

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Integrating Renewable Resources
Into the Wholesale Electric Grid

Docket No. AD 09-4-000

**Comments of the Organization of MIDWEST ISO States
Presented by the OMS President (Lauren Azar¹)**

I. INTRODUCTION

Today’s technical conference gathers experts to discuss the challenges of integrating renewable resources into the wholesale electric grid. These challenges fall in three specific areas: the planning challenges, the operational challenges, and the tariff impediments to integrating renewable resources into the wholesale grid. In these written comments, the Organization of Midwest ISO² States (“OMS”) provides a state regulatory perspective, emphasizing the planning challenges brought about by the incorporation of new energy resources, including renewable resources, and the need to address carbon emissions, touching briefly on the other two topics.

II. THE PLANNING CHALLENGES OF INTEGRATING RENEWABLE RESOURCES INTO THE WHOLESALE GRID:

Before anyone can resolve the planning challenge of integrating renewable resources into the grid, we must first agree on what the problem is. In this section, the OMS attempts to

¹ Lauren Azar is a Commissioner at the Public Service Commission of Wisconsin. These written comments have been approved by the Board of Directors of the OMS and do not necessarily reflect the personal views of Commissioner Azar or the views of the Public Service Commission of Wisconsin.

² Midwest ISO is the Midwest Independent Transmission System Operator.

identify the problems we are trying to solve, what makes planning for renewables so difficult, and who should tackle this challenge.

A. What Problem(s) Are We Trying to Solve in the Planning Process?

Though larger problems are looming, 29 state commissions are already facing the challenge of how their utilities will comply with state-sponsored renewable portfolio requirements, and five others are dealing with renewable energy goals. But focusing solely on compliance with existing renewable standards may be too myopic. As has been well publicized, Congress and President Obama both appear to favor a national renewable portfolio standard. It also appears likely that the federal government will take action to control carbon emissions either through the Clean Air Act or through a new mechanism such as a carbon tax or carbon-cap-and-trade system. While planning to meet a federal renewable standard will be daunting, planning for an electricity generation portfolio under severe carbon restraints will be transformational. Our duties as Commissioners require that we consider this transformational change now, before we are too far behind.

State commissions are charged with ensuring their own states have safe and reliable sources of a power at a reasonable price. Given the enormity of the costs facing the states, the cost-effectiveness of any transmission plan will be important. Last month, the Lawrence Berkeley National Laboratory released a report suggesting that transmission planning that incorporates more than one type of generation will likely be more cost-effective in the long run.³ Spending billions now to accommodate only one type of renewable generation, without recognizing and planning for the larger issue of carbon reduction may not be cost-effective.

³ “[S]haring transmission between different generation technologies enables economic re-dispatch opportunities when the transmission capacity is a binding limit or wind to utilize a portion of a transmission line that is unused by the other generation technologies while the wind is blowing.” (LBNL, *The Cost of Transmission for Wind Energy: A Review of Transmission Planning Studies*, n. 16, p. 12.)

In sum, though this technical conference focuses on the problem of integrating “renewable resources,” OMS suggests that we all need to expand our understanding of the problems that we are facing, including all types of carbon-free or low-carbon power.

B. What Makes Planning for Renewables and Carbon Constraints Difficult?

There are two primary difficulties in planning for renewables and possible carbon constraints: (1) the most cost-effective solutions will likely be multi-state solutions; and (2) without finalized goals and timelines on renewable and carbon emissions, our planning efforts will rely on scenario analyses.

1. Planning for Renewables and Carbon Constraints Is Most Cost-Effective If Done Regionally

Historically, states have fiercely guarded their jurisdiction over resource adequacy. Given the importance of adequate electricity to economic development, states will continue to protect this right. At the same time, states have and continue to recognize the benefits of collaborating with neighboring states when it comes to electric power supply and transmission.⁴ The need for out-of-state renewable, low-carbon, or carbon-free energy is already pushing these state collaborations to new levels.

For instance, the Midwest ISO market footprint contains 13 states and one Canadian province. Each Midwest ISO state has its own unique needs when it comes to renewables and carbon. As part of its Cost Allocation/Regional Planning Initiative, OMS informally surveyed each Midwest ISO state on its reliance on carbon-emitting generation and on its native resources that could mitigate carbon emissions. (A summary of these informal survey results is attached at Appendix A.) The differences are vast. While some of the Midwest ISO states have more

⁴ Collaboration first took the form of power pools. Now, many states are participating in multi-state centrally dispatched transmission and energy markets, like that of the Midwest ISO.

renewable energy than they can use, others heavily rely on coal and have few native renewable sources. This diversity makes regional planning difficult because states have conflicting interests in the cost allocation and planning discussions. At the same time, this diversity provides the Midwest ISO states with the opportunity to conduct collaborative planning that would optimize the regional assets, potentially optimizing the generation and dispatch of all generation resources.

In addition to the needs of the Midwest ISO states, OMS is cognizant that states to the east and south of the Midwest ISO may need or wish to purchase renewable, low-carbon, or carbon-free energy from generators located in the Midwest ISO states. Indeed, a recent study shows that wind generation in the Midwest ISO footprint is one option for providing the bulk of the renewable energy to the entire Eastern Interconnect.⁵ Not surprisingly, the Midwest ISO states that have valuable renewable resources are interested in selling their commodity outside of the Midwest ISO footprint. The challenge is to accommodate the transport of renewable, low-carbon or carbon-free energy through the Midwest ISO footprint without harming the localized transmission grid and at the same time providing adequate compensation to the areas burdened by the transport infrastructure. This difficult problem might also be best solved through multi-state negotiations.

Though states have historically looked only within their own boundaries (or close to their own boundaries) for generation resources, the existing renewable standards and likely carbon constraints are forcing states to approach their energy issues differently. Specifically, many states are now effectively required to look beyond their boundaries for renewable, low-carbon

⁵ See the JCSP'08 Report Volume 1 –Economic Assessment (February 2009) has two transmission scenarios. The early 2008 RPS Eastern Interconnection has a transmission overlay with possible benefit/cost ratios up to 1.46. See pages 79-91. If these indications bear up under continued study, it would allow other Eastern Interconnection states to consider Midwest ISO wind as a cost-effective option for satisfying their renewables goals or requirements.

and carbon free generation. Today, many states are already evaluating whether to collaborate with other states on the sharing of generation resources. These multi-state collaborations can take many forms. Later we will describe OMS's efforts at multi-state collaboration as well as identify other collaborations that are currently underway.

2. Planning for Renewables and Carbon Constraints without Finalized Goals and Deadlines Is Not Optimal.

To state the obvious, planning to integrate renewable, low-carbon or carbon-free resources would be easier if we knew what the federal government will mandate with respect to renewable requirements and emission levels, and the timelines that apply to both. However, given the likelihood of both outcomes, and the time that it takes to put new transmission and generation into service, waiting for certainty would be unwise. For example, states are currently receiving applications from utilities to retrofit aging coal plants with air pollution controls for SO_x, NO_x, and mercury. Regulators today must decide whether to spend billions of dollars on retaining generators that may be retired in one, two or three decades or whether they should retire those generators early and spend the billions elsewhere. Hence, even uncertainty about the level and timelines for carbon regulations should not stop states from moving forward with multi-state collaboratives. These multi-state efforts provide regulators with additional information that will make their individual decisions more informed, and better for the long-term.

The forthcoming debates on carbon restrictions and reductions highlight the need for regional planning that accounts for a variety potential outcomes. Regardless of the result of these forthcoming debates, OMS regulators recognize the need to face the challenges of integrating renewable resources onto the grid today to meet the requirements that we already

face. We also recognize the need to maintain flexibility to meet future requirements and constraints, whatever form they eventually take. Though uncertainty creates a hurdle, it is not insurmountable. Multi-state collaboratives can conduct planning for a multitude of future scenarios and select options that provide the most optionality.

C. Who Should Tackle this Regional Planning Challenge?

There is no shortage of parties wanting to plan transmission projects on a regional basis. Appendix B quickly summarizes the more substantial efforts at multi-state transmission planning currently occurring in the Midwest.

Dating back to the debate on the adoption of our Constitution, there has been a nearly constant debate about the relative power that should reside in the federal government and state governments. Integrating renewable resources into our generation and transmission portfolios presents another opportunity for this debate to be carried forward. The OMS believes, however, that this is not a time in U.S. history where debates over jurisdictional issues will have a beneficial impact on people, as important as such debates may be. Time is of the essence. We must act, not argue.

This call for collective, not divisive, action also extends to the discussions amongst the states. If each state tries to meet the renewable and anticipated carbon requirements alone, it will be quite costly. In this global economy, the United States, and each of our states, cannot afford this. Additionally, though our state interests may be quite diverse, most states have the common interest of wanting to keep state-control of regional planning.

States are also uniquely situated to contribute to regional transmission planning for the following reasons. First, state commissions have the ultimate responsibility of retail electric

rates. How the costs of interstate transmission lines are borne by individual states within a regional market is of critical importance and state commissioners will be held accountable by their ratepayers. Second, the process of siting transmission projects is inherently local given the potential land use and environmental impacts. State decision-making allows more complete public information, participation, and acceptance. Third, transmission planning may need to reflect state choices with respect to the generation mix and the complimentary demand-side programs that can be implemented with retail rates to match the states' respective load mix.

Acting Chairman Wellinghoff has recognized the practical role that states play in the electric industry. In an article relating to the federal-state relationship as it relates to implementing demand response, the Chairman made the following observation:

As a practical matter, demand response is unlikely to achieve its full potential without the support of state regulators, and Commission preemption could have the unintended consequence of discouraging needed federal-state cooperation in this area.

Jon Wellinghoff and David Morenoff, *Recognizing the Importance of Demand Response: The Second Half of the Wholesale Electric Market Equation*, Energy Law Journal 2007, pp. 417-418.

OMS believes the same is true with respect to transmission and generation planning and siting. As a practical matter, electric utility customers need to accept renewable energy as a part of the generation mix; they are going to have to pay more for it. They need to know they had a say in how that energy is developed and transmitted. State commissions are particularly well situated to ensure people have faith in the process. Further, state commissioners live near where these lines will be built; they have the same interests as their friends and neighbors.

As the Acting Chairman noted with demand response, there is much-needed federal and state cooperation. Debates over who should have primary jurisdiction will be resolved in a

political forum, not in our discussions. As important as those debates are, they should not keep us from working constructively to achieve the goals that policymakers have set for us.

D. What Process Should Be Used in Multi-State Collaborative Planning?

1. What Constitutes Regional Planning?

In conducting regional plans, states must first address four fundamental issues about their planning efforts.

- a. **Should States Conduct Planning to Convey Certain Types of Energy over Their Region or Should They Conduct Regional Planning Simply for Transmission Reliability Purposes?**

Historically, resource planning and transmission planning were often discrete functions: for resource planning, a utility would forecast the electricity capacity needs in its service territory, and, for transmission planning the utility would evaluate the reliability and adequacy of its grid to deliver the area capacity. As the title of this technical conference demonstrates, it is likely that the days of separating these functions have passed. Today, the siting of generation resources and transmission are integrally intertwined, especially for states participating in a regional transmission operator (“RTO”). Transmission planning has moved from the concept of serving demand under contingencies to now being optimized for providing energy every hour of the year from a multi-state network composed of different styles of generation fuels and characteristics. Further, evidence is mounting that balancing generation resources with loads over larger footprints is more cost-effective. Today, states must decide how much they are willing to include resource planning in their multi-state negotiations.

b. Should States Conduct Transmission Planning by Compiling Individual Plans From the Transmission Owners or Should They Plan a Transmission Grid That Optimizes the Regional Resources?

Two competing methodologies are currently being used for “regional transmission planning.” One method compiles transmission-owners’ plans and eliminates redundancies, while the other method optimizes resources within a defined region independently of utility or state boundaries. Agreeing that the transmission grid should be planned independently of utility and state boundaries is an important step towards regionalizing the grid and minimizing overall costs. However, states must decide how much they are willing to site transmission lines in their own state that bring regional, not just local, benefits.

c. Should States Continue to Distinguish Between Reliability and Economic Transmission Projects or Are Those Planning Criteria No Longer Meaningful?

The evidence shows that almost every transmission project supplies both reliability and economic benefits in the regional grid. Indeed, as more “reliability projects” are completed, the need to distinguish between reliability and economic planning goals are diminishing.⁶ States must decide if they are willing to redefine the goals of regional planning by eliminating the distinction between reliability and economic projects.⁷ This decision will also likely impact how states will evaluate the cost allocation of regional projects.⁸

d. Should Regional Planning Extend to Non-Transmission Solutions, such as Generation Siting or Distribution Improvements?

States will need to determine how or if any existing or anticipated integrated resource planning efforts in their own states will be represented in regional planning efforts. This is less

⁶ The Montana Commission disagrees with these two sentences.

⁷ Of course, projects needed to maintain reliability will continue to be justified under NERC standards. However, the metrics used to determine whether a project should be built need not distinguish between reliability and economics.

⁸ The Ohio Commission disagrees with this paragraph and would maintain the distinction between reliability and economic projects.

of an issue in states with traditional vertically integrated utility structures than it is for states that have restructured to divest generation or transmission functions to other entities.

2. The OMS Commitment to Regional Planning.

At its 2008 strategic planning sessions, OMS identified regional planning and cost-allocation as our top priorities for 2009. Accordingly we have embarked on a joint Cost Allocation and Regional Planning initiative affectionately known as “CARP”. As to regional planning, OMS is in the process of identifying the assumptions it would like the Midwest ISO to use in designing an indicative regional plan, i.e. a transmission plan that would provide rough options on how to accomplish the goals we set. At our second meeting on February 26th and 27th, OMS began our negotiations on such issues as the following:

1. What type of regional planning: Compilation of transmission owner plans or optimization of regional assets?
2. What energy should our regional plan transmit?
 - Renewables for the Midwest ISO states under existing renewable standards.
 - Renewables for the Midwest ISO states under a national renewable standard.
 - Renewables for the entire Eastern Interconnection under a national renewable standard.
 - Low-carbon generation from such sources as new mine mouth coal plants located near geologic sequestration sites.
 - Carbon-free generation from new nuclear plants.
3. How should our regional plans capture demand response and smart grid initiatives?

Since our dialogue has just begun, it is difficult to predict what the results will be. However, we can say for certain that OMS recognizes the importance of regional planning and recognizes that if we are not successful in developing at least an indicative plan, we are not accomplishing the requirements that our policymakers have set for us, and we might lose the right to create those plans in the future. To achieve our goals in a timely manner, we are meeting every three to four weeks to continue this dialogue. We know that our time is now.

III. OPERATIONAL CHALLENGES

The operational challenges of using wind as the nation's primary renewable resource are well known. Rest assured, as a general rule, state regulators rely on engineers to answer the operational questions of how to integrate large quantities of variable and non-dispatchable resources into the regional grid. It is noteworthy that states within an RTO will likely be better able to address these operational challenges.

OMS understands that some of the most cost-effective solutions for these operational challenges will be found on a regional level. For instance, geographic diversity helps to resolve the variability and uncertainty attendant with wind and solar generation, which means deliberately considering regional geographic diversity when making state siting decisions. Also, regionally siting electricity storage at key locations in the grid could benefit numerous states and eliminate redundancies. As discussed above, multi-state collaboratives can tackle this challenge where it arises.

OMS would also like to note that the Ancillary Services Markets will provide additional tools to accept variable energy sources such as wind. These markets provide regulation to balance load and generation to keep the frequency balanced in a safe range. The ancillary services markets also provide operating reserves, which can instantly provide the equivalent of about one-half the capacity of any large generator or major transmission line.

IV. TARIFF AND MARKET RULE IMPEDIMENTS

As noted above, one of the top two priorities for OMS in 2009 is to review the cost-allocation methods for regional transmission projects. This issue arose for two reasons:

- (1) dissatisfaction by states and other stakeholders with the existing cost-allocation formulas, and
- (2) transmission owner concern that state regulation may result in less than full recovery of

allocated transmission costs in regulated retail rates, thereby prompting some transmission owners to consider one or more of the following: abandon transmission projects, propose other work-around projects, seek approval and cost allocation in multiple forums, or leave the Midwest ISO.

The cost-allocation for transmission projects is the most contentious issue that OMS faces. As part of OMS's informal survey for its cost allocation and regional planning discussions, we asked each state for its position on the existing Midwest ISO Regional Expansion Criteria and Benefits ("RECB") I (reliability projects) and RECB II (economic projects) formulas. While the states are divided about the success of RECB I, almost everyone agreed that RECB II was ineffective. No transmission projects proposed in the Midwest ISO have qualified for cost sharing under the RECB II criteria.

When asked how costs should be allocated, every OMS member agreed that cost-causer and beneficiary analyses should be a part⁹ of the calculus. However, our first meeting did not reach a final discussion or consensus on who exactly "benefits" and when those benefits should be measured became crystal clear. We expect to return to that issue in the fourth meeting of CARP. Our intent is to allow the Midwest ISO to complete an indicative regional plan based on the assumptions OMS establishes working with other stakeholders. This indicative regional plan will help frame our discussion of who will be benefitting and causing the costs for our regional grid upgrades.

Given that it is early in the CARP process, it is unclear whether OMS will remain with the RECB I and II methodologies or propose a wholly new approach for cost allocation. The one

⁹ At least one OMS member (Ohio) believes cost-causers and beneficiaries should be the entirety of the calculus.

thing that is certain is OMS's commitment to reaching a consensus or near consensus on cost-allocation.

V. CONCLUSION

The OMS submits these comments because a majority of the members have agreed to generally support them. Individual OMS members reserve the right to file separate comments regarding the issues discussed in these comments. The following members generally support these comments.

Indiana Utility Regulatory Commission
Iowa Utilities Board
Michigan Public Service Commission
Minnesota Public Utilities Commission
Montana Public Service Commission
North Dakota Public Service Commission
South Dakota Public Utilities Commission
Wisconsin Public Service Commission

The Illinois Commerce Commission, the Kentucky Public Service Commission, the Nebraska Power Review Board, the Public Utilities Commission of Ohio, and the Pennsylvania Public Utility Commission abstained from the vote on this pleading.

The Manitoba Public Utilities Board and the Missouri Public Service Commission did not participate in this pleading.

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APPENDIX A - MIDWEST ISO STATES' GENERATION PORTFOLIOS

(Actual Energy Production by Technology)

State	% Coal	% Nat Gas	% Nuclear	% Wind	% Hydro	% Oil	% Other	Notes
IL	47.1	3.7	47.8	0.3	0.1	0.1	1.0	Data from DOE-EIA
IN	91	1	8	0	0	0		
IA	76.5	6.2	9.1	5.5	1.9	0.5		Data from DOE-EIA
KY	92.3	1.2	0	0	2.6	3.4	0.5	Data from EIA
MAN								Survey forwarded to different agency
MI	60.2	10.0	25.8	2.2	1.4	0.4	1.0	
MN	62.1	4.8	24.8	5.7	1.1	0.9	0.6	
MO	76	4	17.5	0.5	2.0	0	0	IOU's only; includes out of state plants
MT		X		x				Buys most from Dakotas. Get % of fuel from MT
ND	81.8	Small	0	7.7	10.5	0		75% is exported
OH	85.9	1.7	10.8	0	0.4	0.9	0.3	DOE-EIA
PA	51	12	34.5	0.1	small	small	small	
SD	34.8	1.7	0	0	63.2	0.2	0	
WI	68	8.3	18.7	0.6	3.0	0.3	1.1	

APPENDIX A: MIDWEST ISO STATES' CARBON-REDUCTION OPTIONS IN-STATE

State	RPS?	Need Out-of-State Renewables?	Energy Efficiency Portfolio Standard?	In-State Geologic CCS?	In-State Electric Storage?	New Nuclear Allowed?
IL	Yes	Yes	Yes	Yes	Unknown	No
IN	No	n.a.	No	Yes	No	Yes
IA	105MW	No	No, but goals	Possibly	No – but compressed air in future	Yes
KY	No	n.a.	No	Yes	No	Only if waste is solved
MAN						
MI	Yes	No	Yes	Yes	Yes – 1872 MW	Yes
MN	Yes	No	Yes	No – ND, SD, Canada, IL	No	No
MO	Yes	Yes	No	Investigating	Yes – 440 MW	Yes
MT	Yes	No	No	Yes	Yes	No
ND	Yes	No	No	Yes	Yes	Yes
OH	Yes	Yes	Yes	Yes	Yes – 2700 MW	Yes
PA	Yes	Yes	Yes	Possibly	Yes	Only if coal couldn't be used
SD	Targets	No	No	Possibly	No	Yes
WI	Yes	Yes	No	No - IL	No	Only if waste is solved

APPENDIX B – CURRENT REGIONAL PLANNING EFFORTS IN THE MIDWEST.

1. State-Sponsored Planning

a. CARP

During 2008, the OMS Board of Directors adopted cost allocation and regional planning as priority goal areas. The commissioners also committed to taking a leadership role in the Midwest ISO's review of RECB allocations. In order to have maximum state input into that leadership, the OMS has undertaken a series of commissioner-level discussions intended to form consensus on allocation and planning issues and to form positive proposals to present to the RECB meetings. This effort began with meetings January 28-29, focused on the basics of transmission benefits and cost allocation alternatives. A second meeting took place February 26-27. Future meetings are planned for March 19-20, April 23-24, and June 17-18. Other meetings may be required.

b. UMTDI

The Governors of five upper mid-western states initiated a joint planning effort in September 2008 called the Upper Midwest Transmission Development Initiative ("UMTDI"), which will identify upper mid-western wind generation resources *necessary to meet the renewable standards in those five states*. UMTDI will also identify the attendant transmission and infrastructure needed to support those resources in a cost-effective manner and will determine a reasonable set of cost allocation principles *for the projects identified*. UMTDI is seeking input from state regulatory agencies, transmission companies, utilities, independent generation owners, and other key parties, including the Midwest ISO. However, the final decisions will be made by the five Governors, which are expected to be completed within a 12-month period.

2. RTO-Sponsored Planning

a. RGOS

The Midwest ISO has completed the phase I of its Regional Generation Outlet Study (RGOS) that looked at developing a regional transmission system to support the existing renewable standards (approximately 15000 MW) in five upper Midwestern states. All scenarios in the study provided consistent economic benefits. Installed costs for transmission and generation range from \$36 billion to \$54 billion for 3,000 to 7,000 transmission line miles rated at 345 kV, 765 kV, and some DC transmission. The Midwest ISO intends to complete the

RGOS Phase 1 in the summer of 2009 for inclusion in Midwest ISO Transmission Expansion Plan 2009.

b. JCSP

Last month, the Midwest ISO issued the final report from its Joint Coordinated System Plan 2008 study, which evaluates the entire Eastern Interconnection. The analysis included SPP, TVA, PJM, NYISO and ISONE. It has two scenarios that expand transmission and generation opportunities between 2008 and 2024 – a Reference Scenario and a 20% Wind Energy Scenario plan for a large portion of the Eastern Interconnection. The Reference Scenario assumes that wind generation from relatively local, on-shore sources produces 5% of the U.S. Eastern Interconnection's energy use. These assumptions and the resulting generation and transmission needs drive design of a transmission overlay and underlying expansion that includes 10,000 miles of new extra high voltage (EHV) transmission at an estimated cost of \$50 billion. The 20% Wind Energy Scenario presumes construction of a transmission overlay with 15,000 miles of new EHV transmission at an estimated cost of \$80 billion. The new transmission in both scenarios would be a mix of transmission line sizes ranging from 345 kV to 765 kV for AC lines and up to 800 kV for DC lines. The transmission overlay enables renewable and base load steam energy from the Midwest to reach a wider area and also has the potential to reduce energy costs to consumers along the Eastern Seaboard. The 20% RPS scenario has several sensitivity assumptions which indicate the limits of cost effectiveness are being reached for assumed values and operating assumptions.

c. SPP

On December 15, 2008, SPP submitted to FERC Tariff revisions regarding its "Balanced Portfolio" process, in which the cost of economic upgrades will be recovered through a regional postage stamp rate (Docket No. ER08-1419).

3. Federally-Sponsored Planning

a. EWITS

The National Renewable Energy Lab (NREL) is the key sponsor of the Eastern Wind Integration Transmission Study (EWITS). As its name suggests, EWITS focuses on the Eastern Interconnection and evaluates 20% and 30% federal renewable-standard scenarios in the Eastern Interconnect, detailed wind model, off shore wind, and operational issues. NREL has been exchanging information with the JCSP study project. EWITS is projecting a final report in July 2009.

4. Multi-state Utility-Sponsored or Transmission Owner Proposals

a. CAPX 2020

CapX2020 is a joint initiative of 11 transmission-owning utilities in Minnesota and the surrounding region to expand the electric transmission grid to ensure continued reliable and affordable service. Planning studies show that customer demand for electricity will increase 4,000 to 6,000 megawatts (MW) by 2020. The new transmission lines will be built in phases designed to meet this increasing demand as well as to support renewable energy expansion. The CapX2020 utilities - investor-owned, electric cooperatives and municipals - include those that serve the majority of customers in Minnesota and the surrounding region.

b. ITC's Green Power Express

ITC recently announced its Green Power Express proposal which consists of 3,000 miles of 765 kV transmission lines that could take 12,000 MW of power from ND, SD, MN, and IA to points east. The project costs are expected to be \$10 to \$12 billion. ITC believes the project will improve the Midwest region's access to renewable energy, enhance the market's ability to drive down energy costs, reduce energy losses, improve long-term energy reliability for customers and reduce carbon emissions.

c. AEP's Hartland Wind

AEP is proposing to build 765kV lines to connect major wind developments in the Dakotas and surrounding states to the existing 765kV network that ends near Chicago. The western terminus of the project would be near a 2,000-megawatt wind generation project in North Dakota being developed by Hartland Wind Farm LLC. Hartland will collaborate with AEP on development of the project. The transmission proposal is in the conceptual stage, but it is anticipated that linking Upper Midwest wind resources with the existing extra-high voltage transmission infrastructure in the Chicago region will likely require more than 1,000 miles of new extra-high voltage transmission lines at a cost of between \$5 billion and \$10 billion. Because of the project's scope and size, it will likely be built in stages over a 10-year period.

d. ITC-AEP joint project

ITC Holdings and AEP have done a joint study evaluating the feasibility and benefits of building a new 765 kV transmission network across Michigan's southern Lower Peninsula into Ohio. The study details some of the regional benefits such a project would provide to the Midwest. These include improving electric reliability, relieving power congestion, enhancing market access to the grid, and supporting state and federal renewable energy objectives.