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 TIM NOELDNER

INTRODUCTION

Q. Please state your name and business address.

A. My name is Tim Noeldner and my business address is 1425 Corporate Center Drive Sun Prairie, Wisconsin 53590.

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

A. I am employed by WPPI Energy ("WPPI") as the Assistant Vice President of Special Projects.

Q. Please describe your educational background and professional experience.

A. I graduated from the University of Wisconsin – Madison in 1984 with a Bachelor of Science Degree in Electrical Engineering. Following graduation, I worked for various utilities in the wholesale power marketing and resource and transmission planning areas. Since 2002, I have been employed by WPPI and I am currently the Assistant Vice President of Special Projects. As part of my job as Assistant Vice President of Special Projects, I serve as WPPI's representative on several CapX2020 committees and have

represented WPPI at numerous open houses and hearings related to the Hampton – Rochester – La Crosse 345 kV Project. My resume is attached as **Ex.-Applicants-Noeldner-1**.

Q. For whom are you testifying?

A. I am providing testimony on behalf of WPPI, one of the Applicants (with Northern States Power Company, a Wisconsin corporation and Dairyland Power Cooperative) in this docket. Applicants seek approval from the Public Service Commission of Wisconsin ("PSCW") and the Wisconsin Department of Natural Resources ("WDNR") to construct the Wisconsin portion of the Hampton – Rochester – La Crosse 345 kV Project. The Wisconsin portion includes a 345 kV line from Alma, Wisconsin to a new transmission substation located in Holmen, Wisconsin and associated 161 kV system interconnections at the new substation. These facilities are together termed the "La Crosse 345 kV Project" or "Project".

Q. What is the purpose of your direct testimony?

A. The purpose of my testimony is to provide testimony related to WPPI's involvement in the Hampton – Rochester – La Crosse 345 kV Transmission Project.

Q. Are you sponsoring any exhibits with your testimony?

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

Ex.-Applicants-Noeldner-1: Resume of Tim Noeldner;

Ex.-Applicants-Noeldner-2: Wind Energy Transmission Economics Assessment; and

Ex.-Applicants-Noeldner-3: Model results – Value of power transfer capability between Minnesota and Wisconsin based on Wind Capacity Factor Differentials.

Q. Can you provide some background information on WPPI?

A. WPPI is a not-for-profit regional power company serving 51 customer-owned electric utility members. Through WPPI, these public power utilities share resources and own generation to provide reliable, affordable electricity to more than 195,000 homes and businesses in Wisconsin, Iowa, and Upper Michigan. WPPI develops and owns generation, negotiates and holds power purchase agreements, and arranges transmission service and congestion protection on behalf of its member utilities. WPPI provides services to its members, and to customers of its members, including conservation and load management programs. All WPPI members and their customers are located within the Midwest Independent Transmission System Operator Inc. ("MISO") footprint, and WPPI is a MISO participant. WPPI pays the MISO network transmission rate for all of its load. WPPI does not currently own transmission directly, but is a minority owner of American Transmission Company. This ownership helps to "hedge" WPPI's transmission delivery costs in eastern Wisconsin and in the Upper Peninsula. WPPI currently has no mechanism in place to hedge its transmission delivery costs in western Wisconsin.

Q. What were WPPI's peak demand and energy requirements in 2010 and 2011?

A. WPPI's overall system peak demand in 2010 was 1,007 MW, and in 2011 was 1,045 MW. WPPI served member energy requirements in 2010 of 5,336 GWH.

PARTICIPATION IN CAPX2020

Q. Please describe WPPI's involvement with the CapX2020 Initiative.

A. WPPI has been an active participant in the CapX2020 Initiative since 2006 and in the Project, in particular, since 2007 under the La Crosse Project Development Agreement

("PDA"). WPPI intends to own 3.0 percent of the total 345 kV Project as a tenant-in-common in undivided ownership interests.

Q. Why did WPPI specifically seek involvement in the Hampton – Rochester – La Crosse 345 kV Project?

A. WPPI is involved in the Hampton – Rochester – La Crosse 345 kV Project for the same reasons as the other co-applicants:

- Improve local reliability and maintain compliance with North American Electric Reliability Corporation reliability standards, especially for the communities of Rochester, La Crosse, and Winona;
- Support regional reliability – this can involve items like the need for flexibility to respond to the results of recent and new environmental regulations, ability to meet operating challenges posed by the addition of additional intermittent generation (e.g., wind), and future load growth; and
- Facilitate the regional market – increased transfer capability allows access to lower cost generation resources located west of Wisconsin, primarily renewables.

Additionally, WPPI is interested in owning its load ratio share of transmission in the pricing zone encompassing western Wisconsin where the following five WPPI member utilities are located: Black River Falls, New Richmond, River Falls, Westby, and Whitehall.

Q. How important is transfer capability for WPPI's customers?

A. As detailed in the direct testimony of Amanda King, the 345 kV Project is designed to provide an essential 345 kV link into Wisconsin that will enable approximately 1200 MW of transfer capability when a 345 kV connection is made further to the east. WPPI

relies upon remote generation to meet member utilities' electrical capacity and energy requirements. Absent transmission transfer capability, use of remote generation for this purpose would not be possible. Power transfer capability has provided WPPI with lower-priced resources over the years in two ways: 1) The direct cost of remote purchases from (or ownership of) Minnesota and Illinois generators is lower on a delivered basis than that of other options available at the time these purchases were made, and 2) Having the ability to reach remote resources has given WPPI a wider range of opportunities when considering the economics of resource options inside and outside of Wisconsin. Thus, the availability of power transfer capability (from Minnesota and points west as well as from Illinois) has reduced the cost of electricity for WPPI's members and their customers. The anticipated near-term and long-term power transfer capability improvements provided by the Project are needed in the future to provide similar benefits. Transfer capability also enables WPPI to meet its renewable energy requirements. WPPI currently purchases 80 MW (nameplate) under long term power purchase agreements from wind farms located west of Wisconsin and owns 1.8 MW (nameplate) of a wind farm located near Worthington, Minnesota.

Q. Has WPPI attempted to quantify the value of transfer capability?

A. Yes. WPPI's experience has been that transfer capability has a significant positive value, both for WPPI's wind energy purchases and for delivery of energy produced by remote WPPI-owned generation resources. With regard to wind resources, the best regional wind resources are located west of Wisconsin. This is borne out by generation interconnection requests. The December 15, 2011 MISO generation interconnection queue for Minnesota and the Dakotas is mostly wind generation – 88 percent of the

generation on active status in Minnesota, and 96 percent of generation in the Dakotas, is wind. WPPI sponsored development of a spreadsheet model in 2010 working with Burns & McDonnell to generically assess the prospective value of power transfer capability based on the difference in wind generation capacity factors between various locations and states where wind generation could be located. The concept and methodology used by this model are described in the Wind Energy Transmission Economics Assessment ("Assessment"), which is attached as **Ex.-Applicants-Noeldner-2**.

Q. Why did WPPI undertake the Assessment?

A. At the time, various transmission proposals were being discussed (including a 765 kV line) for delivering wind from the best wind resource locations in this region (i.e., the Dakotas and Minnesota) to Wisconsin and points east. WPPI wanted to determine at a conceptual screening level how much transmission investment could be justified by the fundamental difference in average wind speeds (and the resulting differences in capacity factor and busbar cost of that generation) between locations with different wind quality.

Q. Is the Assessment the types of data typically relied upon by utilities when forming opinions on the subject?

A. Yes. Electric utilities typically rely upon outside consultant resources to perform analyses like the Assessment.

Q. Do you consider Burns & McDonnell to be a reliable vendor?

A. Yes. WPPI has a long-standing relationship with Burns & McDonnell. Burns & McDonnell provided consulting services to WPPI that have included generation siting studies (*e.g.*, siting of the South Fond du Lac combustion turbines), technology evaluations (*e.g.*, characteristics of various types of peaking, intermediate, and baseload

generation technologies) to assist WPPI in selecting the appropriate upgrades to our generation mix, and services as Owners Engineer during WPPI's participation in the Prairie State Energy Campus development (later WPPI withdrew from this project). Several staff members of WPPI, including a Senior Vice President of Power Supply (now retired).

Q. What was your role in the Assessment?

A. I was the project manager. I scoped out the analysis and concept description and directed Burns & McDonnell to build WPPI a model that would perform this task. I also oversaw development of the Assessment.

Q. Please describe generally the results of that Assessment.

A. The key output of the analysis was that the difference in wind generation capacity factors has a measurable value. The Assessment contains a graph (Figure 5-1) showing the breakeven cost of power transfer capability as a function of differences in capacity factor of wind generation. Figure 5-1 of the Assessment is based on an underlying source location capacity factor of 40 percent and a sink location capacity factor of 20 percent. The breakeven transmission capital cost is the amount one could justify spending on transmission improvements to enable the transfer of wind energy from the source to the load (i.e., power transfer capability). If the transmission capital cost necessary purely to achieve the transfer of wind energy (i.e., incremental to the cost of satisfying reliability requirements, the value of reducing congestion, etc.) is below the "Breakeven Transmission Capital Cost," it is more economical to build the transmission and site the wind generation in the better quality wind area rather than near the load. Another way of looking at this is that if two transmission improvement alternatives both meet a local

reliability need but provide differing levels of power transfer capability, the Breakeven Transmission Capital Cost quantifies the value that extra power transfer capability could provide if used to transmit wind energy from the source.

Figure 5-1 illustrates how the value of power transfer capability varies with differences in wind capacity factor. To apply this concept to the 345 kV Project one must update the model to reflect the specific wind energy capacity factors expected in Minnesota versus Wisconsin because the 345 kV Project would increase the power transfer capability across that interface as testified by Ms. King.

Q. Have you updated the Assessment model as necessary to apply it to this Project?

A. Yes. At the time the model was originally developed, the National Renewable Energy Laboratory ("NREL") had published wind energy potential by state at a level of 50 meters. The Assessment extrapolated the 50 meter information to 80 meters, a more appropriate level given the height of today's wind turbines. Since that time, NREL published estimates of Wind Energy Potential by state at a level of 80 meters. Thus, it is no longer necessary to extrapolate to the typical wind turbine hub height, so I updated the model accordingly. I also updated the model inputs to specifically use NREL's wind capacity factor estimates for Minnesota and Wisconsin instead of the more generic range used in Figure 5-1.

Ex.-Applicants-Noeldner-3 shows the results obtained when applying the updated model to estimate the wind-transfer-related value of power transfer capability from Minnesota to Wisconsin, which the 345 kV Project would enhance. **Ex.-Applicants-Noeldner-3** displays results for a number of additional runs I investigated to determine how sensitive the results are to input assumptions. I used modeling information vetted

and agreed to through the Eastern Interconnection Planning Collaborative to establish several of the sensitivity ranges.

Q. Looking at wind resources in Minnesota for delivery in Wisconsin, do you have an opinion regarding the value of transfer capability based on the Assessment?

A. My analysis indicates that the value of power transfer capability is in the range of $130 to $250 ($ per kW of power transfer capability) based on the differential in expected capacity factor of wind generation located in Minnesota versus that of wind generation located in Wisconsin. Other economic benefits available from such power transfer capability are not captured by this screening level analysis and are addressed by other witnesses.

CONCLUSION

Q. Does this complete your direct testimony?

A. Yes.

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