

Transmission Planning and Wind Energy in the Midwest

June 22, 2005 • St. Paul, MN
Meeting Summary

On June 22, 2005, representatives of the electric utilities, transmission companies, public service commissions, consumer advocates, environmental community, wind energy developers and wind advocates met in St. Paul to review the status of transmission planning work underway by MISO, regional utilities, WAPA and Manitoba. The workshop provided an opportunity to address how transmission providers are planning for the large amount of wind expected to develop in the region over the next decade.

Please note that all presentations from this meeting and a number of additional materials are available online at <http://www.nationalwind.org/events/transmission/midwest/2005/default.htm>.

Introductions

After introductions of all participants, **Jeff Webb, MISO**, provided a welcome to the meeting. Commenting that this was the fifth in a series meetings that the NWCC had been involved in with MISO-region stakeholders, Mr. Webb provided an overview of MISO's interests in bringing wind into the energy mix in the region and thanked the participants for attending and continuing to move the wind energy and transmission dialogue forward.

Abby Arnold, RESOLVE, introduced herself as the meeting facilitator and reviewed the purpose of the meeting and the agenda. The purpose of the workshop was to review the status of medium- and long-term planning processes in the MISO region, examining the implications of regional plans and the interlinking of sub-regional plans. The meeting was intended to bring together a variety of stakeholders from a cross-spectrum of interests engaged in policy development and transmission implementation in the MISO region to identify obstacles and transmission needs for wind at the regional and sub-regional level, to identify concrete near-term steps and solutions, and to make recommendations to public and private decision makers for moving transmission planning forward.

NWCC Background

Ed DeMeo, Renewable Energy Consulting provided a briefing on the background of the NWCC, including its history, vision, and current activities. He noted that the vision of the NWCC is to help create and support commercial wind-power markets that are environmentally, economically and politically sustainable. This is achieved through an overall focus on high quality information of use to all sectors, including those responsible for policy development. Since its founding in 1994, the NWCC has provided forums for dialogue among stakeholders on transmission, siting, wildlife, credit trading, and economic development.

Since 2000, NWCC has held workshops in key regions to foster dialogue that encourages proactive transmission planning that recognizes longer term trends and likely wind development. He pointed out that four previous meetings in MISO, complimenting a great deal of effort in the region, had helped bring the regional discussion on wind energy and transmission to its current level. The critical intended result for this workshop is the same as for all NWCC activities:

increased understanding by all. The meetings do not intend to come to conclusions, but begin the discussion on how to move from the planning phase to implementation.

Publications and other work performed by the NWCC Transmission Workgroup (as well as other NWCC workgroups) is reviewed before being released by the NWCC. This meeting summary will join all other NWCC documents at www.nationalwind.org.

Federal Activities

Matthew Deal of the Federal Energy Regulatory Commission opened the substantive presentations with a presentation on federal activities on wind energy and transmission. The FERC has been looking at wind energy issues for about 2 ½ years, beginning by identifying the geography of the resource and determining needs for transmission. Drivers for wind energy that the FERC identified included renewable portfolio standards, tightening environmental rules, fuel costs, technology advances as well as added diversity, decreased risks, and public interest in the technology.

The chief challenges included the “boom-bust” cycle of the production tax credit, (though this might be eased with proposals on Capitol Hill for a longer extension) facility siting & transmission. For this last challenge, the primary questions are not only how to get access to wires, but how to build new ones, how to ensure that wires are fully subscribed, and how to improve the usage of those transmission lines.

Concerns that the FERC staff began to identify included imbalance penalties and tariffs that govern point-to-point transmission. These were sometimes structured in ways that did not account for wind energy’s characteristics and in some cases, created barriers. Interconnection was another issue that the FERC identified and began to tackle. An issue that remains under exploration is capacity value. FERC staff continue to look into this, as wind-interested stakeholders are interested in learning whether this additional revenue stream can be fairly tapped.

FERC has engaged in a number of initiatives related to wind energy. Its December 2004 Staff Paper, “Assessing The State of Wind Energy in Wholesale Markets”, kicked off the Commission’s efforts on wind, providing guidance and direction for the commission. This was followed by a Technical Conference in December 2004 in Denver, CO. This conference created a punch-list of issues that could be addressed for wind. In March 2005, the FERC held a follow-up meeting in Portland OR to review Bonneville Power Administration’s proposals for a “Conditional Firm” transmission product. The FERC also opened dockets on interconnection and imbalance penalties.

On interconnection, FERC issued Order 661 on June 2, 2005. This order featured 5 main components dealing with Low-voltage ride through, SCADA controls, reactive power, queuing and self-study as part of the queuing process, and revisions to rules on the transition period. The new requirements apply to all new interconnection agreements commenced after January 2006 to account for re-engineering existing technology.

The FERC has also begun an initiative on imbalance penalties for intermittent resources. The proposal would establish a new generator imbalance service schedule under the pro forma open access transmission tariff (OATT) for intermittent resources, establishing a +/-10% allowable deviation in bandwidth. Deviations within the proposed bandwidth would be settled at the transmission provider’s system incremental cost (SIC). Deviations that exceed the proposed bandwidth would be settled at SIC +/-10%. It also allows for generator schedule revisions up to

20 minutes before the close of the hour. Comments on this were due on May 26, 2005, at the time of the meeting, about 50 comments had been received and were being analyzed by staff.

FERC sees other opportunities on the horizon, including new directions for FERC's transmission planning provisions, reforms to the transmission access queue that get generators into the queue faster and get past "dead projects" at the head of the queue, rate pancaking, tribal involvement, and determining where wind can play a role in capacity valuation. A number of these issues are not specific to wind.

Overview of Current Mid- to Long-Term Transmission Planning Activities in the Midwest

Acting as the technical moderator, *Matt Scheurger, Wind On The Wires*, introduced the speakers for this session and outlined the session purpose, to provide information on the state of long-term planning in the region that relates to wind energy.

MTEP: Transmission Planning in MISO

Jeff Webb, MISO, provided an overview of MISO's planning processes that deal with reliability. Referring to a system map, he demonstrated the footprint of MISO across the Midwest. MISO manages 119,000 MW at peak load from 131,000 MW of generating capacity within its footprint. In addition it governs over 97,000 miles of transmission lines, \$12.6 billion in installed assets serving 15.1 million customers. MISO was the first RTO in the country, and as an RTO, one of its fundamental responsibilities is to coordinate and execute planning to ensure that transmission is built to meet stakeholder needs; including serving reliability, economic, and other interests.

MISO covers a large area with high wind potential. Wind energy is prominently featured in the interconnection queue in Iowa, the Dakotas and Minnesota, with a large amount of capacity expected soon in Illinois and Wisconsin. Wind is important to MISO because it is important to its members and stakeholders, and a significant resource in the region.

The requirements for Regional transmission Organization (RTO) development call for the system operator to plan for and serve both commercial benefit and reliability. In addition, the organization must meet the stated policy objectives of stakeholders in the region. FERC's wholesale power market platform reinforces idea that RTO planning should address access to cost effective transmission to cost effective resources. For the MISO region, this effectively means providing transmission for remotely located supplies of energy. This effects coal at the mine mouth and wind in remote areas.

MISO's agenda to expand transmission begins with an identification of reliability needs. It is a challenge to develop transmission on a regional basis because of competing jurisdictions and interests, and this must be balanced with the ongoing processing of reliable new generator interconnections. To meet this balance, MISO is proceeding on parallel fronts: identifying what the right / needed transmission is based on stakeholder and system interests. From this basis, MISO must determine what benefits, costs, and other issues exist, even though the policy requirements driving this potential development are not yet immediately understood. Even if the region's renewable energy policies were mandated today (and the cost recovery ramifications were established and known) MISO would need to be able to determine the right transmission projects to fund and build.

MISO is charged with the identification of transmission system expansion projects that have economic benefits for the region. The well-documented time lag between generation availability

and transmission availability creates a need to act with foresight, planning early and working on equitable solutions to problems like cost allocation.

MISO's first regional expansion plan (MTEP) was released in June 2003, and evaluated the impact of regional transmission expansion on the energy costs of customers. This plan determined that existing transmission and plans cannot accommodate existing and new wind and coal resources. MISO worked with wind energy advocates and developers to develop transmission concepts to access new wind and coal resources.

They were able to postulate a dozen regional expansion plans, including scenarios for high gas, high wind, high coal, etc. Using marginal costs in region, they determined what the cost of wholesale power would be in each scenario. The results of these were presented at previous NWCC transmission meetings in the Midwest.

The current planning process, MTEP 05, focuses on baseline reliability. MISO has continued to work with stakeholders on some of the more promising of the scenarios identified in previous planning exercises. For example, in the Northwest part of the footprint, there has been significant collaborative interest on the part of developers, industrial groups, transmission owners, state regulatory authorities, and other state interests. Past and ongoing MTEP processes have looked at Iowa / Southern Minnesota expansion (ISMNEX) as well as expansion in the Dakotas and Northwest area of the service footprint. MTEP 06 will also explore options for Michigan and Illinois / Indiana. Going forward, MISO intends to balance reliability planning with economic and value-added planning objectives.

Mr. Webb identified key elements of the policy timeline in planning. Once reliability-based projects are identified, there is rarely much controversy about whether to proceed, only how to recover costs. For remote resources, transmission access and clearing out congested queues remain issues. He offered that it may be possible that the queue questions may deserve a different type of analysis that the MISO has previously applied to transmission planning. He concluded by identifying next steps in determining cost allocation. Stakeholder input would come through the Regional Expansion and Criteria Benefits Task Force (RECB) work from June to December 2005, followed with a filing that addresses reliability. Between December 2005 and June 2006, MISO would file economic projects with FERC. More information on cost allocation would come in the following presentation.

Cost Allocation Work By The MISO Regional Expansion Criteria and Benefits Task Force

Dale Osborn, MISO, provided a presentation on the allocation of costs for transmission in the region. He noted that this can be the most difficult aspect of making regional transmission a reality. Identifying beneficiaries of regional transmission expansion is a critical element, and is accomplished by working with stakeholders and the Regional State Committee at the Organization of MISO States to develop a regional transmission pricing policy. MISO expects to be filing tariff revisions to establish protocols for cost sharing of reliability projects by Fall 2005, and work is expected to continue for another year to address economic and regional access projects.

Most stakeholders (particularly regulators) accept cost sharing as a essential to the effective use of the regional transmission grid, particularly in the market environment now in place with MISO. OMS has provided guiding principles that cost allocation should be guided by who creates costs and who benefits from expansion. Issues arise over how to measure these costs and benefits, however. Reliability projects will continue to have costs recovered using established

methods, but economic upgrades must go through longer processes including mediation and data verification.

The RECB taskforce will determine in the coming year if the current “license plate” approach (where costs are recovered in-zone for projects built in-zone) is the right one. One concept with momentum is that of “rough justice”, which recognizes aggregate benefits to customers as a whole and avoids difficult to target benefits and the resultant disputes. The current proposal is a blend of ideas that try to incorporate a range of potential reliability benefits.

MISO recognizes 3 project categories: Baseline Reliability (being considered in MTEP), Transmission Access Requests (generator interconnection access requests), and Regionally Beneficial Projects (economic projects).

Baseline Reliability projects must have a “materiality cost” of \$5 million or greater to be eligible for cost sharing. The solution being proposed uses a blended cost allocation strategy for baseline reliability projects that blends postage stamp, local zone, and neighboring-zone subregional elements. A proposal for level system provision is in development.

Generator interconnection access requests would be eligible if they have a 5 year contract with MISO as a network resource and its costs are less than a cap based on average MISO transmission costs. Generators fund these upgrades up-front and are repaid from regional shares.

For economic projects, the interim proposal calls for MISO to provide analysis and benefits identification for the applicant, as well as facilitating cost negotiation. MISO is aiming to formalize the rules for this classification of project by June 2006.

The benefits of transmission can extend over a great distance, so identifying costs and benefits can be difficult in a very large RTO. Once identified, how to allocate the costs “fairly” remains a difficult question. State representatives on the regional state committee seem to back the overall vision of the interim proposal, and will be exploring key issues at meetings in the summer of 2005. Remaining issues include system robustness, finding the right blend of Postage Stamp/Sub-regional/Local cost formulas, the treatment of generator upgrades, and the timetable for action.

Exploratory Studies

The group turned to specific exploratory studies that inform transmission planning in the region.

The Northwest Exploratory Study

Walt Grivna, Xcel Energy, provided a presentation outlining the Northwest Exploratory Study being undertaken by MISO, various utilities in Minnesota, North and South Dakota, and a number of wind and coal advocates involved in the Upper Great Plains Transmission Coalition. The study scope is to identify the best single line and two line transmission expansion scenarios to the Twin Cities for a projected 2000 MW increase in wind and coal generation in North Dakota and South Dakota. Using assumed sites for generation, the study is looking at 2000 MW of generation. This will comprise 500 MW of new coal and 1500 MW of new wind in the study footprint. This total amount is well over the 825 MW of renewables required by Minnesota’s Renewable Energy Obligation.

Study participants entered into the study unsure of how expansion to the Dakotas and elsewhere would effect transmission on the Minnesota load side of the system. It identified how far the

system would need to be expanded to effectively bring 2000 MW to market and what effects each of the new elements would have.

The maps used in the study were developed over time as the study indicated new effects. For example, in one case, by building a hybrid line in Southern Minnesota, power flows were shifted on the system that created added capability to add wind to system.

Broad conclusions from the study indicated that line conversions did not add much capability to the overall system. A single circuit cross system addition at 345 kV should add around 800 MW of new transfer capability, while a single 500 kV cross system line will not add a significant amount of additional capability above that of a 345 kV line –the underlying system cannot support the increased flows. Finally, a two line 345 or 500 kV cross system plan should be sufficient to add around 2000 MW of new thermal capability.

Concept recommendations for regional developments still need to be converted to actual project analyses. Questions that will affect this development include:

- Where will generation actually be developed?
- What actual routing corridors will be used?
- What impacts would occur from other planning studies (such as CAPX 2020 and others)?

Other assumptions would be altered or eliminated based on events on the ground. Conceptually, what works best are 345 kV upgrades running north-south in the area. Bulk system upgrades could accommodate wind development that is possible by building off those lines, because they would improve power flow.

Next steps for the study include finalizing the study with the steering committee, then investigating potential route corridors. This could then be reported to MISO as part of the MTEP planning process and coordinated with the CAPX study and process. This would begin the process of establishing detailed plans: evaluating the MISO queue, timing, utility resource plans, etc.; and reviewing stability analysis, particularly the flowgate impacts and economics of the potential projects. Looking at of lower voltage system impacts is also part of the next steps.

The Southern Minnesota / Iowa Exploratory Study

David Duebner, MISO, led a discussion of the studies being undertaken to explore transmission expansion in Southern Minnesota and Iowa. This study aims to develop a high-level transmission plan which provides increased capability to the system. To accomplish this, those working on the study are developing descriptions of transmission upgrades required to deliver large amounts of generation to market. This will help direct future development of the transmission system in the region for existing queue projects and facilitate the development and integration of wind resources in the region, while addressing regional reliability issues.

The study explored two scenarios: one with 2,700 MW and one with 3,500 MW of wind, which were developed using data from the generator interconnection queue, wind developers and advocates. It included the Minnesota renewable energy objective plus other likely development locations and market sensitivities.

The study then explored two generation scenarios and two transmission scenarios. These looked at thermal restrictions and at how new facilities performed during contingencies. After this screening analysis, the study participants identified lines that were not contributing, and ones that were high performance. These were also screened for performance in moving electricity to three

specific markets (Minnesota, Iowa, and Wisconsin load centers). These markets were then isolated and studied individually.

For next steps, the study will engage in AC, reliability, and economic analysis, particularly looking at transmission costing and benefits, and at location-based marginal pricing issues relating to generators.

The study develops a transmission upgrade plan which enables large amounts of generation to be delivered to market. The high level transmission plan looked only at getting wind to market, not on lower-level issues. For implementation this may be advantageous because future system development has a direction and can be integrated with the plan. This may reduce the number of underlying system issues to be addressed. This may be more cost effective than individual fixes when engaging in larger-scale planning.

The generation scenarios explored for Iowa / Southern Minnesota include one with 2710 MW of new wind, and a second scenario with 3500 MW of wind and a 600 MW coal plant in South Dakota. Mr. Deubner provided a map that shows the potential routes that the study plotted. In addition interconnections in the Midwest impact flowgates on the MISO grid, so reliability analysis was also undertaken. Various scenarios removed underperforming lines and resulted in two scenarios that showed the most critical upgrades.

Models used dealt with coincident loading by assumed that all wind plants on the system were co-operating: this would only occur on a very windy day. At the meeting time, the MTEP 05 report was essentially done, with the MTEP 06 report (including other components like reliability and economic analysis), due out in a year.

MISO Transmission Expansion Plan Reliability Studies

Dale Osborn, MISO, provided information on the recently released MISO transmission plan, MTEP 05. This plan explores 615 planned and proposed projects for \$2.9 billion. Planning maps that come out of the process are available via the MISO website, www.midwestiso.org.

The focus of the first study was reliability, which gives the system a thorough physical from a number of angles. It includes tests for taking out lines, losing loads, etc. Passing the tests means that loads can be served without undue expectation of outages. While this is not necessarily considered “economic” planning, it has much in common with economic planning. Each generator tries to serve load efficiently, but when taken all together there is the potential for even greater savings. Ten percent of load can be treated economically and traded, but the other 90 percent is traded within power contracts and other mechanisms.

If wind is sold to a load, it is included in the transmission plans as part of the MTEP process. From the generation side, if you sell electricity to a MISO utility, bringing that electricity to market is the utility’s problem, but if you sell on open market, you become much more concerned about constraints that keep you from selling to markets.

Mr. Osborne discussed the information that reliability studies provide. He noted that the studies are important because they establish a fair playing ground. They are not required to mitigate existing problems of system stability that they were not the cause of. Therefore, solving all the local transmission problems does not fall exclusively on the wind generator’s back. Appendix A of MTEP 05 includes a listing of all new projects in the footprint that were included in the system. Problems that can be resolved by operating instructions are also listed, as well as problems for further study.

The development of the plan was an open process: neighboring RTOs, transmission owners in MISO, and other stakeholders were involved in transmission reliability studies. The process was a direct opportunity for stakeholders to participate. It used data from transmission owners (these provided most of the data, as they study their systems in greater detail than MISO does), generation interconnection studies, and historical operating data to identify problems. They calculated data from available transmission capacity, information from wind energy advocates and other stakeholders, and from national models from NERC.

A number of tests were performed, including steady state with contingencies, load deliverability, voltage stability, and small signal stability analysis. Dynamic screening was undertaken to determine the effect of losing individual generation, transmission, or other infrastructural elements.

The assumptions in MTEP 05 included some governing transmission loading relief, however this is being transitioned out in favor of location-based marginal pricing. This is notable because dispatch and operating approaches can eliminate 95 percent of transmission loading relief. Also, instead of using a one hour dispatch system, MISO intends to transition to adjustment in 5 minute increments. This creates better opportunities for wind generation to bid in and hit generation targets. In MISO, wind is generally dispatched as a price-taker, always running unless there are transmission constraints. Wind may also bid in markets when economical. It is to the wind generator's advantage to have transmission built: wind and coal would be dispatched before gas but would receive the benefits of prices set by gas generators. Economic constraints persist because MAPP-based generators export to MISO and are low-cost operators.

Responding to a question about the assumption that wind can only serve load 10% of time, Mr. Osborn indicated that he thought that number was misleading. If you look at the MAPP area, wind is at full output about 10% of time. MISO takes 8760 hours and runs a model on it to determine capacity for wind, to create a more accurate result. In his opinion, wind is an obvious energy resource but not an obvious capacity resource, since it can supply a considerable amount of energy, but not necessarily at certain peak times.

CAPX 2020 Vision

Gordon Pietsch, Great River Energy, began by explaining that 18 months ago, a group of load serving entities recognized predictable future load growth in the region and determined that they needed a solution for meeting this growth and a plan for implementing that solution. The process for coming up with this plan operated on a very high level with a 15-year horizon, focused on implementation instead of simply planning.

Six utilities participated in this plan: Great River Energy, Xcel Energy, Otter Tail Power Company, Missouri River Energy Services, Minnesota Power, and Southern Minnesota Municipal Power Agency. The project's website is available at www.Capx2020.com.

The vision statement for the CAPX project is to create a joint vision of required transmission infrastructure investments needed to meet growth in demand for electricity in Minnesota and the region, while creating an environment that allows these projects to be developed in a timely, efficient manner, consistent with the public interest.

The technical scope of the meeting was to address growth-driven needs in the region (some driven by the Minnesota Renewable Energy Objective) while addressing reliability concerns in the Red River Valley of North Dakota. In addition, the study would verify transmission solutions

from a previous study. The study would identify common transmission needs of several generation scenarios.

The study area included load serving entities in Minnesota and those that have load in Minnesota. Taken together, these represent 6300 MW of load growth in the next 15 years. The information for predicting growth came from the integrated resource plans of utilities, MAPP info, and from historical load growth (which was 2.64% from 2000 - 2004; and is predicted to be 2.49 % between 2009 and 2020.)

Looking at the MISO interconnection queue gave clues as to where generation would be developed. Load and development data came from MISO as well as from Wind On The Wires and other stakeholders.

The study identified three zones that were used in creating “bias” scenarios for generation growth. These included Iowa / Southern Minnesota, the Dakotas, Northern Minnesota, Wisconsin, and the Metro Twin Cities. Based on these inputs, the study envisioned 3 scenarios: a North / West bias that featured more generation in the Dakotas, a Minnesota bias, and an Eastern bias that featured more generation in Wisconsin. The study used this data to scale up to 6300 MW of new load. Before adding transmission to model, the study participants identified 42 potential overload scenarios in the base case. One by one, (starting at 320 kV and moving up), these overloads were modeled. In each scenario the participants were able to see various outcomes, including significant voltage violations, prior outage violations, and system intact overloads.

The load growth in the Minnesota bias is largely in GRE territory, and features a great deal of new generation on Buffalo Ridge, Southern Minnesota and Iowa, and the Metro area. There are consistencies in this model with the Northwest Exploratory Study. The total cost of expansion required under the assumptions of this bias is estimated at \$1.5 billion.

The North / West bias features more development in the Dakotas and on Buffalo Ridge, with less in the Metro area. It would also result in potential upgrade costs of \$1.5 billion.

The Eastern bias, with greater generation assumed in the Dakotas and Wisconsin, but less in the Metro and Northern Minnesota areas, was the most challenging to analyze. This is due to the lack of transmission connecting these areas across the seam of MAIN and MAPP. It would require 2300 miles of new transmission lines at a cost of \$1.7 billion.

Commonalities across the at least two of the three biases show which lines are most likely to be built regardless of the bias that potentially plays out. The facilities in common still represent a great deal of new transmission – just under 2000 miles, costing \$1.5 billion.

Next steps include undertaking load sensitivity studies to identify potential problem areas and the transmission alternatives that create the best solutions; engaging in studies that support Certificate of Need (CPCN) filings for critical facilities; and identifying bulk substation locations that address overloads. From this basis, it should be possible to prepare least cost planning alternatives that meet the predicted load growth in the area and integrate these with other study results (from MISO and elsewhere).

Red River Valley

Tim Rogelstad, Otter Tail Power Company, provided information on a study to explore stability solutions for transmission in the Red River Valley. The Red River Valley incorporates the Fargo

and Grand Forks areas. Remote from significant generation, this area has a limited ability to control voltage stability during the winter peak. This problem was identified back in the early 1990s and a planning study for the region was completed in 2004. The objective of the study was to develop a plan for adequate study work to support a Certificate of Need application for projects that would alleviate these concerns.

The study area looked at two zones and identified short- and long-term solutions. In the shorter term, reactive power additions would provide system stability to the Northern Valley. In the longer term, a 230 kV line (the Wilton-Boswell line), was proposed for the northern extent of the Red River Valley. For the Southern part of the Valley, capacitor bank additions were identified as a short term solution; a new 345 kV line from the Benton, MN area was seen as a solution. The plan is to have all of these solutions implemented incrementally.

Further study is needed: stability analysis, and a determination of the needed size of reactive power additions. A report issued will be issued in the summer of 2005. The benefits for wind could be significant, because the new lines would provide the opportunity to add wind to the system in areas with good wind resources. It is especially likely to benefit North Dakota because to the extent that wind is developed in the state, these lines will facilitate export to other states with greater load and demand for wind energy.

WAPA Wind Integration Study

Ed Weber, Western Area Power Administration (WAPA), provided information on the Dakotas Wind Transmission Study. He began by noting that WAPA is a Federal power marketing agency, and as such follows FERC guidelines but is not FERC regulated. WAPA is one of four power marketing administrations within the U.S. Department of Energy that transmits federally produced hydroelectric power to fifteen central and western states. WAPA's 683 wholesale power customers include cooperatives, municipalities, public utility districts, and project use customers, served by over 8000 miles of transmission.

In 2003, Congress passed legislation sponsored by Senator Byron Dorgan which included funding for WAPA to undertake a transmission study on the placement of 500 MW of wind energy in North Dakota and South Dakota. The Dakotas lead the nation in potential wind resources and have 110 MW of installed wind energy, though transmission is limited by both stability and thermal loading.

In addition to studying the 500 MW wind addition, the study's objectives are to build upon prior related technical work, coordinate with current work, solicit and incorporate public comments, and produce meaningful, broadly supported results through a technically rigorous, inclusive study process. Seventy comments have been received and two public meetings were held.

The study scope is to analyze non-firm transmission potential of wind in the region, to analyze the potential impact of new technologies, devices, transformers, and systems; to look at interconnection locations to determine promising sites using local studies, and to study delivery to market of new wind generation (looking across several subregions of transmission).

In analyzing the potential for non-firm transmission, WAPA discovered that during peak wind resource times there are coincident with periods of time when transmission is being little used. The existing total transfer capability across the major paths in the Dakotas is already reserved under long-term contracts; but the scheduled amount of capacity is often less than the total amount, leaving unused capacity in many hours of the year. WAPA is studying the possibility of delivering wind energy through long-term, non-firm access, with curtailment of power during

critical periods. They have learned that there are times when there is available capacity on almost every line in the study area.

In the North Dakota interface with the rest of the grid, there are 17 transmission lines owned by 5 different entities. These lines face a small number of key constraints: between the MISO system and the Dakotas; a southern constraint, and a Minnesota constraint.

The WAPA study is also exploring technologies that could help transmission stability, such as static var compensation, series compensation, phase-shifting on transmission lines, dynamic line rating, reconductoring, and other approaches.

For interconnection, WAPA's study evaluates seven wind generation zones. These were developed from public comments, wind resource maps, the Western interconnection queue, tribal projects, and developer projects. The study is also exploring the local impacts of new wind generation for each site at four wind generation levels of 50, 150, 250, and 500 megawatts and studying other impacts including steady state power flow analysis, constrained interface analysis, short circuit analysis, and dynamic stability analysis.

Between now and the system study's completion in the Fall of 2005, WAPA's contractor (ABB) will perform aggregate delivery studies on the four most favorable interconnection zones and develop several delivery scenarios for the new wind power. The incremental transmission delivery capability of each zone will be identified with the necessary transmission improvements for each level of generation. Once steady state and stability analysis and loss-analysis is complete, the transmission improvement options will be ranked.

The study began in January 2005, and a technical review group was formed to review assumptions, methods, and draft results (including technical representatives of tribal interests, NREL, AWEA, WOW, and regional utilities. It is scheduled to be completed in Fall 2005. More information is available online at <http://www.wapa.gov/ugp/study/DakotasWind/>.

Manitoba

Ron Mazur, Manitoba Hydro, provided information on transmission expansion planning and wind energy integration in Manitoba.

Effective December 2003, Manitoba Hydro posted its Open Access Interconnection Tariff and procedure for requesting connection to the Manitoba Hydro system. In this system, the generator pays Manitoba Hydro \$10,000 study deposit and the ultimate cost of the study, and Manitoba Hydro does the work. A Request for Transmission Service is a separate procedure, governed by the Open Access Transmission Tariff. Their website (<http://www.hydro.mb.ca>) has information on the tariffs, interconnection procedure, queue, and completed studies.

The majority of the wind assessed is in the southwest of the Province, in an area that is a geographical extension of a ridge that enters the US and is an identified wind resource there. The majority of requests for interconnection and transmission service are outside requests from the Manitoba Hydro fleet, and total about 750 – 1450 MW. Manitoba Hydro is working on a study to identify operational cost variation with high wind penetration levels, including regulation costs, load following costs, generation service costs, and firming & shaping impacts. As penetration gets higher, costs become significant. Since firming has an opportunity cost for hydropower, this can be twice as big as the regulation cost to the Manitoba Hydro system.

Manitoba Hydro has engaged in a wind energy project at St. Leon. This 99 MW project started partial operation in April 2005, with full operation predicted for December 2005. The value of the wind energy is greater in drought years; right now, wind is worth less because there is lots of water in the system's hydro reservoirs.

Manitoba Hydro's tariff is based on the MISO tariff and the FERC tariff. The intent is to follow the large generation interconnection tariff in the future. In Manitoba, there is a requirement for cold weather operation within ranges of -30 C to + 30 C. Reactive power requirements are like those used by FERC's but applied at the generator intermediate bus. Voltage control is expected from the generator. Manitoba Hydro has specific requirements for overvoltage and undervoltage condition ride-through, and has found that for the most part its St. Leon facility can comply with them. Because of the concentration of wind resources on their system, they will probably continue to require this.

Manitoba Hydro's expansion study assumes 750 MW of new wind in the St. Leon region, 125 km southwest from Winnipeg. The study concluded that for \$140 Million Cdn, (not including pre-existing needed upgrades,) 2 lines could support 750 MW. While there is some wind that could potentially be developed farther north, this could potentially be integrated with minimal changes to the transmission system. Questions remain about the effect of new wind energy on the import ability of Manitoba Hydro. In addition, other evaluation studies have been posted online for projects that would require upgrades costing between \$2.9 – \$23 Million Cdn.

Discussion Panel

After lunch, a panel of utility planners began a discussion among the meeting participants about how to coordinate between these planning studies, and how to ensure that wind energy is integrated across them. The group considered how wind development is interacting with planning; what has, and has not, worked; and what information needs and involvement is needed from the wind industry.

Information Needs

MISO representatives noted that there has been a lot of progress in plan development and that ongoing input from formal development plans from the industry and advocates will continue to be helpful. In the past this has shown where capacity is needed and where development is likely, which has been critical in planning. As individual study groups continue to do work, more participation from the industry and advocates should be solicited.

WAPA representatives noted that more than half of their planning activities in past year have related to evaluating the interconnection of wind projects. From the planning perspective, any information transfer that can help speed this interconnection process would be valuable as well as solutions relating to cost recovery and allocation.

Seams

Xcel Energy representatives pointed out that Xcel has begun addressing the added issue of operating on a seam between two Control Areas with different tariff systems, processes, and operating procedures. More coordination across seams is important. Noting that transmission, by its nature, is point to point, they asked wind developers and advocates to work with transmission planners to indicate where the next round of wind resources might come online. More specific inputs will help to determine what reasonable magnitudes are for development over reasonable time frame.

Meeting participants discussed the time frame for transmission development, especially as they affect large wind farms. New transmission from these resources can come online relatively quickly, but the transmission plans being discussed at this meeting are multi-year developments. Transmission owners and operators need more lead time about a developing wind farm, so that they are informed long before a queue request is filed. Information about potential wind farms of all sizes may need to be aggregated since it is unlikely that a full-length transmission line would be built for a 10 MW farm from the Dakotas to Minneapolis. Making information available to transmission planners as early as possible is helpful in ensuring that planners can explore transmission extension.

Bridging long-term plans with immediate interconnection needs

Utility representatives led a discussion of how to take the vision plans and line them up with needs of specific projects. They commented that the utilities are getting better at understanding the impacts of wind, and that the wind community is getting better at understanding the opportunities and challenges in transmission. This is a strong start. One key remaining challenge is the distance from resources to load. This will make siting and Right-Of-Way (ROW) issues critical.

MISO representatives commented that at the reliability study level, only those projects with signed interconnection agreements are included in MTEP. While generation location and load location are important basic data points to identify, other issues exist that affect how transmission expansion should be planned:

- Should planners design for 100 percent of nameplate generating capacity?
- Should planning account for different development timing characteristics of wind energy?
- What other design criteria should be accounted for?
- What tools, policies, and methods affect the design used?
- Can information be consolidated across wind projects to facilitate its incorporation into planning?

Interconnection & Scale

Regional representatives asked whether there was either a minimum or optimum size for a wind farm in planning, and what assumed sizes were being incorporated into ongoing work. Xcel and WAPA planners said that typical wind farms they have encountered on Buffalo Ridge have been 50 – 250 MW. Since the largest wind farms and smallest ones go through the same interconnection processes, with a similar range of costs, it appears more cost effective to add large farms than smaller ones.

MISO participants were asked whether they had a preference for smaller or larger projects. They replied that the system is constrained for larger projects, but that small wind can get on the system more immediately. In addition, the 10 % Renewable Energy Objective creates a huge need for renewables and a huge requirement for them to implement transmission to get renewables on the grid. In Southern Minnesota in particular, there is a strong interest in small projects and a good economic development case to be made for these. MISO is still working to make sure that these also have a fair playing field to get onto the system.

Utility participants added that a limited amount of small transmission can get interconnected relatively easily, because that transmission capacity is available, but that for long term planning, it is simpler to concentrate a single line or corridor that connects a large wind farm. Once the existing system is saturated, there will be a need to extend new lines to resource areas, even for

smaller projects. Another participant commented that utilities understand well the effect of adding smaller systems, and understand how adding a large number of small systems would work in aggregate in the same way they understand the effects of adding larger systems. To the transmission system, four new 25 MW projects look like an addition of 100 MW.

Cost recovery

AWEA participants asked about the mechanisms for addressing cost allocation in the region. MISO pointed out that its Regional Expansion Criteria and Benefits task force were in discussion with MISO staff and other stakeholders. MISO cost sharing proposals divide along reliability and non-reliability transmission expansion lines. One important objective for transmission owners is that they can reasonably expect to get costs recovered.

Regulators have tended to talk about the implications of rolling costs into the rate base when transmission owners have reliability problems. Regulators and transmission developers need to agree on a level of commitment or risk that each is willing to engage in for cost recovery discussions. Both regulatory buy-in and transmission-owner buy-in is needed. To reach that point, there need to be tools to reduce risk, and assurances that regulators can get behind a kind of planning that prepares to build lines when specific plant proposals with interconnection agreements do not exist yet. The conversation has moved past “you-caused-it-you-pay-for-it”, towards a sense from stakeholders that cost sharing is important and must be part of the formula for a cost allocation solution. The formula for generator-driven allocation might still be an open question, and more stakeholder involvement will be needed to formulate the right solution.

Utility representatives involved in CAPX commented that while they are fully supportive of the RECB work, there are other efforts like CAPX that are involved in finding cost allocation solutions. There are a large number of critical issues, and many utilities are looking internally to find cost recovery solutions from their own projects. In the short term, where the RECB process is not producing results, utility-led efforts like CAPX may produce results. MISO representatives replied that they could not see a reason to prohibit those who want to pay for transmission from doing so.

Wind advocates asked how CAPX was addressing cost recovery across state lines, given that there is a mechanism in Minnesota, but that other states vary. Those involved in CAPX noted that whole Minnesota customers were the anchor for this process, each company involved serves customers in multiple states. In approaching other states, CAPX participants may model their methods on the experience from Minnesota to get costs recovered through retail customers. There may be provisions in other states that are analogous, if not identical, to those in Minnesota, where investor-owned utilities now have the ability to pass transmission upgrade costs to customers via a rider without going through a full rate case.

Deliverability

Other utility representatives asked if there was a deliverability test that should be considered in answering who takes the curtailment risk. They noted that people have not appreciated the risk of wind being considered as a resource based on its ability to generate, and highlighted MISO’s deliverability test, where wind is treated as a resource with 20 % nameplate capacity. Should these generator assets produce more energy, the risk of curtailment would fall on them.

MISO commented that its deliverability test is linked to having enough reserve on the system to continue to meet load requirements, meaning that wind would only be required to provide certain loss of load expectations during times when it can still expect to serve load reliably in determining deliverability. As long as the generator has enough resources to meet its reserve

requirements, it will not be in violation of any requirements or at risk of curtailment. MISO will only require that a wind generator pay for its interconnection at 20% capacity and meet a set reserve requirement. If customers are concerned about ability to operate at over 20% level, there are avenues to get more transmission built through optional studies in the interconnection process. Cost recovery for optional studies might be market participant based, however. However, these utility representatives felt that it was important to understand that wind and coal generation were not totally substitutable products on a 1-for-1 basis in any event; mandates for renewable energy will drive the choice for wind generation over other types of generation.

Communication and Coordination

The meeting participants turned to ways to improve coordination, several commenting that it appears that coordination between parties in the region was already at a relatively advanced state. Utility representatives said that to some extent they can never coordinate enough, but that in the transmission planning arena, the utilities have always worked together well, since many studies involve more than one company, except for the most focused ones.

Meeting participants from WAPA commented that one communication barrier is the separation of business units dealing with generation and with transmission. In some forums, until information is posted on someone's OASIS, even information about the type of generation being planned (wind, coal, gas, etc.) is unavailable. This delay slows down planning, which is critical for wind because the deployment of wind generation is always on a fast track to meet the deadlines set by the PTC.

High penetration level system impact studies

Utility representatives commented that if studies are going to be undertaken to determine system impacts at the 10 percent level, studies should be done at higher levels as well. If the system might eventually be facing 20 percent penetration by wind, transmission providers will need to start evaluating that for impacts as early as possible. For example, planners should be interested in what happens if wind does not ride through during a period of low voltage. In this scenario, at 20 percent penetration, wind could become a large source of generator trip-offs on the system. More study work at this level of deployment is required, and these representatives argued that the time to start thinking about the next round of large-scale studies is now.

Illustrating Issues 1: The Buffalo Ridge Incremental Outlet Study

To illustrate some of the issues facing wind and transmission expansion in the region, **Rick Gonzalez, Excel Engineering** provided a presentation on the Buffalo Ridge Incremental Generation Outlet Transmission Study. Extending across Southern Minnesota and into South Dakota, Buffalo Ridge is the premier wind resource in these states. There is already about 500 MW of wind energy sited along the ridge, and transmission improvements are underway to increase the outlet capacity of this area to 825 MW. The difference in capacity is expected to be utilized almost immediately. MISO & WAPA interconnection queues for the region, Along with renewable energy obligations by Xcel and other Minnesota power suppliers have resulted in intense interest in wind development on the Ridge.

To look beyond the current transmission expansion plans, Xcel Energy put together a study group to see how to provide adequate transmission using modest line additions. Their technical analysis used a power flow model from MISO and MAPP sources using 2007 predicted data, concentrating on off-peak times to ensure that all the potentially generated energy would be able to be delivered from the north and south ends of Buffalo Ridge to load in the Twin Cities, while satisfying load and voltage criteria and testing financial and economic performance.

In analyzing the cost versus outlet effectiveness for a number of incremental upgrade options, the study explored losses that occur as wind increases on the Ridge, what other fixes would be needed, and what installed cost would result. Analysis of the lowest cost projects revealed that when each option is providing outlet for about 1350 MW, there was a line in common.

Analysis was complicated by a number of factors, including reactive power requirements and voltage stability, determining power and energy losses, load-serving considerations, constructability, the MISO-WAPA interface, the North Dakota Export (NDEX) interface, and the geographic extent of Buffalo Ridge. The analysis assumed that half of the generation additions and outlet needs would be up at the north extent of the ridge, half at the southern extent, but in actually it is expected that generation will occur wherever transmission extends to.

In this study, each option achieves a 300-500 MW increase. Some options require extensive additional improvements, such as line reconductoring & rebuilds, transformer replacements, or shunt capacitor additions. The incremental line additions all have high losses (in the range of 25 – 30 %). This indicates that the next transmission improvements might be more effective if they are higher voltage or capacity lines. In addition, the study shows that all the options that are “best” (have the greatest effective outlet at the least cost) use one line – the Fenton / Nobles line – as the fastest and least expensive ways to reach the 345 kV transmission system. In addition, the study showed that with small transmission upgrades, changes in system power flows would allow outlet for 200-400 MW of additional generation.

The study was released in mid-June, and it identifies a single option (“Option 31A”) as the highest value. This option requires transformer and other equipment upgrades, reconductoring and shunt capacitor bank additions, and two new 115kV lines (including the Nobles Co. – Fenton line). This option is capable of providing 300 - 500 MW of incremental outlet (beyond the 825 MW level) at a \$20 million - \$30 million installed cost, while providing additional incidental load-serving benefits. Even under the best options for incremental upgrades, the lines will experience 20 % losses, so that additions for 100 MW would deliver only 80 MW to the Twin Cities. Adding an additional 345 kV line reduces losses further, however.

The next steps for this study are to confirm compatibility with identified projects, such as the Big Stone 2 coal-fired plant planned for South Dakota, and with long-term plans like CAPX and the NW Exploratory plan underway at MISO. After correcting for wind additions and testing if the assumption of a north/south split is correct, it may be possible to initiate the permitting process.

Illustrating Issues 2: The MISO Interconnection Queue

To further illustrate issues at the system and sub-regional level, *Jeff Webb, MISO*, described the MISO interconnection process under Order 2003, with particular attention to how the interconnection process dovetails with planning. The steps include a written application to MISO, followed by an initial scoping meeting, feasibility study, system impact study, facility study, and finally, the drafting and finalization of an Interconnection Agreement. He noted that the specific details and business practices for interconnecting wind to the grid were also available via the MISO website, <http://www.midwestiso.org>.

A customer interested in interconnecting a wind resource can elect to be designated as a network resource, by adding an additional study that uses 20% as a capacity requirement, rather than simply evaluating the energy resource. Once that study has been performed once, no more additional transmission studies are required for a network resource designation, and it becomes the obligation of the transmission provider to preserve system access for that resource. Mr. Webb

noted that most of the requests for interconnection, (though on a per unit basis, and not a MW basis) are to interconnect wind generators.

The transmission system in Southwestern Minnesota can currently accommodate 1200 MW of wind, but there are about 2500 MW of applications in the interconnection queue. This leads to longer queue delays and higher incremental upgrade costs.

MISO is also exploring options to address capacity needs outside of the interconnection queue. For example, they have engaged in the regional expansion studies in MTEP (the exploratory studies in this area could provide for near 3500 MW of new wind additions). In addition, they have been working on expansion policies that relieve congested areas and enable efficient queue processes. This requires collaboration on developing cost recovery policies for regionally beneficial projects. MISO has entered into group studies with neighboring control areas to determine how to allocate funding responsibility for upgrades. There are six group studies underway for wind energy, four with MAPP, one with MAIN, and one with ECAR. Though MISO initiated these to clear congestion, they have had good customer cooperation and see a number of benefits: this study method expedites sequential processing, lowers study costs, and identifies more efficient upgrades. The extended planning horizon facilitated by this approach provides longer lead time so that transmission is available when generation arrives.

A Timeline of Next Steps

The group turned to a discussion of how to identify actions and responsible parties as the region moves forward with transmission planning and wind implementation in the Midwest. In addition, the group discussed the decisions (rule changes, policies, regulation, or legislation) that are needed to make the visions laid out in the discussed transmission planning processes a reality, and brainstormed needed information, actions, and feasible goals for achieving these.

To determine future directions, the group explored a timeline of the obligations and milestones that have already been established by legislatures, public utility commissions, utility planning horizons, and other deadlines. With regard to renewable energy obligations, these are seen as targets by some states, and as minimums by renewable energy advocates. These include state renewable energy obligations:

- **Minnesota:** 2400 MW of wind by 2015
- **Wisconsin:** potential 1700 MW of wind by 2015
- **Illinois:** potential 4000 MW of wind by 2012

Other inputs to the timeline include:

- Summer/Fall 2005 – Xcel Energy files application for Certificates of Need for new transmission lines from the Buffalo Ridge Incremental Generation Outlet (BRIGO) study to support 400-600 new MW of wind power in the Buffalo Ridge area
- July 2005 – CAPX 2020 files implementation plan with Minnesota Public Utilities Commission for first set of transmission projects
- August 1, 2005 – American Transmission Company (ATC) files update to its Access Initiative docket at the Public Service Commission of Wisconsin
- November 1, 2005 – Minnesota utilities file Biennial Transmission Project Report with the Minnesota Public Utilities Commission
- December 31, 2005 – Western Area Power Administration (Western) Dakotas Wind Transmission Study complete

- January 15, 2006 – reports due to the Minnesota Legislature from the Siting and Routing Work; Group and Landowner Compensation Work Group
- June 2006 – Presentation of MTEP 06 to MISO Board of Directors
- November 30, 2006 – Minnesota statewide wind integration study complete for 20% of Minnesota retail electric energy sales by the year 2020
- November 1, 2007 – Minnesota utilities file Biennial Transmission Project Report with the Minnesota Public Utilities Commission

Moving Forward: Brainstorming Issues

The group was asked to break into groups to come up with ideas for moving forward, and report back. This created a collection of ideas brainstormed by participants. There was not time for discussion of these ideas and consensus was not sought or discussed.

Issues for state regulators, permitting authorities, and legislators

- Regulators should investigate Certificates of Public Convenience and Need (CPCN) for multi-state, multi-line planning within the next 5 years.
- Permitting authorities should start preparing for transmission development: if visions like CAPX and the renewable milestones become reality, the applications for CPCNs will start coming quickly.
- State agencies and authorities should begin thinking about landowner compensation as they move towards dealing with siting and other related challenges for transmission.
- Permitting agencies can speed the process when CPCNs are needed; Legislatures can help by providing resources to accomplish this.
- Legislators and regulators should work with, support, and include in their planning the new state transmission infrastructure authorities where they are relevant.
- Regulators and planners should investigate how to make wind immediately deliverable to markets on existing lines by finding methods to use contractually fully subscribed lines that still have actual capacity.
- Regulators can help identify projects that will need to file CPCNs in short term (before the end of 2006).
- Regulators and legislators should work to link cost recovery & bonding authorities in states (2005 – 2006).
- State authorities can forge alliances among neighboring states to ensure that state-level planning is coordinated and augmented with interstate planning.
- There is a need for discussion and agreement on how to solve siting and permitting problems at the state and local level across jurisdictions. Leadership at the state PUC level is needed to accomplish this.
- State agencies and authorities should address the chicken & egg issue: the need for transmission projects is driven by legislatively-set priorities (such as state Renewable Energy Obligation and/or RPS). However, these mandates do not necessarily provide support for expanding transmission development beyond the directions already set by the legislature.
- Some state utility commissions are operating under older rules in an environment that uses more updated rules. Potential rule changes include:
- Project substitution in queue, in case one project does not work out, a company can remove it and submit an alternate;
- FERC rule changes to allow FERC, MISO, stakeholders to engage in dual process for queue, one for renewables. This would solve the question of how to build transmission now for wind projects that are not yet proposed, but could be built in 2010 – 2015. There

is a need for a way to plan for transmission for projects before knowing what the projects are.

- Identifying ways to use corridors to allow sharing of capacity by more than just the entity requesting CPCN – make more accessible to other needs
- State agencies can better synchronize state resource planning processes with transmission planning processes
- The National Conference of State Legislatures can promulgate its new model legislation on interstate coordination of siting to a broad audience.
- Utility commissions can create rules for cost recovery for lines before full subscription under the assumption that “if you build it, the electrons will come”.

Issues for MISO

- MISO should integrate the CAPX Vision into what is currently proposed for MTEP and other planning processes.
- Queue reform needs to be addressed: weeding out “dead projects” in the queue would allow other viable projects to be considered.
- MISO should consider an interconnection queue processing moratorium: this would allow them to stop studying projects that will not be built until after 2012 and apply resources to CPCNs.
- MISO should be prepared in the event that wind power is installed beyond mandates. Can that scenario be evaluated? Should evaluation occur on a scheduled or ongoing basis?
- Are modeling frameworks optimized for wind? Can forecasting tools be better utilized in planning? Synergies between adjacent locations?
- MISO can take advantage of a recently developed high-resolution wind map in informing decisions for placing transmission lines, substations, etc.
- Seams and pancaking issues remain important: extending the MISO footprint further up Buffalo Ridge would create incentives for developers not willing to build in what is currently WAPA (or in other areas, Mid-American or other non-MISO members’) service territory and incur the need to deal with multiple jurisdictions. In lieu of extending its footprint, MISO can better coordinate with non-MISO members on seams and pancaking.
- MISO can support coordination between generation and transmission in planning. They would need to go back to FERC to address this (and start soon)
- In 2005 MISO will be filing its reliability plan and cost allocation proposals to FERC; and in 2006 MISO will file proposals for cost recovery with FERC.
- MISO should engage in a high-level synthesis of all the studies going on in the footprint to determine what works, and what fits together from these processes. This should be done in the next year or two.
- MISO should also inventory its load growth over the period of 2006 – 2015 and compare it to historical growth to improve planning and forecasting.
- MISO should explore the issues that lie ahead if wind energy were to surpass 20% penetration of the system. What issues would arise? What effect would this have on transmission financing? (This should be explored soon, potentially by the end of 2006.)
- Some long-range planning should take new technologies into account: the planning inputs and assumptions become outdated as transmission, SCADA, and other technology improves.
- Low-voltage ride through capability and var support capability fixes incorporated into FERC rules should be included in MISO interconnection rules.
- MISO should consider building HVDC lines to load centers from wind resource areas.

Issues for utility transmission planners

- These planners can coordinate to study the implications of a 10% RPS across the entire MISO footprint.
- For short and medium term increases in wind development in the region, it would make sense to identify areas with thermal capacity but stability issues, and to explore what opportunities exist for smaller-scale wind projects to satisfy those (modest) stability needs.
- Developing long-range transmission planning processes should integrate small- & community-scale projects.
- A crisis exists with regard to the need for transmission for large and small projects in the region: there is a long interconnection queue with many wind projects, so planners need to consider how MISO can get caught up? How can regulators get the CPCNs that will be needed filed in order to get started building? What is the vehicle for moving in that direction? One first step would be to ensure that the right amount of generation and right type of transmission is included in CAPX.
- In the immediate term, gathering and coordinating other relevant information on the region's transmission studies in the hope of connecting with adjacent studies would allow for improved "transmission to transmission" communication, in the absence of "transmission to generation" communication in planning.
- Planning for transmission requires huge amounts of money and human resources. Scaling "Mount Incomus", the incremental additions of capital and labor that would be required to plan and implement new transmission, is very large. Planners will need to consider resource competition with generation investments: they are also facing a large capital and human resource challenge as large amounts of new generation is needed.

Issues for the Wind Industry and Advocates

- Corporate wind developers can support community wind projects. Small projects can get built and connected in the interim while waiting for long-term transmission developments to be built.
- Developers and advocates should support an extension of the Production Tax Credit (PTC) for wind, but also create analogous federal tax incentives for transmission (this project should be addressed in the short term).
- To make a big transmission investment, grouping wind projects together might help, as they can be in competition with each other and with other transmission needs.
- Can wind industry / advocates provide inputs to MTEP 06 that take wind penetration beyond levels in the High Wind scenario of MTEP 03? (MISO could do this but it would require shifting other activities in the current scope – they may wait to revisit this until after some other implementation priorities are addressed).
- Transmission planning is not designed to be integrated into business plans. Information flow about wind energy projects for transmission planners has to start with publicly available info on OASIS or on another public source.

Issues for additional partners / stakeholders

- Public entities (such as Basin Electric and WAPA) can investigate how they can use their status and capabilities to build transmission to carry wind energy to markets.
- MISO is located on the eastern extreme of the West: this creates options for serving the Western Governors' clean energy goals. The Western Governor's Association may see an opportunity in MISO-located wind.
- Tribal generation is growing: by 2015, there may be 150 MW on each of eight reservations on the Northern Great Plains. MISO, regulators, and others should build that consideration into their efforts.

- Great Lakes Tribes are recipients of DOE money to assess wind potential. Tribes may work together with utilities, the system operator, and others as part of a vision for a National Renewable Energy Grid.
- Cities doing voluntary RPS through Kyoto voluntary goals could be a potent market for wind energy and transmission that facilitates this could be a high priority.
- Federal and state regulators, advocates, and others should foster education in the context of alliances between co-interested groups (such as has been seen between corn growers and wind-interested stakeholders).
- Governors' offices, legislators, and load-serving entities can support the education of more people to help create expertise in enough people to implement these transmission visions. This work should be begun immediately.

The group's bullets were recorded, and the hosts and organizing committee offered their thanks to speakers, meeting planners, the MISO conference center staff, and the meeting participants for creating an engaging discussion. The meeting adjourned.