



UPPER MIDWEST TRANSMISSION DEVELOPMENT INITIATIVE

Executive Committee Final Report

September 29, 2010

BACKGROUND

In 2008, the governors of Iowa, Minnesota, North Dakota, South Dakota and Wisconsin formed the Upper Midwest Transmission Development Initiative (UMTDI). The goal of this effort was to identify and resolve regional transmission planning and cost allocation issues associated with the delivery of renewable energy from wind rich areas within the five-state footprint to the region's customers.

The effort was initiated because of the promise, and the related problems, in delivering more renewable energy from source to load (i.e., energy consumers) in the region.

The Upper Midwest has an enormous renewable energy potential, and the five states in this effort have aggressively sought to tap this clean resource. Iowa has a capacity requirement of 105 megawatts (MW) of wind from its two largest utilities. In the late 1990s, Wisconsin established an electric renewable portfolio standard (RPS) that has been increased to 10 percent by 2015. Minnesota's RPS stands at 30 percent by 2020 for its largest utility, and 25 percent by 2025 for all other utilities. Finally, North Dakota and South Dakota have renewable goals of 10 percent by 2015. Collectively, these five states have more than 6,400 MW of wind installed and operating, providing substantial economic value to the region.

At the federal level, Congress has a long history of extending tax benefits to those who produce renewable energy. More recently, Congress has debated the creation of a federal RPS or

carbon constraint mechanisms, either of which would likely lead to the increased production of wind from the Upper Midwest. Federal agencies such as the Federal Energy Regulatory Commission (FERC) and the Department of Energy have prioritized increasing output from the country's renewable resources in support of energy security, environmental goals, and economic development.

This regional and national emphasis on enhanced renewable energy production, particularly wind power, cannot occur without a substantial enhancement to the country's electric transmission grid. The transmission grid began as a mosaic of separate and independent systems to serve individual local utilities, but is now an interconnected network that makes the generation resources and transmission efforts of many states highly interdependent. In the Upper Midwest, the existing electric transmission grid is being used to maintain the day-to-day economies, lifestyles, and existing renewable resources of the five states.

As such, new power lines need to be built to deliver additional renewable power from resource areas to customers. Because the grid was not originally designed for delivering renewable energy across several states, efforts to build regional transmission systems are complicated by institutional and economic barriers. The Upper Midwest has taken the initiative to address these issues, but is not the only region trying to overcome these barriers; they frustrate efforts nationally and are very challenging to address. Issues include:

- **The need for certainty in regional planning for transmission.** Developers and regulators need to know what the rules are for transmission planning. In the absence of such certainty, development stalls and the potential for inaccurate decision-making arises.
- **The right balance between remote and local renewable generation.** There is a need to cost effectively balance highly efficient renewable energy resources far from customers with local renewable energy resources closer to population centers.
- **Large transmission projects are expensive and will impact electric rates.** Billions of dollars of transmission investment may be necessary. Minimizing these costs through sound planning is critical to ensure that projects get built cost effectively.
- **Large transmission projects can cause large land-use impacts.** Transmission projects require the acquisition of sizeable tracts of land for right-of-way easements. Such acquisitions garner strong reactions from landowners and neighbors and the public at large. While recognizing that each state has the ultimate siting authority for transmission lines

within that state, sound regional planning is essential to help ensure that potential rights-of-way are most efficiently used to mitigate land-use impacts where ever possible.

- **Cost allocation for the needed transmission is contentious.** Arguably the largest hurdle to new construction is how the costs get distributed. In the absence of an equitable formula, projects will not get built, or parties not benefiting from the projects will end up paying for them.

Recognizing this potential for developing renewable energy, and acknowledging the challenges in translating potential into reality, the governors formed UMTDI. The governors recognize that the challenges are significant, and that they inhibit the full development of wind's economic potential. However, the governors also agree that clean energy will be an increasingly important component of these states' economic growth strategies in the foreseeable future.

ORGANIZATIONAL STRUCTURE

UMTDI is composed of an Executive Committee consisting of a governor's representative and a utility commissioner from each of the UMTDI states. Senior staff from the states have assisted with analysis, as have planners and managers from the Midwest ISO, the regional grid operator. Meetings, both telephonic and in person, were held approximately twice a month, with emphasis not only on UMTDI's internal analysis, but also on parallel processes ongoing in other forums. Public input has been sought through opportunities for comment at various stages of the analysis.

Three working groups were eventually formed within the UMTDI: Legal, Cost Allocation, and Regional Planning. Chairman David Boyd from Minnesota and Chairman Eric Callisto from Wisconsin served as Chairs or Co-chairs of the work groups and Executive Committee.

ACCOMPLISHMENTS

UMTDI's major accomplishments during 2008-2010 include:

- Serving as a catalyst for current transmission policy development, including regional transmission planning techniques and cost allocation approaches.
- Identifying the existing legal structures and impediments to further regional cooperation on transmission siting.

- Developing a set of cost allocation principles that can serve as a foundation for ongoing cost allocation discussions in the region and the country.
- Designating regional renewable energy zones that have been adopted by the Midwest ISO as optimal areas for further wind development as part of broader transmission planning efforts.
- Finally, the UMTDI Executive Committee has identified six renewable transmission corridors that could be considered as primary paths for the first stage of future transmission analysis and development in the region in an effort to advance energy, economic, and environmental progress in the five states.

LEGAL CONSIDERATIONS

Interstate cooperation on transmission siting can only be advanced to the extent that legal structures exist to support that goal. Thus, one of the UMTDI's work groups explored legal issues related to development of multi-state energy corridors.

The workgroup concluded that the states have substantial means under their existing legal authorities for coordinating the siting and construction of interstate projects, especially if the economic development and regulatory perspectives can be harmonized. On the other hand, a binding cost allocation method for transmission facilities is largely subject to FERC's jurisdiction under the Federal Power Act (FPA). Efficiently securing the appropriate results from FERC for a five-state-only effort may depend on the states' willingness to coordinate and work with the Midwest ISO on implementing an appropriate FPA tariff filing. More detail on the legal workgroup's conclusions can be found at Appendix A.

COST ALLOCATION

The UMTDI "tall task" for cost allocation was to develop a formula and process for cost sharing, assuming agreement could be reached on the siting of regional transmission lines. The first step in this effort, with the assistance of stakeholder comments, was the creation of a set of cost allocation principles (Appendix B). These principles are consistent with those created by other entities exploring cost allocation, and can serve as a foundation for ongoing cost allocation efforts in the region.

Simultaneous with the early stages of UMTDI's cost allocation discussion, the Midwest ISO began its own evaluation of this problem, through the MISO Regional Expansion Criteria and Benefits Task Force (RECB-TF). The Organization of MISO States (OMS) also created a separate but consistent process to advise the Midwest ISO regarding cost allocation. OMS is comprised

of utility regulators from each of the thirteen Midwest ISO states, and acts in an advisory capacity to the Midwest ISO. These two groups held dozens of meetings over the past two years to help the Midwest ISO develop a cost allocation method for the delivery of renewable energy from local areas as well as remote regions of the Midwest ISO footprint.

Based on the efforts of the OMS and the RECB-TF processes, the Midwest ISO submitted to FERC this past July a tariff filing seeking FERC approval of broad cost sharing of large regional transmission lines in the Midwest ISO. Given the substantial efforts of the RECB-TF and OMS on cost allocation, UMTDI decided to defer any additional discussion of cost sharing beyond that already achieved in the creation of the principles.

While commissioners from individual UMTDI states may have different views on the adequacy, effectiveness, and equity of the Midwest ISO filing at FERC, they all agree that if approved the Midwest ISO tariff will generally provide a known and predictable structure for cost allocation of large transmission lines designed to move renewable energy. UMTDI will continue to monitor the progress of the Midwest ISO's FERC filing on cost allocation, and UMTDI will reinstate its deliberations on this topic if FERC or Midwest ISO action on the tariff so warrant.

REGIONAL PLANNING AND FIRST MOVER TRANSMISSION PROJECTS

UMTDI Study Process and Wind Zone Selection

Transmission planning for wind power integration no longer follows traditional methods, which assumed that generation would be close to load, and that transmission was necessary only to move energy relatively short distances. The best wind resources are generally far from where energy is needed. If the goal is to access this remote generation source, then transmission planning must be done on a much larger scale. However, such planning must be tempered by careful attention to customers' energy needs, economic factors and existing and developing environmental laws and public policy requirements.

Additionally, given the dynamic energy market implemented through the Midwest ISO, traditional planning methods and tools have to be supplemented to address the real-time dispatch of more than 144,000 MW of power throughout the Midwest ISO wholesale energy market. This is complicated by the variability of some of the resources, including wind, which is non-dispatchable and often blows strongest at times when the demand for energy is relatively low.

Given the complexity of this task, and the limited resources of the utility commissions to conduct this type of analysis, the Midwest ISO and appropriate transmission owners agreed to assist the UMTDI commission staff in assessing transmission requirements.

The first planning task for UMTDI was to more accurately quantify how much renewable energy was needed to fulfill renewable portfolio standards and goals in the five adjacent states. The Midwest ISO, utilities and the states investigated this question and concluded that approximately 15,000 MW of renewable resource capacity would be needed by 2024-25 to fulfill the entire renewable portfolio obligations and goals in the five states. This was based on estimates of capacity factors for wind turbines in different wind regimes throughout the Midwest ISO footprint. While current load growth forecasts are reduced from 2008 levels, 15,000 MW of additional capacity is a reasonable proxy for the region's needs. This number thus became the "target" number for the UMTDI for transmission planning purposes.

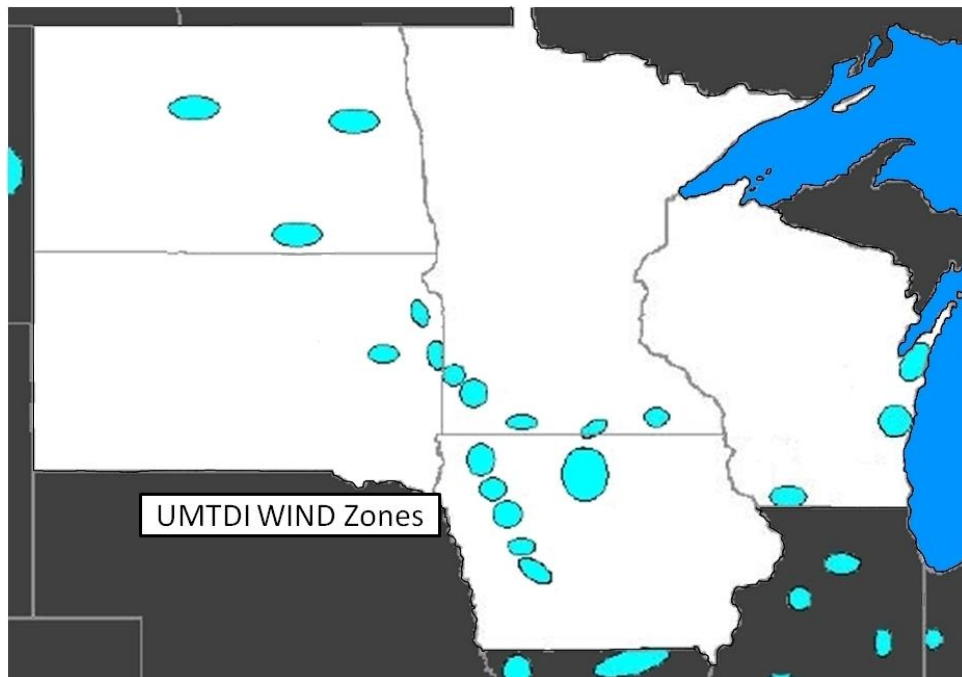
Next, UMTDI explored the question of whether it was better to focus on siting renewable resources locally or remotely.

The local option calls for using resource areas closest to the load that needs renewable energy to fulfill state mandates: primarily Minnesota and Wisconsin. A strong point of this local option is that since the electric generation is located close to its target load, the need for longer Extra High Voltage (EHV) power lines might be reduced. A weakness is that resource areas close to the larger concentrations of customers generally do not produce as much energy as cost effectively as the wind regimes farther away. Put simply, the wind blows stronger in remote areas far from the load. A further concern evidenced in recent wind project siting dockets is the increasing difficulty in siting wind farms in areas near load, which tend to have more heavily-populated land use.

The remote option focuses on selecting resource areas with the greatest potential to generate the most energy (likely in the Dakotas, southwestern Minnesota and Iowa) and then constructing longer EHV transmission lines to the load centers in the eastern side of the UMTDI states. The strength of this option is that the areas with the best wind resource are used, so the cost of generating electricity is cheaper than in the local option. The other strength is that, generally, fewer wind turbines will need to be sited to produce an equal amount of energy when compared to the local option. However, the transmission needed to deliver that more remotely located energy to customers will add an incremental cost as well as environmental impacts within the corridor.

The result of this analysis was that neither extreme approach was cost effective when considering the combined costs of the wind generators and the transmission lines required to move energy into the market without excessive curtailments or economic congestion. A middle option was appropriate, with a combination of wind from both remote and local zones.

Informed by this evidence, the UMTDI Executive Committee then identified likely efficient wind resource development areas. Based on wind profiles, existing wind generation, generation queue requests, and geographic areas to avoid, wind zones were located in each state as likely areas needing major transmission connections to the market. The Executive Committee decided on the probable realistic wind zones depicted by light blue ovals in the following map. For modeling purposes, each of the ovals was assumed to have the potential to produce from 750 to 1,250 MW of wind energy capacity.



The chosen zones represent a reasonable, achievable selection of locations with developable wind resources. These zones served as the initial guiding basis for the Midwest ISO's footprint-wide evaluation of renewable transmission needs. Actual zones developed will likely be different, as a result of the effective winnowing and decision-making that comes from state-specific processes.

Other Studies

While UMTDI was conducting its wind zone analysis, transmission companies were positioning themselves to participate in the potential transmission build-out associated with the delivery of renewable energy in and out of the Midwest.

At least three large network projects have been publicly proposed by transmission companies. In each case, the proposal has included some analysis as well as potential line and voltage configurations. However, none of these proposals has received ultimate approval in the Midwest ISO's transmission planning process - a prerequisite, along with any required state approvals, for actual construction. The three proposals are *Green Power Express* (by ITC Transmission Holdings Corp), *Hartland Transmission Study* (by American Electric Power), and *SMARTransmission Study* (a transmission joint venture of subsidiaries of American Electric Power and MidAmerican Energy Holdings Company, American Transmission Company, Exelon Corporation, NorthWestern Energy, MidAmerican Energy Company – a subsidiary of MidAmerican Energy Holdings Company, and Xcel Energy). These studies include various configurations of 345 kV, 765 kV, and Direct Current (DC) transmission facilities.

Neither UMTDI nor its individual state members takes a position on the merits of these plans, or on the viability and desirability of building lines larger than 345 kV, which is the largest configuration currently in place in the UMTDI states. However, the existence of these proposals supports UMTDI's conclusion that transmission buildout is needed, that competing developers are willing to move forward on appropriate projects, and that regulatory oversight of the buildout remains an important issue.

Midwest ISO's Regional Generation Outlet Study and the UMTDI Transmission Corridors

While providing technical assistance to UMTDI in conducting its work on the wind zone analysis, the Midwest ISO simultaneously worked on a larger, similar project. Designated the "Regional Generation Outlet Study," (RGOS) the project is a transmission planning initiative for the entire Midwest ISO footprint.

For RGOS, the Midwest ISO initially used the previously-mentioned analysis done for UMTDI, and then worked with the remainder of the MISO states to identify renewable energy resource areas in each of the remaining MISO states. This footprint-wide renewable resource inventory was coupled with the projected renewable energy mandate needs in the MISO states resulting in the renewable generation needed by 2024. The Midwest ISO then conducted transmission studies using differing variables regarding fuel costs (particularly natural gas), energy usage

rates, and environmental (including carbon) costs. These studies used a variety of sensitivity analyses, and resulted in different transmission scenarios with different voltage overlays, numbers of lines, and location of lines that would be needed to fulfill different scenarios.

The Midwest ISO completed its footprint-wide study to accommodate renewable energy in the summer of 2010, and expects to issue a report this fall. UMTDI asked the Midwest ISO, for the purposes of this final UMTDI report, to identify some of the possible locations and types of projects that could be considered “no regrets” or “first mover” transmission lines for the five states. The Midwest ISO conducted this exercise to identify lines that would provide benefits or fulfill transmission needs in a variety of likely future scenarios. Next generation lines must remain robust in the face of an uncertain future. Variables used to test the robustness of these projects included variations in future energy usage rates, future construction costs, future inflation rates, and costs for future generation fuels.

This RGOS analysis resulted in the identification of new transmission lines that will remain important and economic in a variety of futures. These first-mover transmission lines include specific proposals in North Dakota, South Dakota, Minnesota, Iowa, Wisconsin, Missouri, Illinois, Indiana, Ohio and Michigan. The total cost for these first-mover lines is approximately \$5.8 billion with \$1.4 billion being funded by customers in PJM, the Midwest ISO’s neighboring independent system operator to the east. Significant transmission owners in the UMTDI states did their own independent analysis of first-mover lines, and their results are largely consistent with the Midwest ISO’s.

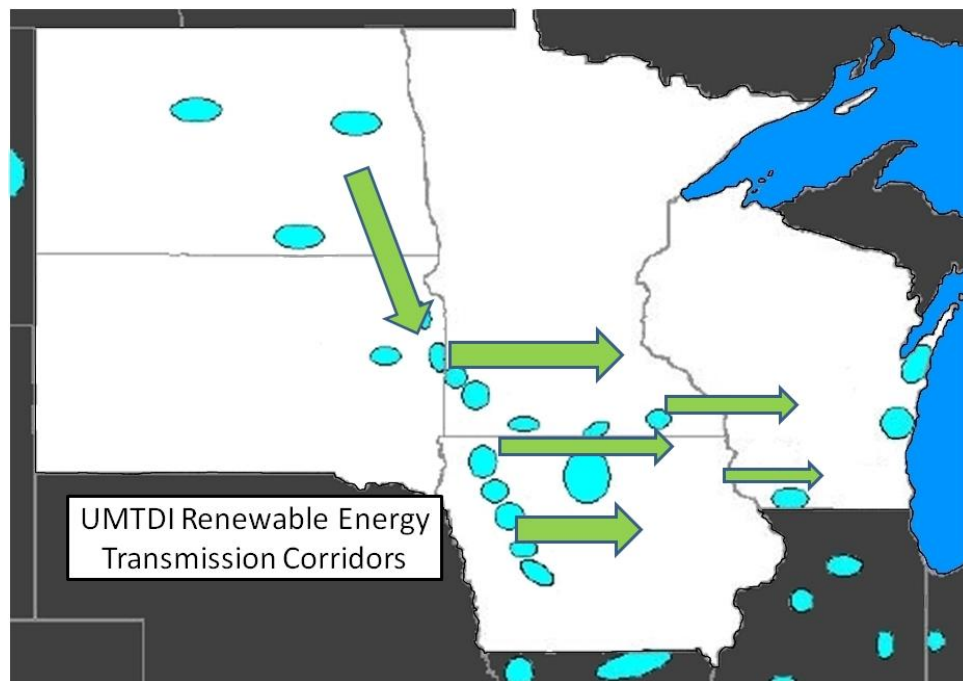
The RGOS first-mover subset located within the UMTDI states’ footprint is:

- Big Stone, SD to Brookings, SD 345kV - estimated cost of \$150 million.
- Brookings, SD to Twin Cities, MN 345kV - estimated cost of \$700 million.
- Lakefield Junction, MN to Mitchell County, IA operated at 345kV but constructed at 765kV specifications to allow full upgrading and operation at 765kV in the future - estimated cost of \$600 million.
- North La Crosse, WI to North Madison, WI and Dubuque, IA to Spring Green, WI to Cardinal, WI 345kV - estimated cost of \$811 million.
- Sheldon, IA to Webster, IA to Hazleton, IA 345kV - estimated cost of \$458 million.

In addition to the proposed transmission projects above, the Midwest ISO's Midwest Transmission Expansion Plan (MTEP) for 2011 identifies the following transmission project as an initial candidate for regional cost sharing because of its regional benefits.

- Ellendale, ND to Big Stone, SD 345 kV – estimated cost of \$275 million.

Using the Midwest ISO's RGOS and MTEP analyses, as well as that of the participating transmission owners, the figure below, *UMTDI Renewable Energy Transmission Corridors*, reflects the locations that the UMTDI Executive Committee have identified as best representing the general areas where EHV lines could be built in the UMTDI states for the purpose of moving wind energy in the region in a cost effective manner. Using the estimates above, and assuming those lines are built in the corridors noted, the total estimated capital cost for these projects is approximately \$3 billion.



Although UMTDI actively engaged in the identification of possible renewable resource areas and potential transmission corridors, this should not be taken as expression of support for particular routes, particular projects, particular voltages, or appropriate levels of spending in any state proceeding. Those decisions remain for a future day, when specific projects might be

proposed. However, the Executive Committee sees great value in affirming its support for coordinated state efforts on these multi-state projects, and its general support for these corridors, which appear to have value in all identified reasonable futures.

A key, unresolved issue for construction of projects of this magnitude is cost sharing. The criteria in the Midwest ISO's recent tariff filing at FERC, as well as other activities ongoing at the Midwest ISO, indicate that these first-mover projects would likely all qualify for cost allocation treatment. This designation would mean that all energy users in the Midwest ISO's footprint would share the costs of these "no regrets" lines. FERC has not approved this rate treatment, however, and it is likely that FERC will receive a number of comments and objections to the Midwest ISO's tariff proposal. While the UMTDI Executive Committee has not taken a position on the Midwest ISO's cost allocation filing, it is safe to say that the absence of cost sharing would make construction of EHV transmission lines in these corridors very difficult.

NEXT STEPS

UMTDI has made great strides in meeting its charge to investigate possible paths to facilitate renewable energy development in the five states. The UMTDI Executive Committee established a productive, collaborative relationship and gained an understanding of the goals and challenges faced by each state.

In addition to the early steps taken on cost allocation, UMTDI identified renewable resource areas in each of the states to use as conceptual "end points" in transmission planning and modeling, and potential renewable transmission corridors to move that energy to load centers.

The Executive Committee intends to continue to meet to discuss cost allocation, and any possible role for UMTDI in advancing or supporting a sound solution to the cost allocation problem.

Other areas for collaboration include:

- Coordinating or, where possible, aligning states' planning and permitting processes for multi-state transmission proposals.
- Identifying and coordinating further steps necessary for implementing infrastructure needs (as identified in RGOS).
- Coordinating with other Regional State Committees on inter-regional or inter-ISO issues.

- The potential use of the successful UMTDI model to facilitate governors' and state Commissions' goals on energy issues of regional importance.

Appendix A

UMTDI LEGAL FRAMEWORK SUMMARY

The Legal Framework Study Group reviewed the existing legal avenues for facilitating the authorization, siting, and allocation of costs of the UMTDI Project [or Projects] in a coordinated fashion within each state and among the five states collectively. Thus, the study group looked at indirect and direct means by which a state could advance the contemplated transmission for purposes of construction and cost allocation (a) within each state, and (b) in coordination with the other states or by use in federal agency forums. The cost allocation analysis did not look at the ability to influence or require participation by non-Midwest Independent Transmission System Operator, Inc. (“Midwest ISO”) members or beneficiaries.

Transmission Construction and Siting

Those state commissions with approval authority for the siting and construction of high-voltage transmission lines, in Iowa, Minnesota and Wisconsin, may inject the UMTDI Project, where clearly relevant, into the consideration of the public interest. North Dakota and South Dakota utility commissions do not have specific construction approval authority, but may consider the siting of a transmission project in congruence with the UMTDI Project.

All five states have provided state commission authority to order construction of transmission facilities if necessary to ensure adequate utility facilities. North Dakota and South Dakota take a different, “proprietary” tack by having created state agencies to promote and invest in additional transmission construction.

States Together – Interstate Compacts

At the highest levels, all five states have the power to create a compact, with the consent of Congress, to establish a common agreement on how to develop the UMTDI Project. Minnesota and Wisconsin provide specific powers to their respective governors to enter compacts involving transmission lines. Congress has specifically contemplated the compact mechanism by authorizing three or more states to form a compact, subject to Congressional approval to “facilitate siting of future electric energy transmission facilities.” Sec. 216(i) of the Federal Power Act (FPA), 16 U.S.C. § 824p. Another FPA provision, little used § 209, authorizes the FERC to delegate any subject matter in its jurisdiction to a group of states, offering another potential avenue of federal approval for joint state action on transmission siting and cost allocation.

States Together – Other Coordination

All five state utility commissions permit entry into non-binding memorandums of understanding to facilitate coordinated action where feasible, and have formal powers to intervene in proceedings before the Federal Energy Regulatory Commission (FERC). North Dakota and South Dakota have executive state agencies, as noted above, geared to the promotion of transmission line development. Those agencies may have to interact with the Iowa, Minnesota and Wisconsin utility commissions - the independent, rather than executive, agencies that are largely responsible for transmission issues in those states.

Transmission Facility Cost Allocation

Apart from a formal interstate compact, the states have no existing, ready mechanism to coordinate the recovery of transmission line costs in a binding cost allocation formula. Each state commission is excluded from jurisdiction over electric cooperatives, but retain jurisdiction in one manner or another to authorize increased rates to permit the recovery of costs of new transmission facilities.

If the UMTDI Project amounts to a transmission-only facility for the interstate transmission of electricity in the wholesale market, the cost allocation formula would be subject to the exclusive jurisdiction of the FERC. To

obtain a cost allocation formula, the states could pursue a cooperative path with the Midwest ISO to initiate, in cooperation with transmission line owners, a § 205 filing under the FPA to change the Midwest ISO's tariffs to include the UMTDI cost allocation formula as one of general application or perhaps as one specific to the UMTDI Project. Alternatively, if willing to undertake the burden of proof, the states might jointly pursue a § 206 FPA complaint to the FERC that the existing Midwest ISO cost allocation formula as related to the UMTDI Project is "unjust and unreasonable." If the FERC considers a cost allocation formula applicable only to the five states, and does not burden other states, chances of a FERC approval appear to be substantially increased.

The states have substantial means for coordination of the construction and siting of the UMTDI Project, especially if the economic development and regulatory perspectives can be harmonized. On the other hand, a binding cost allocation method is largely subject to the FERC's jurisdiction under the FPA. Securing the appropriate results from the FERC in the most efficient fashion may depend on the states' willingness to coordinate and work with the Midwest ISO to effect implementing a § 205 FPA tariff filing, rather than pursuing a more difficult § 206 FPA complaint.

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Appendix B

UMTDI COST ALLOCATION PRINCIPLES

- Principle 1 The UMTDI favors cost allocation that is informed by clearly-defined state, regional and federal public policy goals, economic efficiency, and sound transmission planning and reliability considerations. Applicable UMTDI cost allocations should be flexible and adjust as state and federal changes are approved and implemented. Cost allocations should allow a reasonable opportunity for recovery of prudently-incurred costs.
- Principle 2 The following questions must be answered through a planning process conducted by appropriate stakeholders:
 - o What is the project's potential cost, purpose, or need?
 - o Which stakeholders are driving the need for the project?
 - o Which stakeholders will directly benefit from the project?
 - o Which stakeholders will be negatively affected by the project?
- Principle 3 Effective transmission planning identifies all who cause costs to be incurred and who benefit from the associated new transmission construction and operation as well as the degree of the causation and benefit.
- Principle 4 As a general rule, cost causers and beneficiaries should pay for the new electric network transmission needed for delivery of renewable energy resources. Determination of beneficiaries should consider more than one single metric as well as current and future needs or uses. With the passage of time there may be a reduced distinction between transmission used for reliability and economic purposes. It may not be possible to identify all beneficiaries over a project's lifetime with precision at the time the project is planned.
- Principle 5 No load serving entity or transmission owner's customers should disproportionately bear the cost of new electric network transmission needed for delivery of renewable energy resources.
- Principle 6 For appropriate cost allocation, effective transmission planning must consider regional impacts. Transmission planning should include all relevant existing and forecast demand loads, including demand and energy use reduction programs, as well as those existing and anticipated supply resources located within the regional level. Transmission planning must factor in the most current topology of the network, proposed projects included in appropriate planning processes, and any anticipated reliability upgrades of the transmission owners.
- Principle 7 For AC lines, the higher the voltage and the longer the transmission line, the greater the likelihood that a broader region will benefit by the project and should hence pay for the improvement.
- Principle 8 To the extent that transmission investment provides benefits to regions outside the UMTDI 5-state region (Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin), proportional costs should be allocated to those non-UMTDI regions.

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