigating each of the nine key risks. The RISC has provided the Board of Trustees with ninety-nine (99) recommendations. Sixty-two (62) of these recommendations are designated as "near-term" recommendations with action anticipated in the one- to two-year time frame. Of the sixty-

two (62) "near-term" recommendations, twenty-seven (27) are directed at mitigating "high" priority risks and the RISC further narrowed the number of recommendations in the Focus Areas to down to twenty (20). Targeted action on specific recommendations that can easily be tracked and reviewed will help the ERO ensure that progress is made in achieving its objectives to mitigate potential risks. WIRAB advises the Board of Trustees to direct NERC and WECC to take targeted action on a set of specific recommendations and report back to the Board in a year's time on progress made in achieving the objectives of these recommendations.

WIRAB selected six RISC recommendations from the report that we believe provide a targeted focus on mitigating key risks important to the Western Interconnection in the "near-term" timeframe and can lead to an effective implementation of the RISC's report. WIRAB selected these six recommendations because they are: (1) recommendations directed to the ERO Enterprise; (2) "near-term" recommendations that are achievable in the next two-year timeframe; (3) recommendations for mitigating "high" priority risks; and/or (4) recommendations that are important across the ERO and of particular importance in the Western Interconnection. WIRAB recommends that the Board of Trustees direct NERC and WECC to prioritize and implement the following RISC recommendations in the next two-year time frame:

1. The ERO Enterprise and industry need to provide more effective guidance to evaluate and improve controllable device settings and how the interaction between these devices can affect BPS reliability, particularly during transient conditions. (Risk Profile #1: Changing Resource Mix, Recommendation #1.)

2. The ERO Enterprise and industry should continue to place stronger emphasis on review and analysis of power system events, including those that are lower impact, to discover potential reliability trends early in their lifecycles. (Risk Profile #1: Changing Resource Mix, Recommendation #2.)

3. The ERO Enterprise should identify the type and periodicity of information needed from distributed energy resources to improve load forecasting and generator modelling and address coordination requirements between BPS and distribution system planners and operators to account for the uncertainty introduced by integration of variable generation, including the impact of weather on these resources. (Risk Profile #2: BPS Planning,

Recommendation #3.)

4. The ERO Enterprise and industry should continue to expand the use of probabilistic approaches to develop resource adequacy measures that reflect variability and overall reliability characteristics of the resources and composite loads, including non-peak system conditions. (Risk Profile #3: Resource Adequacy and Performance, Recommendation #3.)

5. The ERO Enterprise should develop metrics regarding the trend of cyber-attacks and potential threats. (Risk Profile #9: Cybersecurity Vulnerabilities, Recommendation #8.)

6. The ERO Enterprise should develop a guideline for industry use in addressing data modeling and information sharing. (Risk Profile #6: Loss of Situational Awareness, Recommendation #4.)

WIRAB elaborates on the selection of these six recommendations below:

1. **The ERO Enterprise and industry need to provide more effective guidance to evaluate and improve controllable device settings and how the interaction between these devices can affect BPS reliability, particularly during transient conditions.**

This RISC recommendation is a "near-term" recommendation for mitigating risks under the "high" priority, Changing Resource Mix Risk Profile. The Changing Resource Mix Risk Profile is of particular importance in the West, which has some of the most aggressive renewable portfolio standards in the United States ("U.S.") and equally aggressive carbon goals in particular states and provinces in the U.S., Canada and Mexico. Recent research by the Western Interstate Energy Board ("WIEB") examined the daily dispatch pattern of ninety-six (96) coal units in the West over the period 2001-2016 and found that baseload operation of the coal fleet in the West decreased from 52 percent of coal unit operating days in 2001 to 22 percent in 2016.[1] Since 2011, the majority of coal units in the West have spent less than 30 percent of days in baseload operation.

[1] *The Role of Coal in the West.* August 2017. http://westernenergyboard.org/2017/08/wieb-webinar-on-the-role-of-coal-in-the-west/

With the transformation of the resource mix away from synchronous resources like large coal and nuclear power generating stations, to more distributed asynchronous generation like wind and distributed solar, some essential reliability services that system operators take for granted today may not be available to the same extent in the future. Therefore, the new generation resources that are replacing retiring generation need to have the capability and appropriate settings to provide essential reliability services and to help maintain system reliability.

WIRAB submitted comments to FERC, in the Commission's *Essential Reliability Services and the Evolving Bulk-Power System – Primary Frequency Response* docket (Docket No. RM16-6), recommending that FERC require that all new generating resources have the capability to provide primary frequency response as a condition of interconnection and that FERC adopt standard default capability requirements.[2] WIRAB also suggested that FERC incentivize faster frequency response, from resources that can provide it, through higher compensation mechanisms. The compensation recommendation was not ultimately considered in the FERC docket, but the concept remains – with the changing resource mix, resources providing essential reliability services need to respond more quickly and accurately to maintain BPS reliability. The ERO Enterprise and industry should provide effective guidance to evaluate and improve resource settings and determine how the interaction between controllable devices can affect BPS reliability.

2. The ERO Enterprise and industry should continue to place stronger emphasis on review and analysis of power system events, including those that are lower impact, to discover potential reliability trends early in their lifecycles.

This RISC recommendation is a "near-term" recommendation for mitigating risks under the "high" priority, Changing Resource Mix Risk Profile. Effective review and analysis of power system events is of particular importance in the West, where unforeseen events can have far-reaching consequences across the interconnection and seemingly-minor events can lead to major problems within the interconnection.

WIRAB has hosted multiple webinars with policymakers and industry to discuss recent power system events that could potentially lead to major issues if systemic problems are not

[2] Advice of WIRAB on the NOI re: Essential Reliability Services and the Evolving Bulk-Power System – Primary Frequency Response under RM16-6 (*filed* April 25, 2016) RM16-6-000

recognized and appropriately addressed. For example, in February 2017, WIRAB hosted a webinar on the "Role of the Reliability Coordinator and Balancing Authorities."[3] In this webinar, the California ISO discussed issues surrounding the "Blue Cut Fire Event" in Southern California. During this event, solar photovoltaic ("PV") inverter settings caused multiple PV plants to trip offline simultaneously when there was a brief, momentary apparent decline in system frequency, resulting in a loss of nearly 1,200 MWs of PV power generation. The individual tripping of these generators were not reportable events per the EOP-004 Event Reporting standard, however, further analysis showed that the simultaneous tripping of solar PV generation was a systemic issue. Many similar, previously undetected, trips have occurred, both before and after the Blue Cut Fire, calling for ERO attention, intervention and guidance. Following the Blue Cut Fire Event, NERC developed a report and issued a NERC Alert to notify industry of potential issues associated with solar PV device settings. Accordingly, NERC is now considering changes to its reliability standards. Events like this highlight the importance for the ERO Enterprise and industry to place stronger emphasis on review and analysis of power system events, including those that are lower impact, and to elevate these events in public discussions to discover potential reliability trends early in their lifecycles.

3. **The ERO Enterprise should identify the type and periodicity of information needed from distributed energy resources to improve load forecasting and generator modelling and address coordination requirements between BPS and distribution system planners and operators to account for the uncertainty introduced by integration of variable generation, including the impact of weather on these resources.**

This RISC recommendation is a "near-term" recommendation for mitigating risks under the "high" priority, BPS Planning Risk Profile. The BPS Planning Risk Profile is of particular importance in the West due to the changing resource mix and rapid adoption of Distributed Energy Resources ("DER"), particularly solar PV, and the unknown impact of these changes on the reliable operation of the future grid.[4] Distributed solar PV is projected to total more than 16,000

[3] WIRAB Webinar – Role of the Reliability Coordinator and Balancing Authorities in the Western Interconnection. February 17, 2017. http://westernenergyboard.org/2017/02/wirab-webinar-on-role-of-the-reliability-coordinator-and-balancing-authorities-in-the-western-interconnection/

[4] The Western Interstate Energy Board (WIEB), initiated a project to study the deployment of distributed solar PV generation in the Western Interconnection. WIRAB is helping using modeling to examine potential reliability issues, develop policy-

MW in nameplate capacity by the year 2026 in the Western U.S and while there are many expected benefits of this trend of increasing DERs, there may well be several unforeseen, potentially deleterious impacts associated with increasing levels of DERs and the changing resource mix.

With increasing level of DERs, one of the major challenges is the limited availability of high-quality data from DERs and the distribution system for BPS planning. BPS planners need high-quality data to develop better models and to conduct more accurate reliability assessments. If the industry is to just look at the BPS and does not consider the distribution system, important reliability issues will be missed. It is important to have high-quality data inputs into reliability assessment to help determine the need of essential reliability services, now and in the future. The ERO Enterprise should help identify the type and periodicity of information needed from distributed energy resources, which can help improve load forecasting and generator modelling and address coordination requirements between BPS and distribution system planners and operators to account for the uncertainty introduced by integration of variable generation.

4. **The ERO Enterprise and industry should continue to expand the use of probabilistic approaches to develop resource adequacy measures that reflect variability and overall reliability characteristics of the resources and composite loads, including non-peak system conditions.**

This RISC recommendation is a "near-term" recommendation for mitigating risks under the "high" priority, Resource Adequacy Risk Profile. The Resource Adequacy Risk Profile is of particular importance in the West and across the Nation. One result of the changing resource mix is increased interdependency between the natural gas and electricity industries. Recent issues surrounding the Aliso Canyon natural gas storage field in southern California highlighted the increasing operational strains that high penetrations of variable energy resources ("VER") and the increasing need for system flexibility are placing on the natural gas system. As the Western Interconnection continues to add large amounts of asynchronous VER, and as traditional coal and nuclear generation resources retire, the natural gas system will play an increasingly key role in ensuring Bulk Electric System ("BES") reliability.

level recommendations on likely reliability concerns associated with distributed solar PV generation, and distribute those recommendations to regulators and policymakers in Western Interconnection states.

Many electric utilities in the West continue to use Integrated Resource Planning ("IRP") to identify generating unit capacity additions needed to ensure resource adequacy in the future; and in many instances, a state public utility commission oversees the development of the utility's IRP. There exists, however, a wide diversity of practices across both utilities and states in the implementation of the resource adequacy construct. For example, the size of the planning reserve margin; the capacity contribution of renewable resources; the consideration of energy storage technologies; the assumed availability of underlying fuel sources; and the willingness to rely on wholesale market power purchases all differ across utilities and states. With the rapidly changing resource mix, the interdependency of natural gas and electric industries, the increased adoption of distributed energy resources, and the potential of energy storage technologies, traditional ways of modeling resource adequacy may no longer be sufficient. It is important for the ERO Enterprise and industry to continue to expand the use of probabilistic approaches to develop resource adequacy measures that reflect variability and overall reliability characteristics of the resources and composite loads, including during non-peak system conditions.

5. **The ERO Enterprise should develop metrics regarding the trend of cyber-attacks and potential threats.**

This RISC recommendation is a "near-term" recommendation for mitigating risks under the "high" priority, Cybersecurity Vulnerabilities Risk Profile. The Cybersecurity Vulnerabilities Risk Profile is of particular importance in the West and across the Nation. WIRAB and others look to NERC and the ERO Enterprise leadership to lead efforts to identify and address cybersecurity issues. WIRAB is concerned with the issue of cyber threats and the potential impacts cyber events could have on utilities and on society.

In December 2017, WIRAB hosted a series of webinars to discuss: (1) cyber threats to utility industrial control systems; (2) how resilience can help mitigate potential threats; and (3) policies that can be implemented to ensure good cyber practices.[5] WIRAB understands that compliance with cybersecurity reliability standards does not necessarily equal security and that compliance should not be the blueprint for an entity's security program. It is important to

[5] WIRAB Webinar Series on Cybersecurity of Electric Utility Industrial Control Systems. December 15, 2017. http://westernenergyboard.org/2017/11/wirab-webinar-series-on-cybersecurity-of-electric-utility-industrial-control-systems/

encourage industry participants to go above and beyond NERC's minimum requirements, to share information on cyber threats, and to identify and share best practices. By developing a common set of metrics and performing trend analysis, NERC can help the industry holistically identify the changing nature of the cyber threat. Then, by improving reporting of cybersecurity incidents among operating entities and enhancing awareness of existing or developing threats, entities can share how they mitigated potential threats and encourage other entities to go above and beyond minimum compliance. It is important to develop metrics regarding the trend of cyber-attacks and potential threats to be able to share best practice and encourage innovation.

6. The ERO Enterprise should develop a guideline for industry use in addressing data modeling and information sharing.

This RISC recommendation is a "near-term" recommendation for mitigating "moderate" priority risks under the Loss of Situational Awareness Risk Profile. The Loss of Situational Awareness Risk Profile is of particular importance in the West because of the far-reaching effects such a loss may have across the Western Interconnection. The September 8, 2011 Southwest Blackout, for example, was a direct result of lack of real-time situational awareness. Three key recommendations to improve situational awareness in the West, identified in the *FERC/NERC Staff Report on the September 8, 2011 Southwest Blackout Event*, were to: (1) expand entities' external visibility in their models through, for example, more complete data sharing; (2) improve the use of real-time tools to ensure the constant monitoring of potential internal or external contingencies that could affect reliable operations; and (3) improve communications among entities to help maintain situational awareness.[6] The Western Interconnection is moving towards fully implementing these recommendations through interconnection-wide coordination and modeling including the development and use of a West-wide System Model, Real Time Contingency Analysis, Outage Coordination, Voltage/Transient Stability Analysis Tools, Remedial Action Scheme Models, etc. In the Western Interconnection, it is imperative that these interconnection-wide tools and technologies continue to be developed and implemented and that high-quality data and information is shared to maintain situational awareness in the West.

[6] *FERC/NERC Staff Report on the September 8, 2011 Southwest Blackout Event*. April 2012. http://www.nerc.com/pa/rrm/ea/September%202011%20Southwest%20Blackout%20Event%20Document%20L/AZOutage_Report_01MAY12.pdf

WIRAB, concerned with the possible loss of this West-wide coordination, commissioned a report titled, *A Framework for Considering Multiple Reliability Coordinators ("RCs") in the Western Interconnection.*[7] This report asserts that the current (or better) level of situational awareness that is available today should set the standard for any transition to multiple RCs in the Western Interconnection. As the West considers a transition to multiple RC service providers, it is unclear if interconnection-wide tools, data modeling and information sharing will be maintained at present levels. It is important that the ERO Enterprise continue to develop guidelines for industry to use in addressing data modeling and information sharing to maintain and enhance situational awareness.

WIRAB recommends that the NERC Board of Trustees endorse the ERO Reliability Risk Priorities Report and the Recommendations from the NERC RISC. Further, WIRAB recommends that the NERC Board of Trustees direct NERC and WECC to take targeted action on a specific set of recommendations in key focus areas and report back in a year's time on progress made to achieve the recommendations' objectives. WIRAB looks forward to working with the NERC and WECC on the successful implementation of many of the key recommendations identified in this report.

(Signature Block on the Following Pages)

[7] *A Framework for Considering Multiple Reliability Coordinators in the Western Interconnection*. GridSME. June 27, 2017. http://westernenergyboard.org/wp-content/uploads/2017/06/06-24-17-WIRAB-reliability-coordinator-review-framework.pdf

Respectfully Submitted,

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