

Transmission Update

October / November 2005

Summary

- ✓ The next Transmission Update call will be December 13 at 1 pm Eastern. Please mark your calendars!
- ✓ Welcome to the Fifth NWCC Transmission Update! Kevin Porter of Exeter Associates led the October 11, 2005 Transmission Update Conference Call, which featured expert speakers providing their insights on issues affecting wind energy, with an opportunity for discussion and questions. 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.
- ✓ Three issues are covered in this brief:
 - Developments in Wyoming on wind and transmission from activity being undertaken by the Wyoming Transmission Authority
 - Update on changes to the Low Voltage Ride-through standard adopted by FERC with subsequent recommended revisions from AWEA and NERC
 - Update on changes afoot in the west on Transmission Planning by the Seams Steering Group-Western Interconnect.
- ✓ Two speakers led with their perspective on new developments in transmission line finance being produced by the Wyoming Infrastructure Authority (WIA): Steve Ellenbecker, a consultant to the WIA, and Don O'Shei, a member of its board. The WIA financed its first transmission project recently in supporting three-fourths of the \$50 million transmission project planned by Basin Electric Power Cooperative in northeastern Wyoming. The project, known as the Hughes Transmission Project, is a proposed 230-kV transmission line that would extend 130 miles. The WIA also entered into a partnership with Trans-Elect to pursue new transmission development to relieve chronic transmission congestion between Denver and Wyoming.
- ✓ Mike Jacobs from AWEA and Craig Quist from PacifiCorp (a member of the NERC Wind Generator Task Force) provided their perspectives on the low voltage ride through issue. In 2004, AWEA filed a proposed low-voltage ride-through standard for large wind projects to meet as part of FERC's proposed interconnection rule. After FERC issued an order largely accepting AWEA's recommendations, NERC asked for rehearing, contending that some of the provisions may harm electric reliability. AWEA and NERC worked through their differences and made a joint filing at FERC on September 19th recommending revisions to the low-voltage ride-through standard.
- ✓ Doug Larson of the Western Interstate Energy Board provided information on upcoming changes for the Seams Steering Group and the Western Electricity Coordinating Council (WECC) on systems integration and transmission planning work, including sessions being sponsored by WECC in Tucson and by NARUC at their upcoming annual meeting in Palm Springs, CA.

The Wyoming Infrastructure Authority's Transmission Financing

Background Wyoming is a state with significant wind energy resources and an ambitious program that aims to remove transmission as a barrier to exporting these resources, along with coal-derived energy, out of state. Its recently-created parastatal organization, the Wyoming Infrastructure Authority (WIA), has begun taking steps to remove identified transmission barriers by providing seed capital to key projects.

In the first of what could be a number of transmission investments in the Rocky Mountain region, the WIA last week inked a deal for the financing on its first power line project, a 130-mile, 230-kV transmission line to be built by Basin Electric Power Cooperative. In addition, the WIA has begun working with the Western Area Power Administration and Trans-Elect on the TOT 3 line connecting Colorado and Wyoming.

As part of a longer-term effort, the WIA will also represent Wyoming in the development of the \$3.3 billion "Frontier Line" that would interconnect the Intermountain West with markets in California.

Perspectives of the WIA As part of the Basin project, the WIA agreed to issue \$34.5 million in bonds in September 2005. By partnering on a loan agreement with Basin Electric, the \$50-million project will have the financing needed to be developed in northeast Wyoming.

The WIA is engaged in talks on forming a partnership to develop major transmission lines spanning several states with Trans-Elect, including the \$580 million Bridger project, which would add 345-kV transmission facilities between Idaho, Utah and Wyoming.

The WIA will also work with the Western Area Power Administration and Trans-Elect on a \$318 million, 345-kV line from the Powder River Basin in northeastern Wyoming across the constrained path between Wyoming and Colorado, known as TOT 3. The Bridges and TOT 3 projects were among those identified by the Rocky Mountain Area Transmission Study (RMATS).

The TOT 3 project is designed to push an initiative forward that came out of RMATS that identified the Northeast Wyoming area as one rich in coal and wind resources. West of I-25, the interstate freeway that runs through Denver into Wyoming, there is a 100-mile stretch of world class wind resources and coal resources unmatched in North America. The partnership with Trans-Elect and WAPA is a continuation of a collaboration begun while working on other transmission lines such as Path 15 in California.

Steve Ellenbecker, formerly the Energy advisor to Gov Freudenthal of Wyoming and a consultant to the WIA, noted that the announcement with Basin in Northeast Wyoming is the agency's maiden voyage for financing these types of projects. He noted that the WIA's statutory mission is to develop transmission that enables power resources in Wyoming to be brought to markets outside the state. The recently announced projects also improve reliability in-state, but enhance connections with Wyoming's neighbors as well.

Mr. Ellenbecker also said that the WIA is working with WAPA to gather information

regarding load and technology options for generation options to serve that load. WIA will soon be trying to aggregate a consortium of developers to identify specific load centers to make the transmission projects viable, and will be consulting with that consortium to help determine which wind and coal baseload projects could serve as anchors to those transmission projects. WAPA representatives on the call noted that they were working with the WIA and Trans-Elect to publish a Federal Register notice soliciting interest in projects to go across the WAPA service territory boundary, and that this should be completed in November.

Recently, the WIA filed comments with the California Energy Commission (CEC) regarding California's greenhouse gas policies. In December 2004, the California PUC (CPUC) required utilities to include an adder of \$8 to \$25 per ton of CO₂ in order to reflect the risks of climate change in the utilities' long-term resource procurement plans. In June 2005, California Governor Arnold Schwarzenegger proposed to reduce California's greenhouse gas emissions to 1990 levels by 2020. On October 6th, the CPUC began to require all new utility-owned generating plants and energy contracts that exceed three years in length to meet a greenhouse gas emission standard at a level no higher than greenhouse gas emissions from a combined cycle natural gas turbine. The CEC plans to incorporate the CPUC proposed this standard into the final version of its Integrated Energy Policy Report that is scheduled to be released in November.

The WIA's letter contended that limiting and allowing greenhouse gas emissions to those of a combined cycle natural gas turbine effectively precludes coal as a potential resource for California for the next 10 to 15 years. Further, the WIA asserts that California's greenhouse gas standard could derail the proposed Frontier transmission line, as coal plants will likely be an important power source that is transmitted. The WIA also questions whether California's proposed greenhouse gas standard would violate the Interstate Commerce Clause of the Constitution, as the standard would penalize a resource that does not exist in-state (coal) and favor resources that do. The WIA recommends that California drop the greenhouse gas standard, support coal technologies that can be built now, support Wyoming's efforts to solicit federal support for a public-private IGCC coal plant in Wyoming, and evaluate projects such as the Frontier transmission line on an integrated basis, reflecting the wind and coal generation that may be transmitted on the Frontier line.

On the call, Steve Ellenbecker reiterated some of the points in the WIA's letter to the CEC. The WIA representatives noted that they were not trying to select a specific technology over the long term, but in the interim, find a coal technology that, when examined as part of an aggregated portfolio that includes climate-friendly technologies like wind, might be more accepted in West Coast markets. They called on the group to help identify which coal technologies are practical to come forward to meet the demand in West Coast States to facilitate transmission that delivers both wind and coal generation.

A number of participants on the call discussed whether this was an optimal solution, and whether the unanswered questions on the accompanying coal resource remains one of the main obstacles that blocks wind development in Wyoming. A few call participants expressed concern that lines advertised as being built to serve wind would serve "interim" coal technologies that would stay around for 40 years or more. Others wondered whether wind alone could support a transmission line such as Frontier. WIA officers argued that the descriptions of the high capacity factor of Wyoming wind are unstudied and as-yet

unproven, and may remain so without transmission to spur greater interest in its development. In the interim, bringing a combination of some wind and some coal technologies to market is a stepped approach.

Some callers noted that without RMATs, there is not a clear venue for getting together and discussing these issues. Steve Ellenbecker agreed and said these conference calls and future feasibility studies are critical.

CEC representatives commented that California wants to send a strong signal through its procurement policy, to encourage the most advanced technologies. The CEC representatives also said that neither carbon capture nor sequestration is required. The CEC representatives also noted that any investment in climate emitting technologies will diminish the prospects of reaching the State's greenhouse gas reduction target, and may become a financial risk for the state as well. The Integrated Energy Policy Report emphasizes that procurement policy is going to be key in meeting GHG goals and could be an important element in technology development and deployment across the West.

Other policies exist in California that call for accounting for all emissions – including CO₂ emissions – in reporting processes. For example, a number of utilities are members of the state's Climate Action Registry, which is a registration process wherein a dollar value is ascribed to CO₂ emissions. These policies, taken together, are intended to send a strong signal to the West and the world – that climate change is important to California.

WIA officials responded that one issue remains problematic: California's policies impact the ability of out-of-state producers (who use coal & other energy sources) to provide climate-friendly options more than in-state producers because of transmission development that adds 5-7 years of development for out-of-state producers. As a result, any technology proposed would be delayed that much behind the cutting edge.

These issues were not settled on the call. Some noted that the NWCC might want to provide a forum to address these issues further.

AWEA representatives asked what customers would be identified to build one of the transmission projects, and what products generators (coal and other) would be willing to put together. They commented that the RMATS process suggested that hundreds of megawatts of potential coal and wind capacity exist in the Powder River Basin. Rather than setting up a coal vs. wind battle, could coal and wind companies work together to understand what is acceptable to load centers, and move in that direction for development?

AWEA representatives also advised the WIA to think about their competition. For instance, the New Mexico Wind Task Force developed a scenario that would export 4,000-6,000 MW of New Mexico wind capacity to load centers in Arizona and California. Other potential competition to wind in Wyoming includes wind in the Pacific Northwest and wind resources in California. AWEA representatives said they are working on identifying short-term issues to resolve and get some wind projects on-line, and that will lay a foundation for longer-term transmission and wind development to occur.

California is clearly considered to be the major load center for large-scale energy plans such as those discussed in RMATs, yet the State's desires to meet its own internal

greenhouse gas emission limits will be an important factor to consider in Western energy markets. Whether or not California's electric procurement policy acts to nix major transmission lines such as Frontier depends on whether the State holds firm to meeting their greenhouse gas emission targets, or whether advanced coal technology can be developed commercially in the near future, or both.

**For More
Information**

Steve Ellenbecker
Don O'Shei

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California Energy Commission, *2005 Integrated Energy Policy Report* (Draft). Available at <http://www.energy.ca.gov/2005publications/CEC-100-2005-007/CEC-100-2005-007-CTD.PDF>.

Letter from Michael Easley, Chairman, Wyoming Infrastructure Authority, to the California Energy Commission, October 5, 2005. Available at http://www.energy.ca.gov/2005_energypolicy/documents/2005-10-11_DER_comments/10-05-05_Wyoming_Infrastructure_Authority.pdf.

Revisions to the FERC low voltage ride through standard, as negotiated by NERC and AWEA

Background

In 2004, AWEA filed a proposed Low-Voltage Ride-Through (LVRT) standard for large wind projects to meet as part of the Federal Energy Regulatory Commission's (FERC) proposed interconnection rule. (For more information on AWEA's proposal, see the March 2005 edition of the transmission update.) After FERC issued an order in July 2005 largely accepting AWEA's recommendations, the North American Electric Reliability Council (NERC) asked for rehearing, contending that some of the provisions may harm electric reliability. AWEA and NERC worked through their differences together and made a joint filing at FERC on September 19th, 2005, recommending revisions to the low-voltage ride-through standard. It is expected that FERC will issue an order by the end of November.

For those unfamiliar with this topic, generators in the electrical system experience changes in service that are roughly as significant as those that reset the clocks in our houses. These momentary drops in voltage can be measured, since changes of the same significance that resets a clock would drop a wind turbine off of the transmission grid. The problem being addressed is that wind turbines dropped off the grid by a low-voltage incident would be unable to come back on, potentially affecting reliability. The central issue involves how severe a voltage incident wind generators would be expected to withstand and stay online. The term "cycle" is used to measure the amount of time a generator is expected to stay operational after a system disturbance. Each cycle is equal to 1/60th of a second.

FERC's July 2005 order, known as Order No. 661, would allow wind generators to disconnect from the grid for voltage drops below 15%. In addition, transmission providers could only impose the LVRT if case-specific reliability studies document that the standard is needed. NERC raised concerns that the new standard provided insufficient protection for reliability, and that wind turbines should stay on-line if the voltage dropped to zero.

NERC also objected to the FERC Order's requirement that transmission providers have the burden of proof in justifying the need for LVRT, among other things. The NERC-AWEA joint recommendation removes this burden of proof. In addition, NERC and AWEA recommend that FERC only consider exceptions to the LVRT standard on an interconnection-wide basis (i.e., the Western Interconnection or the Eastern Interconnection). Transmission providers individually may request deviations from the LVRT standard by filing with FERC.

FERC's July order called for wind turbines to ride through a voltage drop for as long as 0.625 seconds, if the voltage dropped to below 15% of what's normal. NERC said this was insufficient, and the wind generators should be expected to stay on even if the voltage dropped to zero. The compromise reached in the talks between AWEA and NERC is that for the first 0.15 seconds, voltage could go to zero and turbines would have to stay online. The 0.15 seconds is equal to 9 cycles.

The NERC and AWEA joint recommendation proposes to phase in the LVRT

standard, beginning in January 2006. A transition period would apply to wind projects with unexecuted interconnection agreements filed at FERC by the end of 2006, or wind projects with a wind turbine procurement contract executed before the end of 2005, for delivery through 2007. Wind projects meeting the provisions of the transition period would follow requirements similar to what was contained in FERC's July 2005 order. The transition period was designed to give time to wind turbine manufacturers to meet the new standard, while limiting the number of wind generators that can interconnect under the transition standard.

Craig Quist noted that one of the most difficult questions addressed in the settlement talks with AWEA was how to define the transition period. Their approach was to craft the transition language to look like the WECC LVRT criteria, only using a different time frame of 9 cycles. This makes the resettlement proposal language look as much like the WECC criteria as possible until 2007, and thereafter reach NERC's preferred level. Mr. Quist noted that there is a group within WECC looking at how to coordinate with NERC before 2007 as well.

John Twitchell of NERC noted that the entire text of the resettlement proposal is available on the NERC website (http://www.nerc.com/~filez/nerc_filings_ferc.html)

Call participants asked whether modifications to the turbine will be expensive. Actual costs will vary by turbine, but to reach the LVRT interim standard, a reasonable estimate is at least \$10,000 per turbine. There was a discussion among the callers as to whether there is a way to do this at the substation level instead of modifying the turbine, and commenters noted that while there are some things you can do, some of wind plants are so spread out that the developer has no choice but to go back to the turbine. Callers noted that the zero level would be measured at the high-voltage tie-in. Mr. Quist acknowledged that this was true, and was done to add some flexibility, but it is not a panacea – the real solution has to occur at the turbine, he stated.

Most wind plants are connected to a feeder system of mid-voltage. The level at the terminals of the turbine is often around 500 volts. At the mid-level distribution level, this is stepped up to 34.5 kV. The step up from there to transmission voltages (112 kV, 345 kV, etc.) is the "high-voltage side" where the voltage would be measured under the resettlement proposal. The language was more confusing in the previous version of the standard: the standard was applied to the point of interconnection, so it could be described as on the high or low-side if there were radial connector lines within the wind farm. Because this was a statutory rather than an engineering description, one way that those involved in drafting the resettlement were able to find a solution to this was to eliminate the lawyers' definitions.

Negotiating the resettlement was difficult because from the utility side, the parties were pretty united, but AWEA was less united in its position because of the diversity of its membership. For example, PacifiCorp is an AWEA member, and as such, was on both sides of the fence. This discussion was also difficult because the issue affected everyone's bottom line. It was a case where two industries that crossed over one another had to come up with answers. Luckily, both sides had enough shared interests to want to find a solution; nobody wanted it to be left unresolved or sorted

out in court. This was the key to its success.

Callers asked whether it was AWEA's sense that wind developers could live with the new standard. Mr. Jacobs thought so, even though it will take some turbine manufacturers back to the design boards, but mostly it will reward those who made their investments early.

In response to a question about how Europe has handled these questions, AWEA representatives responded that this was where reliability standards for wind started. Much of the wind in Europe is connected at the distribution level, however, so it was not as good a template as the wind industry had hoped for. LVRT remains a heated topic of technical discussion in Europe.

Mr. Twitchell added that there is a wind generator task force at NERC. The wind generator task force commented on the joint recommendation and held up the joint recommendation with AWEA. Over next several months, the task force will recommend whether there need to be modifications to the reliability standards based on wind technology features as opposed to simply basing it on synchronous generators. They commented that all should be taking the opportunity to participate in the NERC standard-setting process – and that could allow issues to be resolved without going to FERC.

The filing of the LVRT standards at FERC, and the debate over the terms and conditions is another illustration that wind is considered an important energy resource. The joint agreement between AWEA and NERC appears to be of mutual benefit to both organizations, and allows the LVRT standards to go forward.

**For more
Information**

Mike Jacobs, AWEA

Craig Quist, PacifiCorp

(The full text of the NERC / AWEA Resettlement proposal is available online from PJM's website at <http://www.pjm.com/committees/planning/downloads/20050928-nerc-and-awea-joint-ferc-filing.pdf>, or at NERC's website at ftp://www.nerc.com/pub/sys/all_updl/docs/ferc/Joint_Report.pdf).

Update on the West

Doug Larson of the Western Interstate Energy Board described changes in transmission planning that are underway in the West.

He alerted callers to the news that interconnection-wide planning in the West is moving from the Seams Steering Group – Western Interconnect (SSG-WI) to WECC under a joint proposal (under EPACT sector 1221) to do planning work.

In the coming weeks before the transition, SGG-WI will run a base case for 2015 using production cost models to determine predictable-case scenarios for wind and other generation types in the West. SSG-WI will also run scenarios based on outcomes from the working groups of the Western Governors' Clean and Diversified Energy Advisory Committee (CDEAC), including a high-renewables case.

The WECC technical session, planned for December 1-2 in Tucson, will be on how to integrate large amounts of wind into the western grid. WECC is looking for help on designing the technical session, and WGA staff highlighted this as an opportunity to educate the WECC staff. Doug said that he has offered to help WECC staff organize the Tucson meeting, and solicited advice on the most important issues that should be addressed.

The National Association of Regulatory Utility Commissioners will also have a special wind integration session at their annual conference, November 12 – 16 in Palm Springs California. Ed DeMeo, Dave Hawkins of the California ISO, Mark Smith of FPL Energy, and others are involved in this session.

Doug Larson commented in response to a question that there is not an anticipated follow-on to RMATS, and said that there had been some frustration that those developing transmission plans in the West, including the WIA, were not using outcomes reflecting the RMATS recommendations.

For the NARUC session on wind integration, see http://annual.narucmeetings.org/comm_agendas/CommERE.pdf.

Next Update: December 13, 2005

The next NWCC Transmission Update will be held on December 13, 2005, at 1 pm Eastern.

Please email Kevin Porter (porter@exeterassociates.com) with any suggestions for topics, or ways to improve the call.