

**National Wind Coordinating Committee
Western Transmission Workshop
Meeting Summary**

**San Diego, CA
February 26-27, 2004**

Introductions

After introductions of all participants, Abby Arnold, RESOLVE, reviewed the purpose of the meeting and the agenda. The purpose of the workshop was:

- Understand the unique characteristics of wind and its interaction with the transmission system;
- Provide an update on transmission planning efforts currently underway in the western US;
- Consider the relationship between current transmission related policy and the wind market; and
- Identify opportunities to modify transmission rules and policies so that wind and conventional energy sources are treated comparably.

Based on input from all stakeholders, the NWCC will consider possible activities that can assist the development of transmission planning processes in the West.

Session I: What is the Context for this NWCC Western Transmission Workshop?

Charlie Smith, chairperson of the **NWCC Transmission Work Group**, gave an overview of the NWCC, discussed previous efforts of the NWCC in the Western US region, and offered some thoughts on the importance of transmission expansion to wind power development. Mr. Smith explained that the NWCC is a multi-stakeholder collaborative group united by a single vision of economically, environmentally, and politically sustainable commercial markets for wind power development. The group identifies key issues affecting wind power, establishes dialogue to achieve consensus views on those issues among the diverse stakeholders, and catalyzes activities moving toward the overall vision. The group convenes workshops and produces documents on a wide range of topics affecting wind energy development, including transmission, economic development, avian and wildlife, siting, and green markets and credit trading. Mr. Smith emphasized the need to hold collaborative discussions to avoid adversarial interaction later.

Mr. Smith next discussed the importance of transmission for wind. The remote location of many wind energy resources underscores the need for transmission to move the electricity from the source to load centers. Financing for wind power development requires a certain level of transmission certainty, which requires more capacity than currently exists. The intermittent nature of wind is also related to the availability of transmission capacity for wind; wind power resources will need transmission access only part of the time, so developing creative ways to accommodate wind along with other constant resources is important.

Mr. Smith described the evolution of wind turbine technology and its impact. Gradual improvements in turbine technology have resulted in greater levels of voltage control, low-voltage ride-through, and stability behavior, improving the performance of these turbines. Additionally, forecasting accuracy for wind resources, crucial to determining when to adjust generation levels to balance the transmission grid, is expected to improve in both hour-ahead and

day-ahead markets. Several studies have noted the relatively low marginal costs to utilities for ancillary services associated with wind generation, as well as the fact that capacity value decreases at higher levels of wind penetration into the transmission grid. The emerging consensus from this body of work is that wind plants can be integrated into utility systems at low to moderate costs.

A major factor in the evolution of transmission markets nationwide is FERC Order 2000, which encourages formation of Regional Transmission Organizations (RTOs) and open markets for transmission and ancillary services. Ultimately, the NWCC transmission Work Group wants to ensure fair and open access to the transmission grid for all resources, including wind.

Mr. Smith reviewed previous transmission workshops held by the NWCC in the West. The Western workshops were born out of the NWCC efforts in the Midwest to facilitate transmission planning discussions in that region and recognition of the need for similar dialogue in the West. The January 2003 workshop in Salt Lake City led to several recommendations, including:

- Integration of results from transmission planning studies to provide a clear picture of issue and alternatives
- Development of transmission planning principles to guide location of generation and transmission and to consider the impacts of efficiency, distributed generation, and pricing.

With increased planning activity throughout the region, as well as changes in FERC policy and continued regional pressure to expand wind, members felt a second workshop was in order. (For more information on the January 2003 Western Transmission Workshop, refer to the NWCC Website at www.nationalwind.org.)

Session II: What is the Status of Wind Development and Regional Planning Activities in the West?

Several presenters provided insights on the numerous planning efforts in the West. The collection of presentations was intended to provide an overview of the wires and transmission policies needed to expand wind development in the West and to explore efforts underway to coordinate planning activities in the region.

Ronald L. Lehr, attorney and consultant, gave an overview of the Balanced Energy Plan for the Interior West. The plan was developed by Western Resource Advocates and released in January 2004. The plan calls for a one-third reduction in energy usage by 2020 and an increase of the percentage of electricity coming from renewables to 20% in the same timeframe. Adoption of these policies will result in reduced air pollution and demand for fossil fuels and decrease exposure to risk from gas price volatility, potential carbon taxes, and drought conditions. The states included in the study are Montana, Wyoming, Colorado, Utah, Nevada, New Mexico, and Arizona. California and the Pacific Northwest were included in the modeling, but clean energy plans were not developed for these regions. The PROSYM modeling platform was used for the study. This model contains information on the cost and performance characteristics of power plants in the region and on the location, type, and cost and performance characteristics of new resources as inputs.

Mr. Lehr mentioned two recent assessments of renewable resources and of potential energy efficiency gains in the region. The Balanced Clean Energy Plan calls for a reduction in the

proportion of fossil fuels, particularly coal, and the increase in renewables to produce electricity. The Plan also suggests very small annual increases in both total energy usage and peak load (0.3%) as compared to a business-as-usual case increase of 2.3% annually. Cost savings from these measures will be realized beginning in 2008, with more significant savings seen annually through 2020. The Plan also realizes significant reductions in NO_x, SO_x, and CO₂ through the same time period.

The Balanced Energy Plan incorporates several different scenarios for risk analysis: a high natural gas price scenario, regulation of carbon emissions, drought conditions in the region, and a confluence of all three conditions. The provisions of the Plan provide increased cost savings over time under all risk scenarios, with great savings coming under enactment of carbon emissions regulation (most likely in the form of taxation).

Mr. Lehr discussed transmission issues associated with implementation of the balanced Clean Energy Plan. The study considered the extent to which renewable energy and energy efficiency resources can help alleviate transmission system constraints and the costs of tapping higher quality, higher transmission cost remote renewables versus less favorable resources closer to load. The study considered two specific scenarios – a remote wind scenario and a near wind scenario. In the remote wind scenario, Class 6 and 7 wind resources are chosen as desirable sites for wind development regardless of proximity to transmission facilities. The near wind scenario allocates wind resources based on proximity to load centers and considers Class 4 and 5 (lesser wind speed quality) sites as well as Class 6 and 7. Transmission upgrade costs for both scenarios were similar. The Plan favors the near wind scenario, citing more equitable geographic distribution of renewables and associated economic development benefits and less need for major inter-state transmission upgrades. Furthermore, dispersed resources tend to be less vulnerable to failures of supply and transmission and less susceptible to correlated swings in power output caused by localized weather patterns.

Lee Otteni, project manager with the **US Bureau of Land Management (BLM)**, discussed the agencies Programmatic Environmental Impact Statement (PEIS) for wind energy development. BLM is working with US Fish and Wildlife Service to develop best management practices for reduced risk to bird and bat populations at future wind energy facilities. Maps are under development by the National Renewable Energy Laboratory which will show wind resource on BLM lands and proximity of these sites to transmission access. A draft of the PEIS is due to BLM in May, and BLM will post the draft on its agency website in June 2004. A comment period of the PEIS will be open until November 22, 2004. The final PEIS will be developed by April 2005, with a final decision on its status due by August 2005.

Doug Larson, executive director of the **Western Interstate Energy Board**, provided the meeting participants with thoughts on the linkages between integrated resource planning (IRP) developed by load serving entities (LSEs) and regional transmission planning. He gave three reasons for improving such linkages. First, linking the two planning efforts provides transmission plans with more realistic load forecasts and, subsequently, future generation assumptions. Second, integrated resource plans (IRPs) often do not consider specific transmission additions because transmission expansion benefits tend to extend beyond one load-serving entity (LSE). Collaborative regional transmission planning will help multiple LSEs and generators identify mutually beneficial transmission projects. Finally, linking regional transmission planning and LSE integrated resource planning tends to increase the likelihood of cost recovery for transmission development, since transmission investments that reflect resource choices in IRPs are more likely to be approved.

Mr. Larson noted that transmission planning processes underway in the West are beginning to incorporate IRP results. In particular, he noted the Rocky Mountain Area Transmission Study (RMATS), which is using PacificCorp and Xcel IRPs for both load forecast and generation additions. Through this inclusion of IRP in the RMATS study, planners aim to incorporate more realistic load and generation scenarios than in earlier efforts. Mr. Larson offered three steps that should be taken to strengthen links between IRP and transmission planning:

- Regional transmission planning should use IRP results when developing transmission scenarios.
- Public utility commissions (PUCs) should require LSEs to supply data to regional and sub-regional planning databases.
- LSEs should reconcile information reported to the Western Electricity Coordinating Council (WECC) with information submitted to PUCs and the public in their IRPs.

Jeff Miller, regional transmission planner with the **California Independent System Operator (ISO)**, gave the audience an overview of interconnection-wide planning under the Seams Steering Group – Western Interconnection, better known as SSG-WI. The organization was formed in 2001 by the three proposed western regional transmission organizations (RTOs) to address seams and coordination issues between them. SSG-WI has been developing conceptual transmission plans to facilitate a robust transmission system. Recent work by SSG-WI has identified major transmission needs to integrate large quantities of wind generation into the regional grid. The 2008 study concluded that as much as \$140 million is lost each year in increased production costs due to transmission congestion. The activities of sub-regional planning groups will need to develop transmission solutions.

In the SSG-WI 2013 study, three generation scenarios were generated, each with high proportions of natural gas (86% of new generation), coal (66%), and renewables [72%, with 21,350 megawatts (MW) of new wind]. At these penetration rates new wind and other renewable generation would require bulk transmission improvements totaling 3,360 miles at a cost of \$6.7 billion. This amount is higher than the \$2.6 billion in bulk transmission improvements for new natural gas generation, but significantly less than the \$16.7 billion in new investment costs for new coal generation. In addition, other policy concerns, such as environmental obligations and competing financial needs, will determine the proper mix of new generation and transmission investment.

Mr. Miller also provided an overview of the **Southwest Transmission Expansion Plan (STEP)**. This planning process was initiated in October 2002 and covers all or parts of southern California, Nevada, Arizona, and Baja Mexico. The planning effort seeks to develop a transmission system that supports seamless, efficient, and competitive wholesale electricity marketers and to develop a common transmission goal among stakeholders. The STEP transmission plan currently calls for short term upgrades, including several series capacitor upgrades and dynamic voltage support, as well as new 500 kilovolt (kV) lines in southern California and Arizona to support load growth in that area. Further planning efforts are underway to address long-term growth trends in the area and to better accommodate increased electricity from Mexico.

Roger Hamilton, executive director of **West Wind Wires**, an advocacy group that promotes wind energy development in the western US, discussed the Rocky Mountain Area Transmission Study (RMATS) in detail. The RMATS process is formed by an 18-person steering committee and seven work groups. The process is based on the concept of locational marginal pricing (LMP); this modeling is being performed by PacifiCorp planners. The analysis is focused on several transmission constraints identified in the RMATS area. The RMATS analysis includes

considerations for demand-side management (DSM; identified as a resource that may free up transmission for remote generation) and potential carbon regulation in the future. In the case of DSM, the RMATS study has found that efficiency investments are relatively low at a three-year payback cycle and eliminates 50% of the expected summer peak demand growth and 40% of the total load growth from 2003 - 2013. In the carbon analysis, the study concluded that wind displaces coal at \$8 per ton of Carbon dioxide, which is significant in the export case with the development of a West Coast Greenhouse Gas initiative (underway in California, Oregon, and Washington).

To date, the RMATS process has identified several potential transmission solutions, including minimum transmission alternatives for new lines and expanded transmission alternatives to support scenarios for high wind and coal penetration. Mr. Hamilton also noted some critiques of the RMATS process. These critiques include an assumption that new transmission is necessary, the belief that LMP modeling assumes perfectly competitive markets, and a lack of authority to enact study results.

Natalie McIntire, policy associate with the **Renewable Northwest Project**, gave an overview of the Northwest Transmission Assessment Committee (NTAC) and its planning activities. NTAC was established in the summer of 2003 as an initiative of the Northwest Power Pool (NWPP) Transmission Planning Committee to provide an open forum that will address transmission planning and development to support a robust transmission system in the NWPP area. Like the RMATS process, the NTAC has no authority to enact planning results and no state government backing. NTAC seeks to provide an annual assessment of the NWPP transmission system, providing necessary information to maintain reliability and to identify constraints under a range of generation scenarios. The NTAC assessments will include non-wires alternatives, such as DSM, economic as well as reliability assessments, high-level path studies, and a regional final report. The Renewable Northwest Project is participating in the study. Ms. McIntire acknowledged the NTAC's need for assistance to prepare for inclusion of wind into scenario studies.

John Candelaria, electrical engineer assisting the **Nevada State Office of Energy**, discussed the Nevada Wind Transmission Project. This project seeks to investigate the regional wind development benefits of upgrades to Nevada's transmission systems. Mr. Candelaria, noted the excellent wind resources in Nevada and other interior West states, such as Idaho, Wyoming, and Utah. However, transmission infrastructure in the West is not sufficient to deliver the output of these wind resources. The Nevada project provides an integrated transmission assessment so that state and federal regulators can see the region-wide benefits from transmission enhancements in Nevada. The project began in October 2003 and is divided into six phases. The initial phase, wind characterization, will be completed by the spring and will build on the Wind Energy Assessment Study for Nevada, currently under development. This study will produce a detailed wind resource map and a database of detailed wind data at ten sites around the state, as well as meteorological data collected at these sites. Tasks 2 and 3 entail transmission studies that will investigate delivery of wind resources to the Mead trading hub and to southern California. These transmission studies are scheduled for completion by July 2004. Following the development of the transmission studies, the Nevada Energy Office will develop a white paper and technical report to detail the effort and perform outreach to various stakeholders. The project is expected to be completed in December 2004. Several participants indicated the importance of this study because of Nevada's position as a potential exporter of wind power to resource-constrained southern California. The expansion of transmission in the state will be important to enable export of wind power to load centers to the west.

Ray Dracker, of the **Center for Resource Solutions**, provided a summary of a Public Interest Energy Research Program sponsored by the CEC. The program is intended to assess renewable energy resources and associated transmission to support cost effective renewable energy deployment in the short term, and advance the development of select renewable technologies for the longer term. The project, lead by Hetch Hetchy Water and Power, has significant participation from California municipal utilities as well as WAPA and BPA. Project work includes conducting an assessment of renewable resources, including wind power, focusing on California, southern Oregon, and western Nevada. As specific resource areas are identified, plausible transmission development options to service the bulk power projects are evaluated, emphasizing options that build on existing lines and right-of-ways. Project work also will evaluate scenarios that consider how western hydropower can be better utilized to leverage new renewable energy, while also making better use of existing transmission. While the strategic implications of extensive integration of western hydro with new renewable energy may be significant, the analysis is still in preliminary stages and has yet to verify the economic viability of the concept. Work will continue on this program through the first half of 2005.

Jim Caldwell, policy director for the **American Wind Energy Association (AWEA)**, shared his organization's concept of a Wind Pipeline in the West. AWEA has proposed a wind energy "pipeline" concept to boost wind energy development in the West by as much as 30,000 – 60,000 MW in the next five to ten years. The AWEA Wind Pipeline is part of a national energy program aimed at increasing the overall reliability of the national electricity system. The Wind Pipeline is a three-phase proposal to develop wind resources in the West. The first phase of the plan involves transmission reform to more fully utilize existing transmission capacity and can result in new wind capacity of nearly 4,000 MW. The second phase of the Wind Pipeline includes addition of several new local transmission lines to remove system bottlenecks and increase secondary reliability. This phase of the project would cost about \$1 billion dollars and would result in the addition of nearly 26,000 MW of new wind capacity to the Western system. The final phase of the Wind Pipeline would be the construction of two major high voltage lines from the wind-rich northern Plains to load centers in the East and West. The lines would cost between \$10 billion and \$20 billion and could potentially add 30,000 – 60,000 megawatts of wind capacity to the Western system.

Review of Transmission Planning Efforts

In a review of the western transmission planning activities, meeting participants noted the following points:

- While there is a substantial amount of planning activity underway in the West, there is also a lack of authority to implement the results of these planning activities. Steps need to be taken to provide teeth to the results being developed in the transmission studies. Several participants expressed the need for more involvement for governmental institutions at the state level, especially PUCs.
- The various transmission planning processes need a better interface with investor-owned utilities. While municipal utilities and co-operatives have participated in the planning exercises to some extent, participation from the IOUs has been little to non-existent. In particular, IOUs that have their own IRP process can help to inform the regional

transmission planning process, and the regional process in turn can inform the IRP development within the IOUs.

- Cost recovery is a major issue for long term transmission development. All the parties involved in the development of new transmission, including LSEs, generators, PUCs, other interests, need to come to some agreement on the mechanisms by which investors in transmission development will be guaranteed a return on this investment. One participant stated that plenty of money exists for transmission expansion; the key issue is figuring out how the investor will see a return on that investment. Other participants expressed a need to develop a regionally accepted business case for transmission expansion.
- A major obstacle to transmission expansion will be public opposition for various reasons, including environmental concerns and land ownership issues. Transmission planning needs to consider these obstacles before development and work with the proper constituents to address their concerns.

The group decided to continue with a discussion of the planning efforts at Bonneville Power Administration on Day 2 and continue the agenda on the next day.

Day 2, February 27, 2004

Session III: What Principles Should Guide Transmission Planning?

Roger Hamilton provided an overview of the NWCC Transmission Planning Principles. The Transmission Planning Principles were developed as a recommendation of the January 2003 Western Transmission Workshop. The Principles were viewed as key to winning public acceptance and regulatory approval of needed transmission additions and upgrades.

- The principles cover three areas: authority, scope and the process of planning. The principles suggest that:
- Transmission planning entities should be independent and accountable, with the authority to identify transmission needs and to provide incentives or implement solutions.
- Transmission planning should be integrated with resource planning and done on a regional basis.
- Transmission planning should integrate planning for reliability and economy.
- Transmission planning processes should be transparent and open to stakeholder input, considering all resources on an equal basis and using explicit, standardized methods and assumptions.
- Transmission plans should be based on life-cycle analyses, clearly identify system needs.

Mr. Hamilton has been engaged in conversations with multiple planning organizations on behalf of the NWCC. These approved principles will serve as a “living document” that will be shared with planning organizations to gain their support and action. Participants generally agreed with

the principles. Several participants noted that their planning entities incorporate several, if not all, of the principles in their existing planning processes.

Session IV: What Near-Term Transmission Policies are Needed? Efficient Use of the Existing System with New Transmission Products

Stephen Enyeart, Bonneville Power Administration (BPA), discussed ongoing planning efforts at the federal power agency. BPA has two business lines: transmission (TBL), which manages the power grid and provides interconnection and transmission services, and power (PBL), which manages the federal hydropower system and buys energy to serve load. Mr. Enyeart noted the intermittent nature of wind, suggesting that the resource may need to be combined with storage concepts.

Mr. Enyeart outlined several TBL grid improvements identified in the last year. Eight line improvement projects have been identified, with Puget Sound area additions having been completed in December 2003. Two more projects, including a 500-kV line addition are under construction, with other projects scheduled to begin later. BPA has developed a new Available Transmission Calculation (ATC) tool that provides a more accurate model of transmission usage and rights. The tool will enable TBL to accelerate the response to transmission requests and offer transmission contracts more quickly.

BPA is developing an automated scheduling system known as E-Tags. The system will run with online transactions to make E-tags transferable. This market-oriented approach is intended to optimize use of the transmission system by enabling those users with an abundance of transmission rights to trade those rights to a user in need of transmission capacity. BPA has also dropped the 100 mil imbalance penalty for wind. PBL is now offering storage and shaping service to customers. This product requires two wheels, one into and one out of the BPA hydropower system. PBL can exchange wind power for hydropower when the resource is available. PBL then schedules delivery of the wind power a week later. This provides a shaped delivery product for wind generation that may also avoid some constraints in the transmission system, and is more easily scheduled to serve loads.

Review of Regulatory and Operational Policies and Practices to Address Barriers to Wind in the West

Mr. Enyeart's presentation was followed by a panel discussion on near-term policies that had been identified as important to wind energy development over the next two to three years in the western US. Panelists included:

- *Jim Caldwell, American Wind Energy Association*
- *Ken Dragoon, PacifiCorp*
- *Stephen Enyeart, Bonneville Power Administration*
- *David Hawkins, California ISO*
- *Chris Thomas, Federal Energy Regulatory Commission*
- *Raymond Vodjani, Western Area Power Administration*

Ron Lehr framed several issues for the panelists to consider and discuss:

- *Network service*
- *Control area best practices and worst practices*
- *Dynamic scheduling and virtual wheeling*
- *Scheduling and forecasting reforms*
- *Imbalance penalties: CAISO example*
- *Queue and interconnection studies and FERC Order 2003*
- *Curtable firm service*
- *Current OASIS practices and FERC Order 888*

Panelists were asked to provide their viewpoints on several of the topics outlined. The following summary of the panel discussion summarizes the key points identified for each topic area.

Network Service and curtable firm service: Panelists noted that the expansion of network service is important to increasing wind access to the transmission grid. Currently, generators are charged for the capacity they take up on the transmission grid. One possibility may be to charge generators for the energy transferred along the grid. Participants noted that contractual limitations are the key issue in expanding network service, not necessarily technical concerns.

FERC has established the notion of open, non-discriminatory access to the transmission grid. Now broad offerings in network service are needed. FERC should consider whether to open up network service. One concern that will arise is the impact on reliability schemes as a result of such an offering. Such an offering could be first tried as a pilot program.

A significant advantage of network service is that it is based on coincident peak rather than individual peak. On a 100MW wind farm, firm point-to-point products assume that the wind generator needs 100 MW of transmission capacity available at all times. For wind generation resources, with 40% capacity factors, this assumption is problematic, since the generator is then paying to access transmission capacity that is not always needed. With network service, the generator does not need that much capacity. By freeing up this excess capacity, the transmission system can move two to three times the electricity and generate more revenue. Some participants noted that such a system can be gamed; to implement network service, loopholes need to be corrected to prevent system abuse.

Panelists suggested that FERC needs to explicitly promote broad network service offerings and produce case studies through the pilots. WAPA and BPA both offer some form of network service, but both are considering how to expand these services; both WAPA and BPA are looking to offer partial firm services in the near future. One participant noted that the New England ISO produces a map that identifies the best locations for transmission based on need and asked if WAPA and BPA (or other regional entities) can produce a similar map for the West. Other participants suggested that the NWCC may produce case studies of the existing WAPA and BPA products. FERC could also discuss examples of network service in white papers, articulating a “floor” for network service. Many participants suggested that western IOUs need to be present to hear these concerns.

A question was raised as to what parties will bear risk with such a model. Panelists noted that a financial contract path needs to be established to show this risk. Developers need to know that they will only be interrupted for a small amount of time, with a contract for a long time frame to suffice financial entities. Panelists also noted that the current contract period for network service (at one year) is much too short for financiers to see a return on investment. A contract period of 15 years is more in line with the needs of developers who must show investors a path to that

return on investment over the long term. Participants noted that any follow-up meeting should include financial parties so that we can begin to understand their risk analysis.

Participants agreed that better definition needs to be given to curtailable firm service so that financiers will have greater certainty. There is a growing consensus that the wind industry can accept a curtailable firm service product, but utilities only offer firm and non-firm service products. Participants suggested that much work can be done in the short-term on defining curtailable firm service. The NWCC may decide to host a workshop specifically on this issue in the coming months.

Control Area Practices: Forecasting was viewed as an important concern for control areas. Pacific Storms impact transmission systems and reliability issues. Good forecasting means that grid operators can tie generation to load and can thus inform the system dispatcher about what is likely to happen, reducing surprises. One panelist pointed out that dynamic line rating systems will change line ratings based on how the wind is blowing. Applying neural network software to predict wind speeds has been very successful, particularly for BPA.

PacifiCorp now requires forecasting with any power purchase agreement. The value of forecasting to the wind industry is significant in telling dispatchers what to expect. Any significant penetration will require good forecasting. Transmission systems need to develop protocols for forecasting that will meet the needs of dispatchers and planners. Typically, information on wind is needed for 2-3 hour intervals.

Panelists then focused on the size of control areas. They noted that control areas are too small and too numerous, and many have mixed charters. The typical function of the control area is to ensure reliability. As transmission systems have been used for more commercial activities since deregulation, the division between economic activity and reliability has blurred and causes more problems that it solves.

Participants noted that there are 33 control areas within WECC, several of which are single bus control areas. The size of control areas is important to wind because generators do balancing within their control area in addition to scheduled interchange (transactions with neighbors). Larger control areas would thus tend to be better for wind power. The panelists also noted the lack of incentives to merge control areas. They surmised that integration problems are more institutional than technical, and suggested that more consideration should be given to the issue by regional planners.

Scheduling and Forecasting Reforms: The California ISO has had success with scheduling forecasting experiments. Hour-ahead data has proven to be much more reliable than day-ahead data, which has a 40% error rate. A 2-3 hour rolling average of wind speed data is much more accurate. This rolling average can tell how much energy will be delivered in the day-ahead market, substituting for wind speed. The California Energy Commission (CEC) has provided funding for research to improve long term forecasting. Other studies are underway around the country. Communication loops need to be improved, with joint activities between planning entities to share information on scheduling improvements. A paper on forecasting methods will be presented at the IEEE conference in Denver this June.

Imbalance penalties: Both WAPA and BPA have eliminated imbalance penalties for wind intermittent resources. The California ISO offers a program to IOUs to avoid imbalance penalties; however, many groups have yet to join the program, leaving the question of whether

imbalance is a real issue for most parties. Some panelists warned, however, that there are costs to the transmission system from a resource as dynamic as wind. These costs can be considered imbalance costs. Transmission planners need to recognize what those costs are and how to charge them. Regulating reserve needs to be available to accommodate this behavior. A formal monitoring system should be developed to address the issue. However, penalties, not costs, should be off the table.

Dynamic Scheduling and Virtual Wheeling: In many cases storage and shaping products act as dynamic scheduling. The Midwest ISO provides this service in the MISO region as a neutral facilitator. Panelists asked whether there was some regional actor that could act as a similar entity in the West, as opposed to control areas.

Participants noted the need for more creative ways of delivering energy back to the transmission grid. They suggested the need to regionalize such issues, moving from a focus solely on load pockets. One suggestion was a NWCC Paper on dynamic scheduling and a revision of the NWCC Transmission Case Study on virtual wheeling.

Queue and Interconnection Issues: This issue was viewed as the most difficult to address. The serial queuing process presents significant challenges. Requestors for interconnection service can spend years in that queue, during which time firm plans or regional circumstances can change, affecting interconnection needs. Group queue processes were suggested to possibly enable better analysis. Determining transmission rights may be an obstacle to timely movement; questions persist as to whether these are property rights. No answers currently exist, and a FERC order on the matter will be important in the long term. New York has a clustering system in place that may offer some answers and examples. A pilot project on interconnection was suggested to collect data and learn about possible solutions to this dilemma.

Summary Discussion

The meeting concluded with a review and summary of the major observations and recommendations that came out of the previous panel discussions. Much of the discussion centered around the need for some white papers and case studies to further explore the questions, issues, and suggestions that had been made, in order to further understand what the possibilities are, and to provide educational material for outreach efforts. A summary of recommendations for possible future actions and activities follows:

Curtable firm: WAPA currently has a curtable firm product referred to as Priority 6. BPA plans to provide a partially firm product in the next rate period. FERC suggested looking at a Limited Term Firm product from the natural gas market. The Order 888 pro forma tariff limits non-firm to less than one year. A case study or white paper on the flexible-firm product should be done to further examine the ideas and propose some possible solutions to the problem of the current tariff. This could also be done as a case study with the Tot 3 constrained interface between Wyoming and Colorado as an extension of the RMATS study.

Wind Forecasting: A better knowledge of how much wind energy will be produced, and when, will increase the value of the energy. A case study of wind forecasting value in the context of the CAISO wind imbalance settlement program could be beneficial.

Dynamic scheduling and virtual wheeling: Further examination of the benefits of dynamically scheduling a wind plant into another control area could be explored in a case study. The existing case study on virtual wheeling could be updated.

Control area: Benefits and issues associated with consolidation of control areas could be pursued in a case study.

FERC Order 888: The Order 888 tariff continues to be the standard transmission tariff around the country. A better understanding of the limitations of the tariff for wind projects and the changes necessary to level the playing field in terms of capacity related charges, rate pancaking, and imbalance penalties could be pursued.

Network service: An examination of the possibility for an expanded definition of network service, as well as an expansion of network service itself, would be beneficial.

Interconnection: Long queues and corresponding long waits for an interconnection study and agreement are a problem in many places. A study of the problem with recommendations for resolution could be carried out.

The meeting adjourned at 3:00 pm.