AN OFFICIAL FILING
BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN

Joint Application of Dairyland Power Cooperative, Northern States Power Company-Wisconsin, and Wisconsin Public Power, Inc., for Authority to Construct and Place in Service 345 kV Electric Transmission Lines and Electric Substation Facilities for the CapX Twin Cities-Rochester-La Crosse Project, Located in Buffalo, Trempealeau, and La Crosse Counties, Wisconsin

Docket No: 05-CE-136

DIRECT TESTIMONY OF AMANDA KING

INTRODUCTION

Q. Please state your name and business address.

A. My name is Amanda King, and my business address is 414 Nicollet Mall, Minneapolis, Minnesota 55401.

Q. By whom are you employed and in what capacity?

A. I am employed as a Senior Transmission Planning Engineer at Northern States Power Company, a Minnesota corporation ("NSPM"). In that capacity, I serve as the lead planning engineer assigned to the Hampton – Rochester – La Crosse 345 kV Project which consists of a 345 kV transmission line between Hampton, Minnesota and La Crosse, Wisconsin and two 161 kV transmission lines in the Rochester Area ("Hampton – Rochester – La Crosse 345 kV Project" or "345 kV Project").

Q. What portion of the 345 kV Project is under review in this proceeding?

A. The Wisconsin portion of the La Crosse 345 kV Project from Alma to the La Crosse area (the "La Crosse 345 kV Project" or "Project").

Q. Please describe your educational background, professional experience and current responsibilities, including your role in the 345 kV Project.

A. I earned a Bachelor of Science degree in Electrical Engineering from Iowa State University in 1999. From 1999 until 2001, I was employed by NSPM as a Development Manager and was responsible for project management of large distribution, substation, and transmission projects from design through construction. Since 2001, I have been employed by NSPM as a Transmission Planning Engineer, with promotion to Senior Transmission Planning Engineer in 2006. My responsibilities include determining required transmission facilities using electric system models for powerflow and voltage/system stability analyses. In addition, I develop and coordinate long term plans to ensure system reliability and efficiency. I am the lead planning engineer for the 345 kV Project. As the lead planning engineer, I have primary responsibility for the engineering analysis supporting the identified needs for this project. I am also primarily responsible for the engineering analysis to support the facilities proposed here to meet those needs. Also since 2004, I have served as NSPM's technical representative for the CapX2020 Technical Team which provides input and guidance on studies to meet the State's transmission needs. This team was originally comprised of CapX2020 engineers but has expanded to include other engineers from transmission-owning utilities in the region and is now under the auspices of the Minnesota Transmission Owners organization. I am the engineer primarily responsible for the technical analyses provided in the Certificate of Public Convenience and Necessity ("CPCN") Application. I was also responsible for the development of writing of the CapX2020 Technical Update study (May 2005) ("Vision Study"). My resume is attached as **Ex.-Applicants-King-1**.

Q. For whom are you testifying?

A. I am providing testimony on behalf of the Applicants in this proceeding: Northern States Power Company, a Wisconsin corporation ("NSPW"), Dairyland Power Cooperative ("Dairyland"), and WPPI Energy.

Q. What is the purpose of your direct testimony?

A. The purpose of my testimony is to explain the need for the 345 kV Project and the supporting engineering analyses, including analyses of alternatives.

Q. What documents have you prepared for this docket?

A. The primary documents that I prepared are Appendix E of the CPCN Application, called the Transmission Studies Summary Report ("TSSR"), and the Supplemental Need Study ("SNS") dated August 31, 2011, **Ex.-Applicants-King-2**. I have also provided responses to various PSCW and party data requests. In addition, I prepared comments on the Draft Environmental Impact Statement regarding need. Applicants' November 28, 2011 DEIS Comments are included in the testimony of Mr. Tom Hillstrom as **Ex.-Applicants-Hillstrom-8**

Q. Are you sponsoring any exhibits with your testimony?

A. Yes. I am sponsoring the following exhibits to my testimony:

Ex.-Applicants-King-1:	Resume of Amanda King;
Ex.-Applicants-King-2:	SNS, (August 31, 2011) (PSC REF #: 152536);
Ex.-Applicants-King-3:	North American Electric Reliability Corporation ("NERC") TPL-002-0b and TPL-003-0a;
Ex.-Applicants-King-4:	Applicants' Response to PSCW Staff Data Request 04-05 (Oct. 31, 2011) (PSC REF #: 155151 (confidential) and PSC REF: # 155152 (public));

Ex.-Applicants-King-5:	Applicants' Response to PSCW Staff Data Request 04-07 (Oct. 14, 2011), (PSC REF #:154647,154715);
Ex.-Applicants-King-6:	La Crosse Area Substation Loads, and Rochester Area Substation Loads, historical and forecast (January 2012 update);
Ex.-Applicants-King-7:	Southwest Twin Cities – Granite Falls Transmission Upgrade & MN RES Update Studies;
Ex.-Applicants-King-8:	Capacity Validation Study Report;
Ex.-Applicants-King-9:	Applicants' Response to PSCW Staff Data Request 04-03 (Oct. 7, 2011) (PSC REF #: 154341 (public); PSC REF #: 154339 (confidential)); and
Ex.-Applicants-King-10:	NSPW's Response to PSCW Staff Data Request 02-02 (April 5, 2011) (PSC REF #: 146720).

NEED CRITERIA

Q. What are the state statutory criteria for determining whether a new 345 kV high voltage transmission line is needed?

A. The CPCN statute, Wis. Stat. § 196.491 has two criteria that specifically apply to need:

> (d) Except as provided under par. (e) and s. 196.493, the commission shall approve an application filed under par. (a) 1. for a certificate of public convenience and necessity only if the commission determines all of the following:
>
> 2. The proposed facility satisfies the reasonable needs of the public for an adequate supply of electric energy. This subdivision does not apply to a wholesale merchant plant.
>
> * * *
>
> 3t. For a high-voltage transmission line that is designed for operation at a nominal voltage of 345 kilovolts or more, the high-voltage transmission line provides usage, service or increased regional reliability benefits to the wholesale and retail customers or

> members in this state and the benefits of the high-voltage transmission line are reasonable in relation to the cost of the high-voltage transmission line.

Wis. Stat. § 196.491(3)(d)(2) and (3)(d)(3t).

In addition, the Commission may decline to grant a CPCN to a public utility if the project will:

> 1. Substantially impair the efficiency of the service of the public utility.
>
> 2. Provide facilities unreasonably in excess of the probable future requirements.
>
> 3. When placed in operation, add to the cost of service without proportionately increasing the value or available quantity of service unless the public utility waives consideration by the commission, in the fixation of rates, of such consequent increase of cost of service.

Wis. Stat. § 196.49(3)(b), required by Wis. Stat. § 196.491(3)(d)(5).

Q. How does the Project meet these criteria?

A. The Project satisfies the requirements because it will 1) meet existing and long-term load serving requirements in the La Crosse/Winona and Rochester areas; 2) enhance the regional electric system including improved reliability, increased power transfer capability, reduced congestion, lower generation production costs, and reduced system losses; and 3) provide generation outlet support at a cost that is reasonable and prudent for the benefits provided. The Project will satisfy these needs at reasonable cost and provide regional benefits by improving the efficient dispatch of generation resources which will reduce energy costs for wholesale and retail customers in the states of Wisconsin and Minnesota over the long term and provide efficient energy delivery.

Q. What need factors will your testimony focus on?

A. My testimony and analyses are concentrated on local community service, regional reliability, transfer capability, and generation support. NSPW witness Mr. Stephen Beuning and WPPI Energy witness Mr. Tim Noeldner are providing testimony regarding regional benefits, including production costs analyses.

NEED ANALYSIS

Mandatory Reliability Standards

Q. What reliability standards must Applicants follow when evaluating the performance of the electrical transmission system?

A. As a Wisconsin public utility, NSPW is required to furnish reasonably adequate services and facilities at reasonable and just rates. Federal Energy Regulatory Commission ("FERC") Order No. 693 requires all transmission owners, including Applicants, to comply with a large number of reliability standards, including four transmission planning ("TPL") standards. Reliability criteria is established by the NERC and overseen by FERC. The standards ensure that the regional transmission system can reliably serve customer loads under a variety of conditions. If a transmission owner is not compliant with any TPL standard requirements or related requirements involving NERC reliability criteria, FERC can assess fines ranging from $1,000 per day up to $1 million per day per violation.

The two standards that specifically relate to the need case for the Project are TPL-002-0b ("TPL-002") and TPL-003-0a ("TPL-003"). TPL-002 and TPL-003 are **Ex.-Applicants-King-3**.

Q. What do these two standards require?

The TPL-002 criteria requires that the system operate without overloads or low voltages in the event of the loss of a single system element (transmission line, transmission transformer, or generator). The TPL-003 criteria requires that the system operate reliably for loss of multiple system elements. For example, as it relates to the Project, if a generating unit is off-line, planning engineers must be able to prove that the system can meet reliability criteria following the next potential outage.

Local Community Reliability

Q. Under what conditions do system planning engineers evaluate the capability of the transmissions system to meet demand?

A. The electrical system is designed to serve the peak demand level. In other words, when planning transmission facilities, system planners determine what the peak demand level will be at any given point in time and identify the facilities required to meet that demand. As part of the CPCN Application process, the historical loads at Winona/La Crosse and Rochester area substations were evaluated and forecasts of future loads were developed to determine whether peak load exceeds the capability of the electrical system under contingency conditions.

Q. What models were developed to analyze the system?

A. Planning engineers created different models for peak and off peak conditions for a set of years. The models were used to build powerflow cases with peak loads for a specific summer case and system topology. The power flow cases systematically run through defined outages and assess whether the loads can be reliably served under all NERC required system conditions. After each contingency, the software identifies facilities that

became overloaded or voltages that fall below thresholds. Planning engineers then compare the levels at which problems occurred with historical and forecast substation loading information from NSPW's distribution department and Dairyland's member distribution cooperatives.

Planning engineers then took this information and identified potential solutions to alleviate the overloaded facilities and low voltages. These options are tested to determine the most reasonable alternative to address the local needs, considering performance, cost, and high level routing considerations. Planning engineers also assessed how alternatives performed on a regional level.

Q. In conducting these analyses, you stated that engineers made certain assumptions regarding system topology and generation operation. What does this mean in the La Crosse/Winona area?

A. As detailed in the TSSR, we evaluated proposed transmission projects that would affect system performance in the La Crosse/Winona areas and modeled generation based on anticipated operation.

Q. On December 7, 2011, Dairyland announced the retirement of three coal-burning units totaling 60 MW at its Alma Generating Plant. Does this change affect the results of your analyses for La Crosse?

A. No.

Q. Please explain.

A. The original modeling assumed that Alma Units 1-3 were offline. Accordingly, the retirement of those units would not change the modeling results, as they were not dispatched in the powerflow case used to analyze the local community needs.

Q. What engineering studies have been undertaken to assess these needs and to develop potential solutions?

A. There have been three engineering study efforts addressing local load serving issues in the Rochester and Winona/La Crosse areas since 2000. The first was a local study relating to load serving issues in Rochester. The second was a local study relating to load serving issues in the La Crosse area. These two studies were incorporated into the written study of a third effort completed in 2006. The 2006 study, Southeastern Minnesota – Southwestern Wisconsin Reliability Enhancement Study (March 13, 2006), resulted from a joint effort to evaluate potential regional improvements that would meet reliability needs in the Rochester area and the La Crosse/Winona area alike, as well as adding system reliability to the wider southern Minnesota/western Wisconsin region. It was this study that first determined the 345 kV Project was the most reasonable alternative to meet local and regional needs. Applicants subsequently completed the TSSR and a transfer study that is contained in the SNS.

Q. What are the community electric reliability needs in the Rochester area?

A. In the Rochester area, electric reliability issues have arisen that are related to population growth and associated increase in electric power demands. If the double circuit 161 kV transmission line from Byron, Minnesota that interconnects to the Maple Leaf and Cascade Creek substations is out of service, the remaining transmission system can only reliably deliver 181 MW of power to area substations. In 2006 the peak load reached 330 MW, and the 2011 peak was 327 MW.

With all local generation operating, the system can support up to 362 MW of demand in the Rochester area should a transmission line be out of service. While local generation

operated in advance of the next line or power plant outage may support additional demand, running generation for system support to prepare for the next line or power plant to go out of service is not a desirable long-term solution because it is less reliable than transmission. In addition, the energy generated from the older facilities is typically more expensive than power purchased from Midwest Independent Transmission System Operator Inc. ("MISO") competitive markets. To address these needs, additional power sources into the Rochester area are needed.

Q. What are the community electric reliability needs in the Winona/La Crosse area?

A. The electrical system's capacity to meet power demands in these communities is limited when the J.P. Madgett unit (395 MW) at Alma or Genoa-3 (377 MW) is off-line. If the Genoa-3 generator is off-line and the Alma – Marshland 161 kV transmission line is disconnected (a N-2 contingency), the La Crosse area experiences low voltage conditions at approximately 430 MW of load. When load on the system is at or above 430 MW, an outage of a generating unit and a transmission source will cause unacceptable low voltages in the La Crosse area, so low that the French Island oil combustion turbines could not be brought on line. As the La Crosse area load exceeds 500 MW, technical analysis has shown that there is the potential for voltage collapse throughout the wider region. See **Ex.-Applicants-King-4**. Because load above 430 MW cannot be reliably served under this N-2 contingency, to comply with NERC standards, load would have to be interrupted after the first outage to put the system in a condition that it can withstand the next contingency. This mitigation is required under NERC reliability standard TPL-003.

Q. How do historical load levels in the Winona/La Crosse area compare to this 430 MW critical load level?

A. The non-coincident peak of the area substations in the study area has exceeded 430 MW since 2006 and reached a new high of 465 MW in the summer of 2011, representing a deficit of 35 MW.

Q. How does the new peak in the La Crosse/Winona area compare to other loads in the MISO system?

A. As noted in the SNS on page 29, the new peak is part of a trend for rising power demands, as evidenced by record levels experiences on July 20, 2011:

- In MISO, the demand for power in its 12-state market area peaked at 103,975 MW, exceeding the prior record of 103,246 MWs set on July 31, 2006.
- For its four-state service area, Dairyland exceeded its last peak set in 2010 of 916 MW and reached a new peak demand of 979 MW, a 6.9 percent increase year-over-year.
- The system operated by Xcel Energy and Northern States Power Company, a Minnesota corporation, over a five-state area (Minnesota, North Dakota, South Dakota, Wisconsin, and Michigan) reached a new peak of 9,533 MW of load served, 402 MW above the peak of 9,131 reached in 2010, representing a 4.4 percent increase.

Q. Does Dairyland's planned rebuild of the Genoa—La Crosse 161 kV line affect the performance of the alternatives under consideration?

A. No. The rebuild does not affect the amount of additional local load serving capacity provided by the 345 kV Project and alternatives being evaluated. See **Ex.-Applicants-King-5**.

Q. Have the Applicants updated the La Crosse area actual substation loads and forecast information?

A. Yes. Historical loads and forecast loads have been tracked and developed since 2006, and utility practice is to update forecasts throughout the year. Therefore, there have been several forecasts submitted during the permitting process. The most recent substation load data previously provided in this docket was in the SNS. The data in the tables provided reflect a 1.18 percent annual increase for 2002 to 2020. The most current substation load table for the La Crosse area, which adds actual loads from 2011, is attached as **Ex.-Applicants-King-6.**

Q. How did Applicants develop the forecasted loads for the years 2012 to 2020?

A. For the substations in the La Crosse/Winona study area, actual loads were reported for 2002, 2006, and 2008 initially, with the growth rate over those years extrapolated by each company through 2020. Known large load additions were included, as well as substations like Holland which were added in 2009. As the Wisconsin CPCN Application was developed, 2009 and 2010 actual loads were added to the report.

In the most recent forecast, **Ex.-Applicants-King-6**, for the La Crosse area, Xcel Energy applied a 1.02 percent growth rate to 2011 loads through 2020.

Dairyland averaged loads from 2006 to 2011 actual loads and then grew the load at each cooperative's respective growth rate as follows: Vernon Power Cooperative, 0.7 percent, Oakdale Electric Cooperative, 1.5 percent, Tri-County Electric Cooperative, Inc., 0.7 percent, and Riverland Energy Cooperative, 1.1 percent.

Q. Have Applicants also forecast further into the future?

A. To evaluate the lifespan of alternatives, the loads had to be projected beyond the 2020 timeframe. To achieve this, Applicants took the total study area load, including NSPM and Dairyland substations for 2020 and grew it by 1.17 percent per year through mid-century.

Q. According to Applicants, how is the identified load serving deficit expected to increase over time?

A. As shown on **Ex.-Applicants-King-6**, Applicants forecast that by the year 2020, the deficit in the Winona/La Crosse area will be approximately 100 MW. As load grows the deficit will rise.

Q. Have Applicants also updated the Rochester area load information?

A. Yes. This is included in **Ex.-Applicants-King-6**.

Regional Reliability

Q. What regional reliability considerations did planning engineers consider when developing the 345 kV Project?

A. As described in the TSSR and discussed in more detail in the SNS, there are several regional system considerations including: system efficiency, transfer capability between Wisconsin and Minnesota, congestion relief and economic dispatch of generation resources.

Generation Support

Q. Please describe the generation support needs in the Wisconsin/Minnesota area.

A. In March of 2009, Minnesota transmission owning utilities jointly worked on three transmission planning studies designed to assess transmission needs for supporting wind

generation integration into the regional transmission system. These studies, Final Report Southwest Twin Cities – Granite Falls Transmission and Upgrade Study/Minnesota RES Update Study and the Capacity Validation Study concluded that additional transfer capability was needed to facilitate development of wind in the MISO footprint, particularly west of Wisconsin. **Ex.-Applicants-King-7** and **Ex.-Applicants-King-8**. The studies further concluded that a 345 kV connection between Minnesota and Wisconsin was needed before significant capacity increase could occur. Lastly, the studies found that the 345 kV Project in combination with a line from La Crosse to the Madison area, would increase power transfer capability.

EVALUATION OF ALTERNATIVES

Q. Describe the alternatives Applicants evaluated in this docket.

A. Five lower voltage alternatives (and two revisions) were analyzed:

- The 161 kV La Crosse Alternative: For La Crosse, this alternative includes reconductoring/rebuilding approximately 200 miles of transmission lines in the La Crosse area and building a new 161 kV transmission line across the Mississippi River to connect to the Prairie Island source at Spring Creek Substation. It also includes a 345 kV line from Hampton to North Rochester and two 161 kV lines in the Rochester area to serve the Rochester load serving area ("Rochester Facilities").

- Reconductor Only Alternative (including 345 kV and 161 kV ties for Rochester): This alternative consists of approximately 200 miles of transmission line reconductors and rebuilds in the city of La Crosse and surrounding area and Rochester Facilities.

- Initial 161 kV North Rochester – Briggs Road Alternative and Revised Alternative: The option includes a 161 kV line from North Rochester to Briggs Road and the Rochester Facilities. This option was first introduced in the TSSR and was shown to have a load serving capability of 550 MW. Following the TSSR, planning engineers analyzed what facilities would be necessary to have this alternative serve load to the same level realized by the 345 kV Project and the La Crosse 161 kV Alternative and concluded that to reach 750 MW load level, the alternative needed to tie in at a new substation near Alma and include all the reconductoring associated with the Reconductor Only option.

- Double Circuit 161 kV North Rochester – Briggs Road Alternative: This option includes a double circuit 161 kV line from North Rochester to Briggs Road and the Rochester Facilities.

- 230 kV North Rochester – Briggs Road Alternative: This alternative includes a 230 kV line from North Rochester to Briggs Road and the Rochester Facilities.

Q. What criteria did Applicants use to compare these alternatives?

A. Applicants considered multiple criteria, including the capacity of each alternative to serve local community reliability needs, the transfer capacity provided, system efficiency, congestion relief, generation support, siting issues, market benefits, and cost. A summary of the load serving, economic value of electric system losses, transfer capability, and siting factors is included in the SNS, **Ex.-Applicants-King-2** at pp. 52-54.

Load Serving Capability

Q. Starting with local load serving capability. How do the alternatives compare?

A. The 345 kV Project will provide 750 MW of load serving capability in the La Crosse area, a level that will last until mid-century. The areas in Wisconsin that would experience enhanced load serving are Buffalo, Trempealeau, and La Crosse counties, including the communities of Alma, Buffalo City, Fountain City, Arcadia, Galesville, Trempealeau, Holmen, Onalaska, La Crosse, and the surrounding rural areas.

Only two of the alternatives, the 161 kV North Rochester – Briggs Road (revised to serve 750 MW) alternative and the La Crosse 161 kV Alternative provide the same capability. The remaining options provide 150 to 200 MW less of capability.

Transfer Capability

Q. How did Applicants assess regional performance of alternatives?

A. For our regional analysis, Applicants conducted a transfer study and a production cost savings analysis. I was responsible for the transfer study. NSPW witness Mr. Beuning is providing testimony regarding the production cost analysis.

Q. How is transfer capability important to regional system operations?

A. As detailed in the SNS, transfer limits between Minnesota and Wisconsin affect system operators' ability to move power in response to a critical contingency or shifts in variable resources such as wind generation. The ability to move power to respond to these conditions enhances system reliability and enables the efficient dispatch of generation across the system.

Q. What evaluation did you do of short-term and long-term transfer capability for the 345 kV Project?

A. Applicants evaluated the immediate and long-term transfer capability between Wisconsin and Minnesota of each alternative. Specifically, Applicants evaluated what transfer capability would result after construction and what transfer capability could be achieved if a 345 kV line were built to Appleton or Madison. Additional information regarding the engineering analysis is included in the SNS, **Ex.-Applicants-King-2**, and **Ex.-Applicants-King-4** and **Ex.-Applicants-King-9**.

Q. One of the scenarios you listed was a 345 kV line between La Crosse and Madison. Has this connection been studied previously?

A. Yes. In 2005, the CapX2020 group included a La Crosse – Madison connection as part of its Vision Study work. A La Crosse – Madison connection was also included in the 2009 Minnesota RES Update Study ("RES Update") of which Northern States Power Company was a key participants.

More recently, a study by American Transmission Company, Northern States Power Company and Dairyland analyzed the need for a new transmission line from La Crosse, Wisconsin to an endpoint in the Madison area. This study work culminated in the Western Wisconsin Transmission Reliability Study ("WWTRS").

Q. What did the WWTRS conclude?

A. The WWTRS assessed the reliability needs and options in western Wisconsin in the eight- to ten-year future time frame. It concluded that a 345 kV connection between the end-point of the Project (in north La Crosse) and north Madison, among other connections, would provide the most benefits in the region. This study result was

recently confirmed by MISO which, on December 8, 2011, included the segment from the Briggs Road Substation to the North Madison Substation in its 2011 Midwest Transmission Expansion Plan or "MTEP" and designated it as a "multi-value project" or "MVP" in accordance with the requirements and specifications of MISO's tariff.

Q. Returning to the transfer analysis, please describe the results.

A. The addition of the 345 kV Project or the La Crosse 161 kV Alternative alone increases the thermal transfer capability between Minnesota and Wisconsin by 775-850 MW. However, a 345 kV connection is more robust in that it also provides for additional transfer capability as the 345 kV system is extended to the east. Transfer study analysis indicates the additional capacity, depending on the eastern termination, could reach approximately 1150 MW over current system levels (depending on the eastern terminus). This 1150 MW increase is not realized if a lower voltage alternative is constructed initially. In fact, the lower voltage alternative followed by a 345 kV line to the east of La Crosse would actually reduce thermal transfer capability below current levels by approximately 700 MW. By increasing transfer capability, the 345 kV Project enhances overall regional reliability.

System Efficiency

Q. How did Applicants assess system efficiency?

A. We assessed system efficiency by evaluating system losses. The 345 kV Project presents cost savings and reduced need for new generation capacity over a lower voltage alternative based on a reduction in system losses. The 345 kV Project provides higher loss savings versus the alternatives, from $5 million up to $36 million more in losses savings depending on the alternative. See SNS, **Ex.-Applicants-King-2** at pp. 53-54.

Congestion

Q. What impact would the 345 kV Project have on congestion?

A. Congestion limits the ability of system operators to dispatch generation in the most economic manner. In the 2010 MTEP, MISO showed that the 345 kV Project relieved generation trapped in Minnesota that was identified in 2010 and 2014 models. Congestion in Wisconsin expands geographically to the east and to the Upper Peninsula of Michigan. Reducing congestion results in lower overall energy costs. This factor is discussed in more detail in Mr. Beuning's testimony and he will be available to answer questions regarding congestion. As shown in the transfer analysis, the lower voltage alternatives reduce transfer capability following any 345 kV transmission system expansion east of La Crosse in the future and therefore would not provide the same congestion relief as the 345 kV Project.

Generation Support

Q. How do the alternatives compare on the generation support factor?

A. Increased transfer capability not only improves system performance and reliability, but it also enables additional generation deliveries into Wisconsin from sources to the west. The 345 kV Project facilitates additional generation deliveries from the wind-rich areas of Minnesota and points west into Wisconsin which, in turn, supports policies favoring the use of renewable energy sources.

Siting

Q. What siting issues were considered when evaluating alternatives?

A. Since 2005, when a 345 kV solution was under study, we recognized it would mean a crossing of the Mississippi River and the U.S. Fish and Wildlife Service's Upper

Mississippi River National Wildlife and Fish Refuge ("Refuge") by new transmission facilities. With this in mind, planning engineers aimed to minimize the number of crossings by maximizing the transmission capacity that can be created on an existing corridor across this natural barrier, thereby minimizing long-term impacts on environmental resources. Only the 345 kV Project meets this objective. If a lower voltage solution between Minnesota and Wisconsin were approved, it is more likely that additional crossings of the Mississippi River and Refuge would be necessary in the future.

Market Benefits

Q. Another factor you identified is market benefits. Please explain.

A. When high voltage facilities are added to the electrical grid, they impact how energy flows across the grid and the level of delivery losses. Regarding losses: for a given level of power transfer, doubling the voltage of the delivery facility reduces the electrical losses on that facility by a factor of four. So although electric delivery losses occur during any power transfer based on the amount of current flowing on the wires, higher voltage transmission upgrades result in reduced delivery losses for a given quantity of delivered power. Regarding energy flow on the grid: transmission additions result in an increased number of supply alternatives for the system load and this creates the opportunity to reduce the overall cost of energy production. Market efficiencies are explained in further detail by Mr. Beuning in his direct testimony.

Costs

Q. How do costs of the alternatives compare?

A. When considering capital costs and the value of reduced losses, the 345 kV Project is estimated to cost $507 million. The two alternatives that also provide 750 MW of capability have lower estimated costs: 161 kV North Rochester – Briggs Road (revised to serve 750 MW) ($456 million) alternative and the La Crosse 161 kV Alternative ($491 million). However, these alternatives do not provide an equivalent level of regional reliability and market benefits as the 345 kV Project. Addressing the needs of the Rochester and La Crosse areas simultaneously results in more efficient system planning and can avoid duplication or balkanization of transmission facilities. While the resultant 345 kV Project has higher costs than certain lower voltage alternatives, a holistic solution that jointly addresses the needs of both areas as well as the need for future facilities results in the most efficient system development.

Q. Are the costs of the 345 kV Project justified?

A. When assessing the cost of the 345 kV Project versus alternatives, the total combination of local and regional performance as well as policy benefits should be assessed. When all of these factors are considered, the 345 kV Project is the most prudent investment to address the identified needs.

NON-TRANSMISSION ALTERNATIVES

Q. Did Applicants also evaluate non-transmission alternatives?

A. Yes. Applicants considered generation, including French Island generation, as well as other renewable and non-renewable alternatives.

Q. What did Applicants conclude about the non-transmission alternatives?

A. As detailed in NSPW's response to PSCW Staff Data Request 02-02, **Ex.-Applicants-King-10**, Applicants concluded that non-transmission options were not reasonable alternatives because they could not meet the identified needs.

Q. What did Applicants conclude regarding the use of French Island generators to increase the capacity of the system to serve the Winona/La Crosse area?

A. We concluded that using the two 70 MW units of generation at the French Island plant (units #3 and #4) is not a reasonable alternative to meet any of the identified needs.

Q. Why?

A. First, generation is less reliable than transmission and therefore is a poor alternative for local load serving needs. Whereas high voltage transmission availability is more than 99.9 percent, the most reliable generation is typically unavailable 7 to 10 percent of the time. Peaking generators, like French Island, are typically unavailable 20 percent of the time or more due to increased maintenance needs. Accordingly, we disagree with the DEIS analysis' suggestion that the reliable load serving capacity of the transmission system serving the greater La Crosse area could be increased from the critical level of 430 MW to 500 MW or 570 MW by relying on 70 MW (Unit #3, which is currently mothballed) and 70 MW (Unit #4) of generation at the French Island plant.

Second, French Island generation would not meet the regional and generation support needs, nor would French Island generation provide transmission efficiencies or market benefits. Only a 345 kV solution can meet these needs as detailed in the SNS.

Third, one of the French Island units, #3, has been mothballed indefinitely and is not operational.

Lastly, there are operational costs and environmental considerations that make reliance on French Island an inferior alternative.

Q. Did Applicants consider a "no build" alternative to the 345 kV Project for the La Crosse/Winona area and surrounding region?

A. Yes. The no-build alternative was considered and found to be unworkable. In the La Crosse/Winona area, the peak loading on the system under contingency conditions already exceeds system capability by 35 MW and this deficiency will continue to grow absent system improvements. Regionally, if the 345 kV Project is not constructed at 345 kV, transfer capability will be limited which will result in higher energy prices as detailed in Mr. Beuning's testimony, reduced capability to deliver wind from Minnesota and areas further west into Wisconsin and higher system losses. In sum, if the Project is not constructed, there will be no improvement in local reliability in the communities at risk and no regional benefits.

OTHER NEED CONSIDERATIONS

Q. Will the 345 kV Project provide capacity beyond the electrical needs of the local communities and the region?

A. No. The 345 kV Project will serve immediate and long-term demand for electricity in the Winona/La Crosse and Rochester areas and meet broader regional needs based on reasonable existing and future scenarios and to provide capacity for future transmission system expansions.

Q. Will the 345 kV Project impair the efficiency of service?

A. No. In fact, the 345 kV Project will improve overall efficiency by reducing system losses.

CONCLUSION

Q. Does this complete your direct testimony?

A. Yes.

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