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Wholesale Electric Markets and Energy Infrastructure
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It is an honor to be here today, sharing thoughts and impressions regarding EPA's proposed Clean Power Plan and how it might affect infrastructure and energy markets in the western region. The Western Area Power Administration is proud of its working relationship with Federal Energy Regulatory Commission and we look forward to continuing our collaborative partnership.

The Western Area Power Administration markets and delivers clean, renewable, reliable, cost-based hydroelectric power and related services from 56 federal hydroelectric powerplants and part of the output from the Navajo Generating Station. Western's more than 1,400 employees manage over 17,000 circuit-miles of transmission, 315 substations and 177,000 structures, covering a footprint of more than 1.3 million square miles in 15 states making us one of the top 10 largest transmission providers in the nation. In addition to marketing power, we also operate as an open access transmission provider. In this way, Western serves about 700 customers including utilities, municipalities, Tribes and others across the western United States.

Western provides much of its resource on a firm electric basis through long term contracts; however, if hydropower is unavailable we purchase on the open market, primarily through short term contractual arrangements. As a result, resource capacity availability for purchase power needs is critical to our business practice.

Because we operate four balancing areas and one sub-balancing area with multiple control centers, the need for system balance and resilience is a 24 hours a day, seven days a week, 365 days a year responsibility. Maintaining power flow across vast tracks of the Western U.S., while coordinating with multiple states, requires constant vigilance.

To continue excellent support for our customers and others, we need to consider the state of our assets and our needs in the future. The Clean Power Plan offers Western some opportunities for expansion in renewable connectivity and overall market management. To be successful in such an endeavor, and to ensure reliability of the grid, we seek a clearer understanding of the timing and quantity of fossil plants that might be involved under this proposed policy.

Although Western is actively involved in state-of-the art asset management, the need for cross-entity planning and management is critical. Operating in both the Eastern and Western interconnection, in areas with markets and without, it is important to have a broad understanding of the infrastructure investments being pursued by others and the timing of those investments.

This statement highlights the significant points Western is considering under each of the eight questions presented to the infrastructure panel as they relate to the proposed Clean Power Plan.

I. Employment of Mechanisms to Ensure Adequate Infrastructure Across Western Region in Compliance with Proposed Rule

In early 2014, staff members from the Environmental Protection Agency reached out to WestConnect for pre-rulemaking insight on how the EPA's forthcoming Clean Power Plan (§111(d)) rule might affect the regional transmission grid and planning processes. At that time, many transmission planners within WestConnect had not yet considered the issue and had little or no study data to respond to the EPA staff inquiry. The discussion particularly alarmed Southwest Area Transmission Subregional Planning Group (SWAT) participants because they estimated that, even without the §111(d) rulemaking, approximately 25% of coal

plants (2,500 MW of 10,000 MW capacity) are projected to retire by 2019 within the SWAT footprint (Arizona, New Mexico, and Southern Nevada).

The rulemaking could potentially cause more coal retirements, leading to several highly technical reliability concerns in the American Southwest. This provoked SWAT to study the issue further. The other WestConnect subregions decided to stay abreast of coal retirement issues by relying on updates from SWAT.

SWAT scoped a study of at least two phases to analyze the issue. The first phase of the study was not designed specifically for the EPA Clean Power Plan §111(d), but it did identify whether credible reliability concerns existed due to changing stability and reactive power conditions associated with coal plant shutdowns. The study analyzed sensitivities with coal retirements ranging from 25% to 50% in the Southwest during a 2019 timeframe. Different hypothetical combinations of renewable and gas resources were tested to replace the retired coal capacity. The study results confirmed that wide area cascading could occur after credible contingencies in scenarios with high coal retirements.

SWAT concluded there is a limit to the amount of coal capacity that could be reliably shut down without transmission system upgrades, but the limit is dependent upon the location and type of replacement resources; and it would take significant study effort to determine specific relationships in these quantities.

Further, SWAT could not determine whether the observed cascading could be mitigated by relatively inexpensive, local transmission system upgrades, such as capacitors, or if wider area solutions would be required, such as new transmission lines.

The second phase of the SWAT study is being conducted throughout 2015. The Department of Energy has requested funding for its 2016 budget to continue support. The second phase will analyze dispatch scenarios likely to occur under the projected EPA §111(d) rules. An objective of this study will be to determine what conceptual transmission solutions could resolve reliability performance violations that occur in these scenarios. The study, however, will not identify specific transmission upgrades or select the most optimal solutions to accommodate the §111(d) rulemaking.

The SWAT study work has been performed by staff at Tucson Electric Power with input from all of the utilities participating in SWAT. In addition to briefing WestConnect on the progress of the study, SWAT members have presented it to several other regional planning groups at their request, including the WECC Transmission Expansion and Policy Planning Committee (TEPPC), Southwest Power Pool, Arizona Corporation Commission, and FERC staff members.

In its current role as chair of SWAT, Western Area Power Administration's Desert Southwest Region Transmission Planning has participated in the SWAT study and has facilitated several meetings to conduct the study. Based on its involvement in this study, Western's DSW staff can share the following opinions related to "Identifying and addressing Infrastructure Needs." They are as follows:

a. Perhaps one "mechanism" would be funding interconnection-wide studies.
b. Regional groups such as SWAT and WestConnect are limited by their technical expertise and volunteer resources to perform study work.
c. Analyses indicate bridge resource planning with transmission planning is needed, *i.e.* software approaches mixing Production Cost Modeling with Power flow capabilities.
d. Prior studies such as the ones funded by FERC and published in December 2010 by Lawrence Berkeley National Laboratory are beneficial in providing metrics for frequency response that could be used to assess the system and beneficial to helping participants shape their understanding of issues associated with coal retirements.
e. A new process that could eventually allow the region to explore scenarios such as coal retirements in a coordinated fashion would put a significant demand on resources.

II. Primary Challenges to Coordinating Planning Processes to Evaluate Energy Infrastructure

Western's experience, expressly in its Desert Southwest Region, has shown a standout primary challenge in cooperatively evaluating energy infrastructure: the great number of participants involved.

The volume of entities and agencies involved in the western region represent a diverse set of competing opinions and demands. This is both a benefit and a challenge in coordinating planning processes for evolving energy infrastructure across the western region. Stakeholder concerns are understandably vast in scope and it requires significant coordination and time to bring myriad perspectives together to study a snapshot of several years in the future.

III. Unique Infrastructure Needs of the Western Region

The only near-certain infrastructure change that has been identified is that we can expect reductions in coal plant dispatch levels under the proposed rule. Although the rule calls for increased use of gas and renewable resources, we do not have definitive studies to say that gas pipelines are needed over transmission expansion in a given area or vice versa.

One thing we can state from a transmission line capacity perspective is that transmission lines do not care what the fuel source is for a given resource injection point. It is location-dependent.

A tool uniquely suited to synthesizing information and understanding what capacity is already available is the synchrophasor. These devices are populated at more than 500 locations in the Western Interconnection. They record and can transmit data in the "cycles" (1/60 of a second) timeframe.

The next step in the evolution of this data stream is to spend some money and time developing a wide-area set of usable data and display it in the control centers in a meaningful fashion.

IV. Impact of Proposed Rule to Existing Trading Patterns and Synching New Construction

Study data related to existing trading patterns synching new construction is not yet available at this point in time. However, most planners agree that we will see an increase in natural gas resources in order to replace coal retirements and balance new renewable resources. Yet, where those resources will be located is difficult to

determine. We note that the Western Interstate Energy Board compiled an informative study on the interface between the gas and electric interface. In general that study showed needed upgrades to existing gas pipeline infrastructure, but it was not extraordinary compared to typical demand growth.

V. Identify Need for and Expedite Development of Infrastructure

We have not had extensive discussion on the permitting of new infrastructure within SWAT.

VI. Impact of Geography on Unique Infrastructure Development and Related Tools and Processes

Longer transmission lines in the West give rise to reactive power and voltage concerns when generators are taken offline in certain areas. Standard transmission planning studies and software packages can be used to study those effects.

VII. Adaptions to Current Commission Policies Needed

The Commission could help prioritize some of the transmission planning initiatives that are currently tasked to industry. Transmission planning staff from most utilities have spent ample time building their Order No. 1000 planning process, sorting out requirements in new NERC standards regarding "TPL" and "Planning Coordinator" requirements, learning methods to assess geomagnetic disturbances, improving modeling tools and processes in response to the September 2011 blackout, conducting physical security studies, and other related topics. These planning steps combined with an aging workforce and a shrinking pool of expertise have impacts on new or existing compliance and transmission initiatives including planning transmission infrastructure for the Clean Power Plan proposed rule.

VIII. Comment on Studies Performed

The Western Area Power Administration is constantly looking at its infrastructure and processes. However, SWAT studies have not specifically addressed infrastructure needs, as yet. WECC has performed several high-level analyses that we anticipate Ms. Melanie Frye, Vice President, Reliability Planning and Performance Analysis, will report in a separate panel. The WECC Membership has long been a source of substantial utility expertise and we see that continued relationship needed going forward as WECC wades through their Bylaws 4.9 review of their Governance structure this calendar year.