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Presented at:

United States of America

Federal Energy Regulatory Commission

Technical Conference

March 2, 2009

Integrating Renewable Resources Into the Wholesale Electric Grid

AD09-4-000

Introduction

Good afternoon and thank you for the opportunity to address the Commission on this important issue. My name is Bradley Nickell and I am the Renewable Integration and Planning Director at the Western Electricity Coordinating Council (WECC).

WECC is one of eight North American Regional Entities and is responsible for assuring the current and future reliability of the Western Interconnection. WECC encompasses a geographic area equivalent to over half the United States. Its 232 member organizations—which represent all segments of the electric industry—provide electricity in 14 western states, two Canadian provinces, and portions of one Mexican state. There are currently 474 Registered Entities in WECC.

WECC's role, as it relates to regional planning, is one of coordination and not advocacy. In this capacity WECC, through its member committees, provides impartial reliability information on aspects of planning and operations to decision makers in the Western Interconnection.

My remarks today center on the operational challenges of maintaining reliability with increasing levels of renewable generation as well as examples of some of the solutions that are being considered or applied by WECC members.

Challenges

To maintain system frequency, generation must be balanced to load in real-time. Variable generation sources such as wind and solar make this task more difficult for electric power system operators. The challenge is, as the levels of variable generation increase, to ensure that appropriate levels of system flexibility are available to maintain frequency.

Flexibility in this context is the ability to change the output of another resource in response to the variability of renewable generation. Flexibility can be acquired through any combination of an entity's own generation, market products, renewable generator curtailment, energy storage, or demand response. It also is described as regulation, ramping, ancillary services, or operating reserves.

Different ownership structures, system configurations, and market paradigms frame the opportunities for renewable energy as well as determine the integration challenges. The Western Interconnection has a diverse mix of generation with a unique set of capabilities and limitations, long distances between generation and load, and mostly hourly, bilateral markets. In addition, the West is comprised of a diverse set of investor and publically-owned entities that operate under a wide range of regulatory frameworks. These dynamics all serve to complicate the application of efficient solutions to integration challenges.

The entities that comprise the Western Interconnection understand that reliability must be maintained and that the balancing metrics outlined in NERC standards must be satisfied. Increasing the level of variable generation increases the flexibility required of the remainder of the generating fleet. Thus, reliably integrating variable generation is a matter of determining how much flexibility is needed, where it is needed, how much it will cost, and who should pay for it.

There is flexibility in the existing system that could be used to balance variable generation. However, there are two obstacles to making it available where and when needed. In addition, based on studies performed by WECC and its members, significant additions of variable generation resources will require that additional transmission and flexibility be constructed.

First – transmission scheduling. There must be adequate physical transmission capacity available to move the resources to where they are needed. In many cases, this is not the limiting factor. Also there must be flexibility in transmission scheduling and services. Currently, transmission schedules are locked down 20 minutes prior to the hour. Opening the market up to within-hour transmission purchases and sales will enable the resources to flow to those who need it.

Second – available flexibility. There must be resources available to balance the system. As the level of variable generation increases, so must the level of flexibility available to any balancing authority. However, there are many opportunities to take advantage of existing flexibility throughout the system. But for this to succeed there must be a mechanism that allows parties to share these resources. Currently, in the hourly market, schedules are also locked down 20 minutes prior to the hour. Enabling within-hour changes to energy schedules will allow balancing authorities to access the flexibility available in the market.

Included in the available generation flexibility is the variable generation itself. For example, we have no control over the variability of the wind, but this does not mean there is no ability to control the output of the wind farm. Wind generation has limited dispatchability. Current control technology allows for the limiting of ramp rates and generation levels (at least in the downward direction). As the penetration of wind increases, the ability to participate as a source of flexibility will be vital. However, under the current Production Tax Credit (PTC) structure, there is a $21 per MWh penalty for wind generators to curtail output or participate as a source of regulation. Concerns have been expressed by some WECC members that the PTC in its current form can lead to inefficient operations[1]. An assessment of the potential for this problem and identification of means of resolution are needed.

[1] January 16, 2009 Northwest Wind Integration Forum – "*Recommended Follow-on Actions to the Wind Integration Action Plan*"

Current Activities

Entities in the Western Interconnection have spent considerable effort over the past few years to identify common challenges and work collaboratively on regional energy issues. WECC facilitates many of these activities through its member committees and subcommittees.

WECC is committed to facilitating the collaborative efforts directed toward the efficient integration of wind and other renewable resources. It is only by working collectively across all companies and interests that the use of renewables can be maximized. I would like to bring a few examples of these activities to the attention of the Commissioners.

The Joint Initiative is a voluntary joint project sponsored by ColumbiaGrid, Northern Tier Transmission Group, and WestConnect. Collectively, these three sub-regional planning groups cover most of the two non-ISO areas of the Western Interconnection. In addition, the project has many participants among WECC member utilities, merchants, and stakeholders. The goal of the Joint Initiative is to tap into the existing flexibility that exists within the Western Interconnection. The Joint Initiative is recommending changes to Transmission Service Provider business practices to allow for within-hour transmission purchase and scheduling, developing tools to facilitate within-hour bilateral transactions, and developing a dynamic scheduling system consisting of standard protocols and communication infrastructure that would allow access to resources across multiple balancing authorities, subject only to transmission constraints.

The ACE Diversity Interchange (ADI) is an example of how to use existing flexibility. It provides a mechanism for balancing authorities to share their variability, which reduces the level of generation changes required by each entity. There are currently 16 balancing authorities in the Western Interconnection participating in this activity. For the entities involved, participation has been shown to reduce balancing costs and improve NERC Control Performance Standard (CPS2) scores. CPS2 is a NERC reliability metric related to how well a balancing authority balances generation and load.

To facilitate a greater understanding and address of the effects of variable generation, The Joint Guidance Committee of WECC members created the Variable Generation Subcommittee (VGS) in October 2008. The subcommittee is made up of a broad set of stakeholders in the West and includes the involvement of FERC staff from the Office of Electric Reliability. The purpose of the VGS is to provide a holistic perspective of the issues and opportunities related to the presence of variable generation in the Western Interconnection. It also serves to facilitate the development and implementation of solutions that both add value to WECC members and assure the future reliability of the

Western Interconnection. These challenges are being met through the compilation of information and member issues, coordination of issue analysis, and dissemination of information. As a recently formed subcommittee, the VGS continues to mature. It is anticipated that the VGS will serve as the central point of facilitation for renewable issues in the Western Interconnection.

Conclusion

Renewable generation poses a unique set of challenges. The full range of flexibility from existing and new transmission, technology innovations and market initiatives will need to be employed to optimize and share the breadth and diversity of the Western Interconnection. This in turn will support the reliable integration of substantial levels of variable resource penetration in an efficient manner.

WECC—through its role as a planning and policy facilitator and provider of credible, impartial interconnection-wide information and analysis—is well placed to support those entities that ultimately have to make these decisions and ensure the reliability of the Western Interconnection.