

Chapter 1

“Whether or not a viable regional transmission organization and adequate transmission exist in Nebraska or in a region that includes Nebraska.”

1.0 Purpose

Technical Group #1 dealt with the question “whether or not a viable regional transmission organization and adequate transmission exist in Nebraska or in a region that includes Nebraska”.

2.0 Team Members

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3.0 Summary

The August 14, 2003 blackout, the most wide-ranging in U.S. electric utility history, will cause a significant review of the nation’s transmission infrastructure and the organizational entities controlling it. Already, congressional hearings have been scheduled and a joint U.S. and Canadian Task Force have been appointed to investigate the blackout. Many are calling for passage of the long debated federal energy legislation. How this will impact the continued development of Regional Transmission Organizations (RTOs) remains to be seen.

The Midwest ISO has indicated it will be reevaluating the timing for the start-up of its energy markets, and will make a recommendation to its Board of Directors in September.

Progress on the development of TRANSLink has been slowed due to the lack of state regulatory commission approvals, and as a result, the TRANSLink participants are re-evaluating their options for continued development of TRANSLink.

In light of the pending investigations of the blackout, and uncertainty about federal legislation which may be enacted, it seems prudent for Nebraska utilities to wait until such time as more is known so they can make an informed decision before proceeding to join a RTO. Nebraska utilities are members of MAPP, and MAPP will continue to provide regional transmission service, generation reserve sharing and reliability functions until the membership acts to discontinue those functions.

At this time there is not a RTO that has been shown to be economically, technically and operationally viable. There is adequate transmission capacity in Nebraska to deliver the generation output of plants in Nebraska to the Nebraska customer load, but there is not sufficient transmission capacity to support all of the wholesale power transactions that are requested in the region.

4.0 August 14, 2003 Blackout

On August 14, 2003 starting about 4:11 pm. EDT, the worst blackout in electric utility history occurred. Approximately 61,800 MW of customer load was lost in an area that covers 50 million people in the Northeast, parts of the Midwest and Canada. The areas most affected include Michigan, Ohio, New York, Ontario, Quebec, northern New Jersey, Massachusetts and Connecticut. Not until August 16 at 10:00 EDT was power restored to nearly all customers.

At the date this report is being written the initial investigation of the causes of the blackout are just beginning. Data from thousands of recording devices on the electric system is being gathered to establish the exact sequence of events, which will be analyzed to determine how the blackout occurred. Preliminary information indicates that the blackout occurred over a time frame of approximately nine seconds when the electric system became unstable and automatic protection devices tripped out hundreds of generating plants and transmission lines. However, during the two hours preceding the blackout, numerous transmission lines tripped off line in the Ohio area and power swings were noted in Canada and the eastern United States.

The electric system is designed with automatic protective devices, which are intended to isolate areas that are experiencing severe electrical disturbances, and prevent the cascading effect that occurred. Certainly one of the many questions to be answered in the investigation is why the systems did not operate properly to isolate the disturbance to a much smaller area.

Electric service to customers in Nebraska, and nearly all of the MAPP region, was unaffected by the blackout. Nevertheless, because most of Nebraska is electrically interconnected with the rest of the Eastern United States and Canada, in what is known as the Eastern Interconnection, control room operators at electric utilities in Nebraska did observe a momentary frequency excursion.

The blackout and the ensuing investigation will likely have significant repercussions for electric utilities throughout the U.S and Canada. Already congressional hearings have been scheduled for September to hear from government and utility leaders about the causes of the blackout and what needs to be done to prevent it from occurring again. In addition, a joint U.S. and Canadian Task Force has been established to investigate the blackout.

Along with the technical aspects of how the system failed to operate to isolate the blackout and what steps could have been taken by the electric utilities, RTOs, ISOs and NERC Security Coordinators to prevent the blackout, the congressional investigations and the Task Force will likely address the condition of the transmission infrastructure and the institutions which govern electric utility system operations. It has been reported by the media that the nation's transmission infrastructure is "antiquated". This is not an accurate representation. What is accurate is that wholesale electric competition has caused a significant increase in the loading of the transmission system due to transactions which transfer power over multi-state areas. The transmission system has only limited capability for such transfers and very little interstate transmission has been built to accommodate the new wholesale markets. In Nebraska, there is adequate transmission to deliver the output of utilities' generators to customer load, but the Nebraska transmission system is

being loaded with wholesale transactions that pass through the system. Nebraska utilities and customers need to be concerned with any mandates which could result from the blackout investigation, such as the requirement to build additional transmission in Nebraska, and who will pay for it.

5.0 Current Status of Regional Transmission Entities

5.1 Mid-Continent Area Power Pool (MAPP)

As part of the unbundling process in MAPP, the Power and Energy Market Committee (PEM) has been spun off into a separate organization called the Midwest Energy Marketing Association (MEMA). The organization was officially formed in May 2003. It is no longer part of MAPP, although all members of PEM are now members of MEMA. It has a new Board of Directors, and the members will continue to use MAPP Service Schedule F to facilitate energy transactions.

Another new entity formed in 2003 is the Midwest Reliability Organization (MRO). Currently, over 20 MAPP Reliability Committee members have joined the new MRO. The MRO would adopt, implement and enforce NERC and regional reliability standards, governed by a balanced stakeholders' board. An organizational meeting of the MRO is expected to be held in the fall of 2003. Since generation reserve sharing is not part of the function of the MRO, this function will remain as a MAPP function.

The MAPP RTC has gone through significant changes since 2002. With a number of members joining the Midwest ISO and the continued development of TRANSLink and Crescent Moon independent transmission companies, it appeared that the end to MAPP Service Schedule F was near. In March 2003, the Regional Transmission Committee (RTC) created a Transition Task Force to develop and recommend a plan of actions in anticipation of the termination of Service Schedule F transmission service. The task force will review the organizational transition of the RTC, its subcommittees and the MAPP Restated Agreement. The task force will also review and

make recommendation on a number of technical issues associated with termination of Service Schedule F transmission service.

The task force presented a preliminary progress report of its findings and recommendations to the RTC at their June 2003 meeting. A final report is expected to be presented later in 2003.

A recent development in MAPP is that a meeting will be held this fall to discuss whether the membership desires to have a cost benefit study performed so the members can determine the cost impact to their customers before they decide whether or not to join the Midwest ISO, or whether other options are available.

The RTC passed a resolution in October 2001 that established a membership threshold. When a specific number of MAPP members had joined the Midwest ISO and removed their transmission facilities from Schedule F, Schedule F would terminate. It appears that due to concerns about the direction the Midwest ISO is headed with the implementation of energy markets, the costs associated with those markets, and the delays with TRANSLink, it is unlikely that the Schedule F threshold will be passed anytime soon.

5.2 Midwest ISO

The Midwest ISO is proceeding to develop their Day 2 operations, scheduled to be operational March 31, 2004. Midwest ISO Day 2 will be significantly different from their current Day 1 operations and will also be significantly different from the operations that utilities in this region are accustomed to. Midwest ISO Day 2 will include a spot energy market for generation and a transmission congestion management system, neither of which Midwest ISO is currently doing. These two new markets will be combined by utilizing a bid based Locational Marginal Price (LMP) system. The congestion management system will utilize a Financial Transmission Rights (FTRs) market to enable customers to hedge against the cost of congestion.

Locational Marginal Price (LMP) is the wholesale electric price at a particular location on the transmission system that reflects the cost to meet the next unit of demand at that location. Without any congestion, or losses, the LMP at all locations would be the same. This is true because the next increment of load in any portion of the system could be met by the same generator in the least cost dispatch order of the generators in the region. With congestion the LMP at all points on the system will be different.

Congestion on the transmission system is created when the least cost dispatched resource in the dispatch order causes a facility to be overloaded or could become overloaded under a system contingency. To keep the facilities from overloading the generation resources in the market are redispatched to the minimum extent possible that relieves the overload(s). This is referred to as a security constraint least cost dispatch. The per-unit cost of congestion between two points on the system is the difference in LMP between those two points. A Financial Transmission Right (FTR) entitles the holder of that financial instrument (FTR) the right to receive a payment, or perhaps make a payment in some cases, equal to the per-unit cost of congestion between the points multiplied by the megawatts of the rights held.

Midwest ISO believes that by establishing these markets the most cost effective dispatch of resources will be obtained for the generation and the transmission that is available to the market at any given time. Also, if properly implemented, they believe that FTRs would provide an adequate hedge against the cost of congestion. For example, if a load serving entity holds FTRs of the same magnitude as its schedule on the same path, they would pay for congestion to Midwest ISO, but by being the FTR holder, they would be paid back that value from Midwest ISO. This load serving entity however would not have to continue to hold these FTRs. They could be sold in an auction or to another party if that is believed to be economical by the holder. Once sold, the new holder would receive the payment for the FTR, and the load serving entity would still have to pay congestion but has been paid by the FTR purchaser an amount to offset that cost.

Midwest ISO is currently in the process of determining the initial allocation of FTRs. In this process they are utilizing a Simultaneous Feasibility Test (SFT) to ensure that at any time all the FTRs that are sold can be funded by the congestion revenues collected. In order to not violate this SFT, Midwest ISO is finding that they will only be able to convert about 90% of the existing transmission rights to FTR's. This percentage may actually be higher or lower by the time Midwest ISO gets to their final allocation early in 2004, but to the extent that they are not 100% means that not all existing transactions will be fully hedged against congestion.

In addition to the FTR market, Midwest ISO is setting up a day ahead market and a real time LMP markets. The day ahead market will allow participants to make financially binding commitments for every hour of the coming day. The real time market will be based on the transmission and generation system in place, the bi-lateral transactions that are being scheduled between two parties, the best load estimates at the time, and the dispatch of units in the security constrained least cost dispatch on five minute intervals. So every five minutes Midwest ISO will send signals to adjust market participating generation to meet the least cost security constrained dispatch considering all the current conditions.

In order for Midwest ISO to meet their operational date of March 31, 2004, other milestones also have to be met. By the end of October of this year they have to complete the Market Registration of participants, they have to completely test their software systems from beginning to end and all the control areas need to be certified with Midwest ISO. Then in November the market trials would begin and run for 4 months to fully test and debug the systems .

Although Midwest ISO has been developing this Day 2 proposal for over two years, there is still much to be completed in each of these markets. There are multiple procedural steps: market protocols have to be finalized, tariff language approved by FERC, FTR allocations developed by Midwest ISO and approved by FERC, the software needed to implement the Day 2 features has to be completed, and all the data bases and interfaces need to be finalized. In addition, these markets

need to be coordinated, all the supporting areas need to be finalized, all of the processes need to be tested, and the participants need to be trained. Some supporting areas would be settlements, billing, and customer relations. Throughout the process the stakeholders in Midwest ISO have been providing comments to Midwest ISO on input parameters. So while much progress has been made there still remain substantial milestones that need to be completed before the Midwest ISO Day 2 markets are fully operational.

With any new system there are many uncertainties but for Midwest ISO Day 2 the changes are so significant and the potential costs so high that the uncertainties are much larger.

5.3 TRANSLink

The TRANSLink utility participants are re-evaluating their options for proceeding with continued development. While TRANSLink has received favorable "conditional" approvals from FERC, state regulatory approvals in Iowa and Minnesota were not granted. TRANSLink has determined it will withdraw any pending state regulatory proceedings and work with the state regulatory commissions to address their concerns. The Iowa and Minnesota regulatory commissions expressed a concern about the uncertainty of the impacts of FERC's Standard Market Design on their regulatory authority. The blackout will undoubtedly raise additional concerns by the states that will need to be addressed.

NPPD and OPPD are continuing their involvement with TRANSLink as a potential option for participation in a regional transmission entity.

5.4 Crescent Moon

Western Area Power Administration (Upper Great Plains Region), Basin Electric Power Cooperative, Sunflower Electric Power, and others have been working to develop an alternative contractual arrangement, called a Coordination Agreement with the Midwest ISO. To this point

they have not been successful in working out differences in the Coordination Agreement. These utilities are interconnected to the Nebraska transmission system, and power deliveries and interchanges are made between these utilities and Nebraska utilities, so it will be important to ensure that procedures are developed to accommodate the interactions, should these utilities and Nebraska utilities join different regional transmission entities.

5.5 Southwest Power Pool (SPP)

The merger of SPP and the Midwest ISO has been cancelled due to an insufficient number of SPP members joining the Midwest ISO. SPP members have determined that they will proceed to re-organize as an Independent System Operator. To date, SPP has not filed any documents at FERC to request approval as an Independent System Operator.

6.0 FERC Rulemakings

6.1 FERC's White Paper on Wholesale Power Market Platform

Last year's LB901 report discussed the Notice of Proposed Rulemaking FERC issued on July 31, 2002 on Standard Market Design (SMD). That proposal elicited broad-based opposition, particularly from congressional representatives, states utility regulators, the Northwest and Southeastern parts of the U.S. and others. In response to the strong opposition FERC backed off its proscriptive approach, and on April 28, 2003 FERC issued a White Paper, entitled Wholesale Power Market Platform. In addition, FERC has been holding a series of technical conferences around the country to gather input from the state regulators and others on the white paper proposal. FERC has indicated it plans to issue a final rulemaking later in 2003. Any rulemaking FERC may issue later this year will be directly influenced by the results of the blackout investigation and any federal legislation that may be enacted.

7.0 Organization of Midwest ISO States (OMS)

One of the concepts that FERC offered in the White Paper in response to the concerns of the state regulators was to invite the states to form Regional State Committees to provide input on a number of the RTO design issues, such as what level of generation supply adequacy is appropriate, what form of transmission pricing should be implemented, and how to allocate Financial Transmission Rights.

An organization of state regulatory commissions representing states that have utilities in the Midwest ISO region held its initial organizational meeting in Omaha on June 11, 2003. The Organization of Midwest ISO States (OMS) approved its Bylaws and elected officers. The Nebraska Power Review Board will have a representative on the OMS.

8.0 Transmission Planning & Adequacy

8.1 MAPP Subregional & Regional Transmission Plan Update

After reviewing the MAPP Transmission Planning Subcommittee's (TPSC) 2002 MAPP Regional Plan the following was summarized. The MAPP TPSC performed power flow analysis to determine the import/export capability between MAPP and its neighboring regions, namely MAIN and SPP. The impact on this simultaneous export/import capability, and the impact upon key MAPP flowgates, was quantified for a futuristic Vision Concept. The Vision Concept includes over 1,900 miles of new 500 kV line at an estimated cost of about \$1.3 billion. The TPSC did not make any specific recommendations for constructing the facilities in the Vision Concept. If the transmission system is to accommodate a range of options for new generation and support a competitive power supply market, the TPSC believes that the need for some type of Vision Concept is imminent. Further analysis among the impacted regions and adjacent regional stakeholders would be needed to better develop the details and assess the benefits and cost of such a project. To this end, the formulation of the TPSC Vision Concept, as well as the recommended SPG plans are being incorporated into the Midwest ISO planning process.

Another issue that warrants some consideration in the planning process is the recent presence of “non-traditional” flows across much of the MAPP region. Flows across the MAPP region have historically been North-to-South and West-to-East. Recently there have been heavy flows in opposite directions, South-to-North and East-to-West, sometimes even forcing TLR to be used to mitigate such flows. For example, Cooper South has been operating predominately South-to-North for the better part of the last 18 months, sometimes as high as 600-700 MW. These “non-traditional” flows are generally related to wholesale market price conditions that cause the transmission system to be used in ways not normally expected.

8.2 Midwest ISO Transmission Expansion Plan

On April 19, 2003 the Midwest ISO approved their first long-range transmission expansion plan. This initial plan, MTEP-03, covers the period from 2002 through 2007 and was developed as part of Midwest ISO’s responsibility as a FERC approved RTO. The information is provided for use by state authorities and market participants for guidance and determining expansions needed for reliability purposes and additional transmission expansion that may provide commercial benefit.

There are two major components of the plan, a reliability review and exploratory plans.

Reliability Review

The reliability review was conducted for the proposed transmission plans of the transmission owners within the Midwest ISO system, including facilities to be in service in the 2002 through 2007 time frame. The cost of the new facilities to be added is expected to be \$1.8 billion. This will include about 3,500 miles of transmission lines being constructed or rebuilt within the Midwest ISO footprint. For reference there are approximately 112,000 miles of existing transmission lines. The plan itemizes all the additions in tabular form in appendices and more detailed explanations of projects exceeding \$15 million are in the body of the report.

One of the major transmission issues is how much business is lost due to constraints. The current method of handling constraints and congestion on the transmission system is through the NERC Transmission Loading Relief (TLR) procedures. Midwest ISO reviewed how often TLRs are called on the system and for what constraints. Then they compared the transmission additions that are being proposed to identify which constraints are being addressed. The analysis found that there were 19 Midwest ISO flowgates accounting for 80% of the TLRs. Of these 19, 12 are addressed by the planned transmission projects within the 5-year planning horizon. Nine of these are addressed by projects to be in service by 2004. Midwest ISO continues to evaluate the remaining flowgates with the highest incident of TLRs to determine the value in relieving these constraints. None of these top 19 flowgates are in Nebraska.

Exploratory Plans

The second part of the MTEP-03 is the most controversial. Midwest ISO has investigated system improvements that would, in their view, provide a commercial benefit to the customers of the transmission system.

The original motivation for doing this may have come from the MAPP Vision Concept that was developed in conjunction with the last MAPP transmission plan. The MAPP vision was an overlay of 500Kv transmission additions in the MAPP region that was believed to eliminate limits on most of the flowgates in the MAPP region. That concept was given to the Midwest ISO to investigate further. Midwest ISO expanded the original concept with some conceptual facilities in SPP and investigated it as part of their exploratory plans. Their findings for this particular plan were that this was probably too expensive for the benefits derived.

In order to determine the economic benefits of the exploratory plans Midwest ISO prepared a 2007 model of the system that includes both the transmission system and the generating system expected to be in place at that time. Utilizing a software package (GE MAPS), Midwest ISO developed projections of locational marginal prices (LMP) that would occur given the

transmission system, the generators, and utilizing a transmission system security constrained dispatch of the generators in the model. Midwest ISO evaluated a full year of estimated bi-hourly loads (they did not look at 8760 hours for the year, but they did look at half of that amount). This was a significant effort to pull together all the associated data and assumptions for this type of analysis. There are literally thousands of assumptions that have to be made. The result of this portion of their analysis gives them a base line LMP and system to compare other generation scenarios to or other transmission plans against.

Midwest ISO then looked at four different generation scenarios: the base set of generators that would be in place by 2007; a case where more generators utilizing natural gas are installed; a case where there is more of a balance between the coal and the natural gas units installed; and finally, a case for a high wind generation scenario which includes 10,000 megawatts of wind. Midwest ISO investigated the impacts of these generation scenarios on the estimated LMP within the region and also exploratory transmission additions.

The exploratory transmission plans added selected transmission facilities within the region, calculated the LMP including the use of additions, and then compared those results back to the base case to calculate the benefits of the additions for the test year. They looked at 11 different exploratory transmission additions. It is important to note that even Midwest ISO stated that these are very preliminary indications of potential effective transmission expansions. There are many additional economic and reliability studies needed before definitive plans are developed.

One of these exploratory plans, however, did connect Western Nebraska to Western Kansas and further expanded portions of the 345 kV system in Kansas and Oklahoma. This plan had about 620 miles of 345kV line additions of which between 100 to 120 miles would be in Nebraska. It was one of the more cost-effective exploratory plans identified by Midwest ISO. Midwest ISO estimated the cost of the additions to be \$503 million and the annual reduction in marginal wholesale energy cost to be between \$259 million and \$517 million depending on the cost of

natural gas. Although both MAPP and SPP facilities are involved, the benefits mostly accrue to SPP where the cost of generation is higher than in Nebraska and the rest of MAPP. For this plan MAPP actually had higher marginal wholesale energy cost by between \$99 million and \$144 million, while SPP has lower costs by between \$314 million and \$516 million. Thus, as always is the case on regional facilities, the major question will be who pays and who benefits. None of those details are developed at this point. But since this MTEP-03 is a plan that will be widely disseminated, review of that system will be required by the transmission owners in the area. In Nebraska that would require that NPPD particularly be involved in further analysis of that system.

Midwest ISO plans to revise their MTEP at least bi-annually with updates occurring in any years between the MTEP's. Also during the intervening periods, analysis of any of these exploratory transmission configurations will undoubtedly be reviewed by affected utilities. Presumably feedback from transmission owner analysis would also be included in the next Midwest ISO transmission expansion plan.

9.0 Conclusions

Due to the recent blackout, and potential ramifications for federal legislation, as well as the uncertainties over any final rulemaking FERC may issue on Wholesale Power Market Platform, uncertainties about the economic impacts associated with the start-up of the Midwest ISO markets, the lack of success with achieving state regulatory approvals for TRANSLink, and the potential for MAPP members to re-evaluate their options, at the timing of this report, it is impossible to predict what will transpire in the months ahead. At best, the report will serve to identify key issues that could significantly affect the way the electric transmission system in Nebraska is planned, operated and priced.

At this juncture the only organization that is a "viable" RTO for Nebraska utilities to participate in is the Midwest ISO. The context of "viable" is limited to the fact that the Midwest ISO has

received FERC approval as a RTO; the Midwest ISO is operational and has an approved transmission tariff for wholesale transactions. However, because the Midwest ISO is proceeding to implement energy markets, and due to the uncertainties associated with how those markets will impact Nebraska customers, it cannot be said that at this time that participation in the Midwest ISO is “viable” from an economic impact standpoint.

For transmission facilities in Nebraska that are part of the Western Interconnected System, there is no “viable” Western RTO at this time.

The Nebraska transmission system is adequate to serve Nebraska customers when system conditions are normal and even many abnormal conditions. However, under severe abnormal system conditions, such as the loss of major transmission lines or a large generation plant, Nebraska customers depend on the interconnected utilities in surrounding states and the generation reserve sharing pool to maintain reliability. Nebraska utilities contribute to the reliability of the region in a reciprocal manner.

The transmission system in Nebraska does experience significant usage due to the wholesale transactions occurring in the region. Reliability is maintained by setting capacity limits on the constrained interfaces, and curtailing transactions when system conditions approach those limits.

Because the wholesale market has become regional in nature, it requires regional solutions to fix the constrained interfaces. In other words, additional high voltage transmission lines will need to be built that cross several utilities’ service areas in order to accommodate much more wholesale activity than what currently exists. The transmission planners have identified several transmission projects to relieve the transmission constraints, but until the projects can be funded and paid for by a regional transmission tariff, utilities will be unlikely to build new transmission.