



# *Transmission Update*

April 2010

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- Summary**
- ✓ Welcome to the Twenty-Seventh National Wind Coordinating Collaborative (NWCC) Transmission Update! Kevin Porter of Exeter Associates, Inc. led the April 20, 2010, Transmission Update conference call. As always, this written brief is being distributed after the call to conference call participants, other NWCC members and participants, and to interested NWCC observers.
  - ✓ This update features an overview of the Federal Energy Regulatory Commission's Notice of Inquiry regarding variable energy resources, and an introduction to the Efficient Dispatch Toolkit that has been proposed to the Western Electricity Coordinating Council (WECC).
  - ✓ Mk Shean, of the Federal Energy Regulatory Commission, was on the call to discuss the Notice of Inquiry. Stephen Beuning, the Director of Market Operations at Xcel Energy, joined the call to explain the Toolkit.

## **Federal Energy Regulatory Commission Notice of Inquiry**

**Background** The Federal Energy Regulatory Commission (FERC) issued a Notice of Inquiry (NOI) seeking comments on whether barriers exist to integrating variable energy resources on the power grid, and whether reforms are needed to remove those barriers. Ms. Shean began by noting that views expressed were her own and were not meant to be the views of the Commission.

She also noted that wind energy generation is growing quickly, having gone from a small portion of the nation's portfolio to nearly 35,000 MW. Variable generation is location-constrained, however, which brings into question many issues such as transmission planning and cost allocation. FERC understands that these issues exist, but the NOI is not focusing on transmission planning or cost allocation. The NOI instead focuses on operational issues with variable generation. Variable generation has the dual difficulties that it is not only variable, but also uncertain. Ms. Shean said that some smaller balancing areas have particularly struggled with incorporating variable energy generation.

Ms. Shean explained that this NOI was not an effort to promote variable energy resources. Instead, FERC sought to determine, in accordance with section 205 and 206

of the Federal Power Act, whether rates and terms are just and reasonable and that there is no undue discrimination to variable energy resources. Ms. Shean noted that some issues within the NOI may overlap with reliability standards established by the North American Electric Reliability Corporation (NERC). She reminded call participants that FERC approves standards set by NERC, but the NOI is not specifically meant as a forum for discussing issues within the reliability standards.

The largest cost in incorporating variable energy resources appears to be procuring sufficient reserves to handle increased variability and uncertainty, said Ms. Shean. FERC would like to establish why this is, develop a toolbox for looking at reserves, and examine FERC policies and procedures related to reserves.

**Comments on  
the NOI**

The NOI included fifty-five questions covering seven different topic areas. The seven topic areas included:

1. data and reporting requirements, including the use of accurate forecasting tools;
2. scheduling practices, flexibility, and incentives for accurate scheduling of variable energy resources;
3. forward market structure and reliability commitment processes;
4. balancing authority area coordination and/or consolidation;
5. suitability of reserve products and reforms necessary to encourage the efficient use of reserve products;
6. capacity market reforms; and
7. redispatch and curtailment practices necessary to accommodate variable energy resources in real time.

Over 130 comments and 2,800 pages were filed, but a preliminary review found some common themes. The largest overarching theme asked the FERC to bear in mind that each participant is unique, and that the applicability of any proposed solution will vary by region, resource portfolio mix, and other factors.

Comments regarding data and reporting requirements universally suggested that more data was necessary. The comments varied significantly in most other aspects such as to where the data should come from and who should provide the data. Ms. Shean noted that it was generally agreed that having tools to more accurately forecast wind would be beneficial, although some commentators warned that the FERC should not see improved wind forecasting as an all-encompassing solution.

Ms. Shean said that the comments concerning scheduling practices generally agreed that shorter periods could be beneficial for incorporating variable energy resources. Commentators noted, however, that there would likely be technical barriers, and possibly barriers within some open access transmission tariffs that would need to be addressed.

In the NOI, FERC stated that variable energy resources appear to mostly participate as price takers in real-time markets, with little participation in the day-ahead market

because of concerns of being exposed to significant imbalance charges if predicted energy deliveries do not appear in real time. FERC asked if the financial risk precluding variable energy resources from participating in day-ahead markets is discriminatory against variable energy resources. FERC also asked if the lack of day-ahead market participation from variable energy resources forces out-of-market commitments and results in rates that are not just and reasonable. Commentators expressed very mixed opinions. Some thought virtual energy transactions would help; others disagreed.

FERC also asked whether an intra-day reliability assessment and commitment could reduce the level of needed reserves and ease the integration of variable energy resources. Commentators generally agreed that a better reliability assessment would result from reliability assessments closer to real-time; however this would depend on the region and the make-up to the generating resources portfolio.

Concerning balancing authority area coordination and/or consolidation, FERC requested commenters to address whether smaller balancing areas would have more difficulty in integrating variable energy resources, whether that would result in rates that are not just and reasonable, and whether FERC should encourage balancing area consolidation or not. Commentators noted greater coordination among balancing authorities' schedules has the potential to reduce costs.

For reserves, FERC expressed concern that higher levels of variable energy generation may cause grid operators to rely on more costly reserves such as regulation. To that end, FERC asked if existing reserve products are the most cost-effective way of preserving reliability, whether the ancillary service provisions of the pro forma Open Access Transmission Tariff need to be revised, and whether variable energy resources can provide reserve services. Some commentators suggested rethinking the use of all existing reserves, though some also noted that the definitions in open access transmission tariffs and NERC standards may be barriers and cautioned FERC that using reserves in a different manner may have grid impacts. Some acknowledged that the new generation of variable energy resources could provide reserve products, while older variable generation technologies might not be able to do the same.

For capacity markets or requirements, FERC stated that variable energy resources can typically qualify for only a small portion of its capacity because of their operating characteristics. In addition, variable energy resources may have to bid into day-ahead markets in order to qualify as a capacity resource. They asked if the existing rules for capacity markets may be unduly discriminatory to variable energy resources or result in rates that are not just and reasonable. The prevailing comment was for more transparent standards on defining eligibility and standards for capacity markets.

FERC also asked whether variable energy resources are being curtailed too often because of unclear curtailment protocols, and whether redispatch and curtailment practices may contribute to unnecessary costs, making these costs unjust and unreasonable. As with capacity markets requirements, commentators asked for greater transparency in curtailment and redispatch procedures.

**Discussion**

A caller asked what FERC viewed as the next step, now that comments have been submitted. Ms. Shean answered that FERC will review the questions and comments to determine what action is necessary – a rulemaking, a policy statement, or to schedule technical conferences.

A caller inquired if there was a general timeline for action on these comments. Ms. Shean replied that despite the large volume of comments to review, there is a sense of urgency to act, as electric power industry is grappling with operational issues now.

**The Efficient Dispatch Toolkit****Background**

The Western Electricity Coordinating Council (WECC) is considering a proposed Efficient Dispatch Toolkit, which is comprised of two tools: a Seams Coordination Tool and an Energy Imbalance Tool. Mr. Beuning explained that the proposed toolkit augments the limited reliability tools currently used in WECC. With penetration of renewable resources increasing, improvements in reliability tools will become necessary, as the assumptions for determining available transmission service when considering a request are less valid when a greater portion of the resources are not dispatchable or have variable output. Mr. Beuning also stated that the toolkit will provide efficiency benefits. Currently, reserves in the West have to be held locally by balancing authorities, and the result of this coupled with increasing variable energy resources is that the variability tends to remain localized in that specific balancing authority, meaning they are forced to carry more reserves. The efficient dispatch toolkit will help with this issue.

Mr. Beuning referred Xcel Energy's situation in Colorado, where there are 1,300 MW of wind and 7,000 MW of peak load. In this case, the level of variability in the single, stand-alone balancing authority requires Xcel Energy to keep a gas turbine online throughout the night to meet reliability standards. This resource mix in off-peak hours is inefficient. In other operating areas that have access to a regional dispatch pool, the saturation level of renewable energy that the grid can incorporate is largely deferred. While there could be, for example, 70% wind penetration in one balancing authority, there may only be 5-10% penetration across the larger region. Most balancing authorities can accommodate variability at 5-10% penetration levels, as these levels of variability are generally inherent in load. When penetration of variable energy resources exceeds 10%, changes in unit commitment may be necessary.

**Seams  
Coordination  
Tool**

The Efficient Dispatch Toolkit consists of two tools that serve three functions. The Seams Coordination Tool would be applied to the entire WECC footprint. This tool is a flow impact calculator that can parse the amount of megawatts on any specific transmission element in real time and track back to the original transmission service reservation that is providing that contribution to flow. In addition, the tool can determine the transmission service priority for tagged and non-tagged flows on the grid, based on the transmission service reservation, and can rank which transactions are assigned a curtailment obligation. According to the FERC pro forma tariff, curtailments should be allocated on a pro rata basis within each transmission service priority level,

and lower priority curtailment service is curtailed first before higher priority curtailment service is accessed. The Seams Coordination Tool continues to perform calculations until the required congestion relief is obtained.

Mr. Beuning explained that one step in developing the Seams Coordination Tool is to address existing regional practices under the Unscheduled Flow Mitigation Procedure to modernize the procedure. A seams coordination tool similar to that proposed for the West already exists in the East, known as the Interchange Distribution Calculator. The current tool being used in the West is rudimentary, and is being used on only six transmission paths in the Western Interconnection. The comparable tool in the Eastern Interconnection calculates the distribution factors of about 3,000 different transmission elements. In the West, a transmission element must be overloaded for 100 hours before it is eligible to be included in the tool, whereas in the East, elements can be added to the tool at will, with information available for use in the reliability coordination process within hours.

**Energy  
Imbalance Tool**

The second tool is the Energy Imbalance Tool, and this would serve as both an energy balancing service and congestion redispatch service. The energy balancing service would consist of dispatch to supply imbalances between generation and load schedules; the congestion redispatch service would relieve overload constraints on the grid. The congestion redispatch service would be new in WECC. The energy imbalance tool would cover participating balancing areas in the WECC footprint, but not for example, the California ISO, which already runs a real-time balancing energy market.

The Energy Imbalance Tool is both more technically complex and potentially more controversial than the Seams Coordination Tool. The energy balancing service would establish a comparable process for all participating entities within the footprint, instead of covering imbalances on a balancing-area by balancing-area basis. This change would affect transmission tariffs for those participating in the toolkit, as balancing areas provide these services under Schedules Four and Nine of their individual open access transmission tariffs. All deviations would be settled at a regionally-determined energy imbalance settlement price rather than a balancing area-specific price.

Energy balancing service and congestion redispatch service would be provided by generators that have voluntarily offered their dispatch capability. The security-constrained economic dispatch software would clear the resources needed to meet energy balancing service and congestion redispatch service requirements. The energy imbalance service would be provided without using pre-reserved transmission service, and indeed has the lowest transmission service priority so no reserved transmission service would be displaced. Compensation would be based on the deviation from the schedule, and generators and loads would either pay or be paid based on errors from scheduled values.

**Next Steps**

Mr. Beuning said the WECC Board will be asked to support a cost/benefit analysis. This is not expected to be controversial, as benefits are widely expected. Mr. Beuning noted that the draft Western Wind and Solar Integration Study found that in a case with 10% penetration of wind and 1% solar energy in the WECC footprint, a savings of \$2 billion

per year could be achieved with region-wide coordination. Mr. Beuning specified that the study does not specifically recommend this particular toolkit, but the proposed toolkit would achieve the aims identified in the study. Mr. Beuning stated that some activities could begin this year if funding is provided in the 2011 WECC budget.

## Discussion

A caller noted that the studies suggest there are significant benefits for a region-wide imbalance rate, and asked how that would be determined. The caller also asked if it would be determined on the margin if a generator undersupplied. Mr. Beuning replied that that was the case. Generation and demand resources would voluntarily participate in providing energy imbalance, and prices would be determined on the margin to meet the deviation.

To another caller, Mr. Beuning explained that the underlying State Estimator and Contingency Analysis software required for the toolkit is used by the Southwest Power Pool, PJM, and others, and is necessary in order to provide security constrained dispatch capability. Mr. Beuning explained that this is part of the reason why WECC is the preferred entity to develop this toolkit. WECC already has an in-house regional state estimator and contingency analysis program. Therefore, they have a foundation to run the new tools, whereas none of the other subregional planning groups do.

A caller noted that Mr. Beuning seemed to suggest that this project could be funded through Section 215, of the Federal Reserve Act and asked if it was being considered under Section 205. Mr. Beuning answered that the Energy Imbalance Tool is specifically not funded under Section 215. The energy imbalance tool would likely have its costs recovered from generators and loads that have imbalance settlements in the footprint. The Seams Coordination Tool could potentially be funded through Section 215. This is because it provides a reliability service that is useful independent of the Energy Imbalance Tool, and could be developed regardless of whether the Energy Imbalance Tool is pursued. If the Energy Imbalance Tool is developed, the Seams Coordination Tool would share coordinating information.

A caller inquired about the possibility of this causing a move to a full LMP market structure. Mr. Beuning replied that the particular instructions at the outset of the project's development were not to design a Regional Transmission Organization or a full LMP market proposal. The SPP began its regional market with offering an energy imbalance service, and is now considering a full LMP market design for implementation in 2013 or 2014. Mr. Beuning noted that the SPP had taken the process step-by-step, and suggested that this was advisable. It is possible that at a later time, a full LMP market design may be desirable for the WECC region as well.

## Implications

If nothing else, the FERC NOI on variable generation provides an opportunity for the electric power industry to describe the experience with integrating variable energy generation and to debate what is needed to enable higher levels of variable generation to be integrated on the U.S. electric power grid. What is unclear is what action FERC will take, if any. FERC could conceivably take a number of actions, such as determining

whether day-ahead schedules are discriminatory towards variable energy generation or consider what reserve costs are just and reasonable. Alternatively, FERC could decide to hold technical conferences on variable generation more generally or on specific issues raised in the NOI.

Several issues in parts of the Western Interconnection make it difficult to incorporate higher levels of variable generation. These issues include the use of hourly schedules instead of sub-hourly schedules; the lack of an ancillary services market; and the lack of price transparency in general. The Efficient Dispatch Toolkit proposal could alleviate some of these issues if it is adopted. By relying on more coordination among balancing areas and adopting such measures as the Efficient Dispatch Toolkit, the Western Interconnection could incorporate more variable generation without adopting a RTO or a LMP-based market. These are important considerations for several stakeholders in the region. Simply going to a region-wide energy imbalance market will be a big step for the West, and will likely be extensively debated for a time.

**For more  
Information**

Mk Shean, [Mk.Shean@ferc.gov](mailto:Mk.Shean@ferc.gov)

Steve Beuning, [stephen.j.beuning@xcelenergy.com](mailto:stephen.j.beuning@xcelenergy.com)

Federal Energy Regulatory Commission. *Integration of Variable Energy Resources*, 130 FERC ¶ 61,053, January 21, 2010, Docket No. RM10-11-000. <http://www.ferc.gov/whats-new/comm-meet/2010/012110/E-4.pdf>.

*Proposed WECC Efficient Dispatch Toolkit: Stakeholder Discussion and Comments*, [www.westconnect.com/filestorage/wc\\_wecc\\_eis\\_proposal\\_final\\_051210.ppt](http://www.westconnect.com/filestorage/wc_wecc_eis_proposal_final_051210.ppt).