

## 5.0 CapX 2020 Transmission Plan

### 5.1 CapX 2020 Utilities

CapX 2020 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 service. Planning studies show that customer demand for electricity will grow by 4,000 to 6,000 megawatts (MW) by 2020. The new transmission lines will be built in phases designed to meet this electric growth, as well as to support renewable energy expansion. The first group of CapX 2020 projects (Group 1) is made up of three proposed 345-kV transmission lines and a proposed 230-kV line.

The CapX 2020 initiative has a current roster of eleven utilities: Central Minnesota Municipal Power Agency, Dairyland Power Cooperative, Great River Energy, Minnesota Power, Minnkota Power Cooperative, Missouri River Energy Services, Otter Tail Power Company, Rochester Public Utilities, Southern Minnesota Municipal Power Agency, Wisconsin Public Power, Inc., and Xcel Energy.

More information about CapX 2020 is available on the webpage maintained by the utilities:

<http://www.capx2020.com>

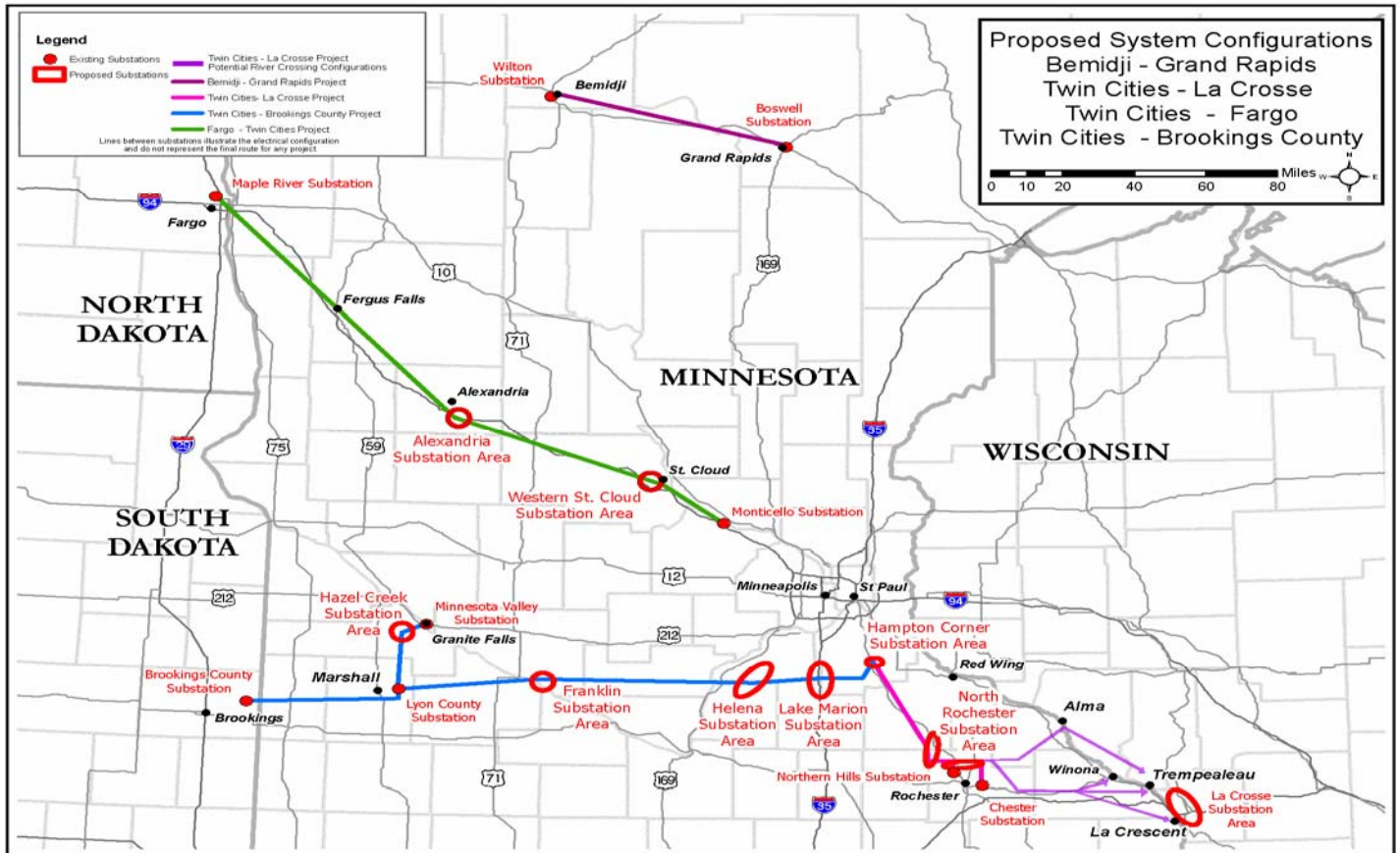
### 5.2 Transmission Projects

The CapX 2020 utilities have identified three 345 kV transmission lines and one 230 kV line that they are prepared to construct. The four lines are:

- Twin Cities – Fargo. This is an approximately 250-mile long, 345 kV project between Monticello, St. Cloud, Alexandria, and Fargo, North Dakota.
- Twin Cities – Brookings County. This is an approximately 200-mile, 345 kV project between the southeastern corner of the Twin Cities and Brookings County, South Dakota, as well as a 345 kV segment from Marshall to the Granite Falls area.
- Twin Cities – LaCrosse. This is an approximately 150-mile, 345 kV project between the southeast corner of the Twin Cities, Rochester, and La Crosse, Wisconsin. This project also includes two new 161 kV transmission lines from North Rochester Substation into Rochester.
- Bemidji-Grand Rapids. This is an approximately 68 mile long line from the 230 kV Wilton Substation located just west of Bemidji, Minnesota (jointly owned by Otter Tail Power and Minnkota Power) to Minnesota Power's 230 kV Boswell Substation in Cohasset, Minnesota, northwest of Grand Rapids, Minnesota.

<b>Tracking Numbers.</b>	2005-CX-1	Twin Cities – Fargo
	2005-CX-2	Twin Cities – Brookings County
	2005-CX-3	Twin Cities – LaCrosse
	2005-NW-N2	Bemidji – Grand Rapids

The map below shows the general location of the four transmission lines.



### 5.3 The 345 kV Projects

**Certificate of Need for the 345 kV Projects.** On August 16 2007, Northern States Power Company, a Minnesota Corporation and wholly-owned subsidiary of Xcel Energy Inc., and Great River Energy, a Minnesota Cooperative Corporation (together the “Applicants”) filed a application with the Minnesota Public Utilities Commission for Certificates of Need for the three 345 kV transmission line projects and associated system connections. These matters have been consolidated into one proceeding by the Commission.

**PUC Docket Numbers.** CN-06-1115 (Notice Plan for Fargo line and combined Certificate of Need for all three lines)  
 CN-06-979 (Notice Plan for LaCrosse line)  
 CN-06-857 (Notice Plan for Brookings County line)

**Summary of Need for the Three Lines.** The Applicants' proposals are designed to address three overall categories of need as listed below:

**Community Service Reliability.** These projects are needed to alleviate emerging service reliability concerns in Rochester and other parts of southeastern Minnesota, in the LaCrosse area, in St. Cloud, in the Alexandria area, and in the Red River Valley. Once in place, these lines will provide service reliability benefits not only to these communities but also to a much larger geographic area throughout the State and region, including communities in southwestern Minnesota, northwestern and central Minnesota, and portions of southeastern Minnesota.

**System Wide Growth.** These three projects are also part of a longer-term plan to strengthen the electrical network to meet 4,000 to 6,000 megawatts of additional demand anticipated in Minnesota and parts of surrounding states by 2020.

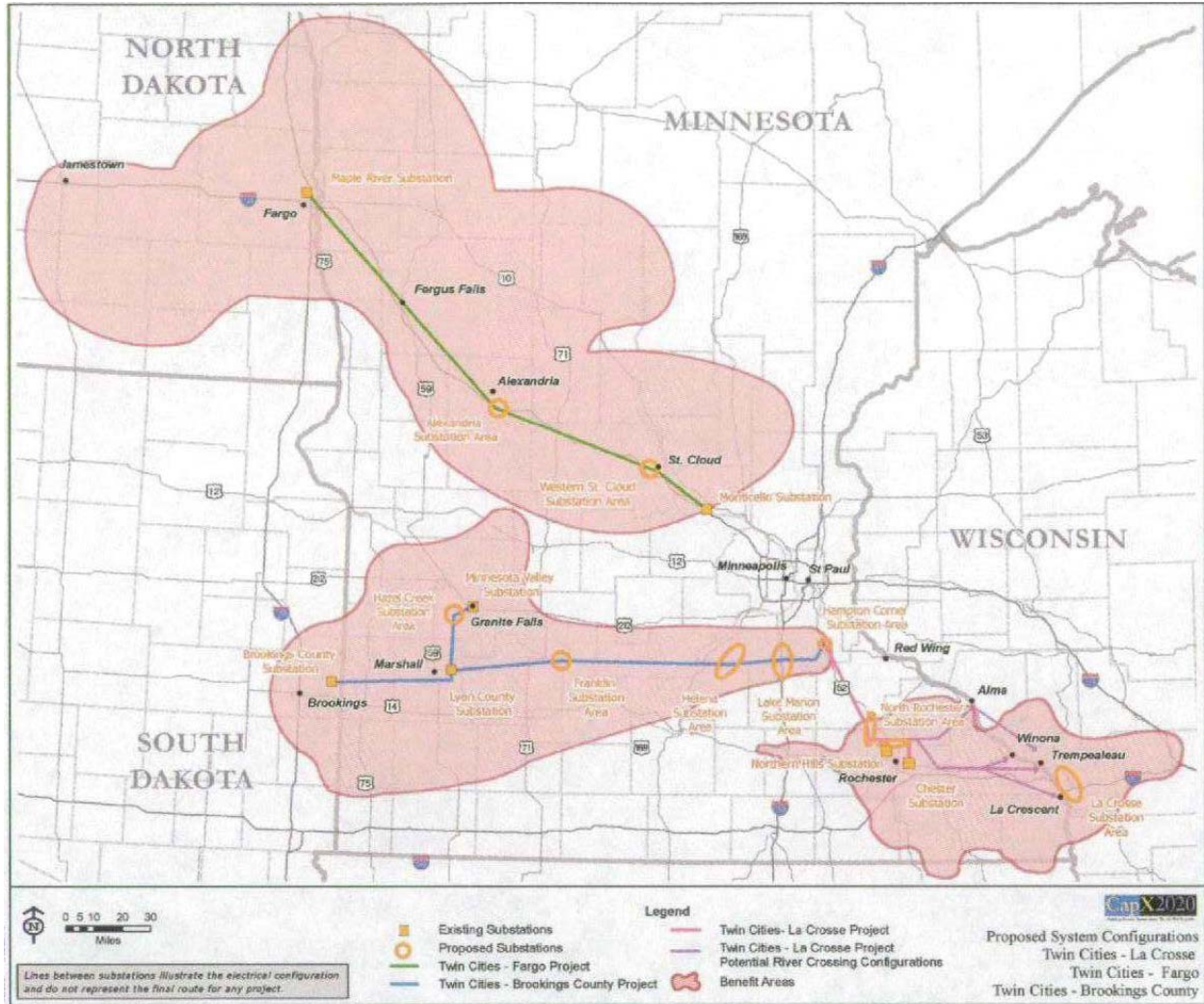
**Generation Outlet/Renewable Energy Support.** These three lines add transmission capacity to the network to support the continuing development of renewables generation along Buffalo Ridge and elsewhere in the state and region.

While additional information about the need for these three 345 kilovolt lines can be found in the Certificate of Need application and will be examined in the CON proceeding, the following summary describes the benefits that will be realized by these lines.

**Community Service Reliability.** Local community needs are key drivers for these lines. The Twin Cities – LaCrosse and Twin Cities – Fargo 345 kV projects will specifically meet critical community service needs in the communities of Rochester, La Crosse, St. Cloud, Fargo, and the surrounding Red River Valley area, including Alexandria. The Twin Cities - Brookings County 345 kV project will enhance customer service capabilities in communities in the project area, including the southwest Twin Cities area, Scott County and Dakota County.

Recognizing this growing concern for additional service in a number of communities, planning engineers selected and analyzed appropriate system alternatives that are capable of addressing the identified problems. The figure below shows the three projects and the areas of the State where electrical system reliability will be improved.

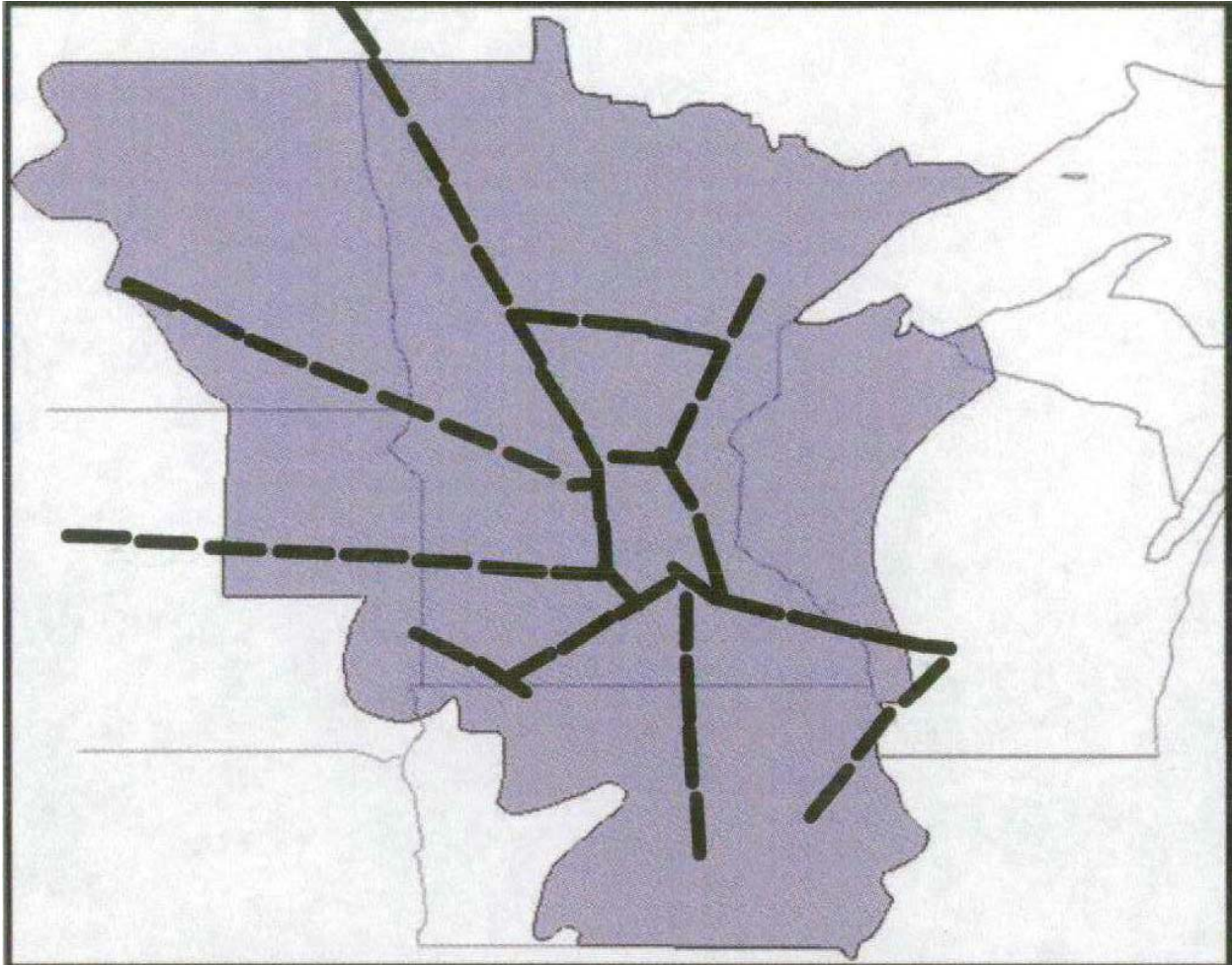
CapX 2020 345 kV Projects Benefit Area



**System Wide Growth.** It has been nearly three decades since the electrical network serving Minnesota has been expanded to any large degree. In preparing the CapX 2020 Vision Plan, utility planners focused on the overall systems of utilities serving Minnesota customers and the growth in the demand for electricity anticipated in those systems by the year 2020.

The geographic scope of the CapX 2020 study work is shown in the figure below.



**Geographic Scope of CapX 2020**

Relying on forecasts of growth in electrical demand from various sources, including generation planners, Load and Capability Reports, regional reliability agencies, and resource planning proceedings before the Public Utilities Commission, forecasters project that the demand for electrical power will grow by 4,000 to 6,000 MW in the study area by 2020. The CapX 2020 engineering analysis found that the state and surrounding region would experience numerous transmission overloads, outages, and voltage problems if no transmission additions were made.

Planning engineers then began to examine potential solutions to the system overloads. The performance of the transmission system depends not only on the size and location of the demand for power but also on the location of the generating facilities to meet that demand. After consulting with generation planners, developers, and other stakeholders on their predictions of the distribution of generation, planning engineers decided to test potential solutions using varying generation distribution solutions. They examined transmission needs if a large portion of new generation were located to the west, then primarily in Minnesota, and then with a more eastern bias. In each scenario major additions to the 345 kV network serving the area were required but the configuration of parts of the system was slightly different in the ultimate build

out of the plan. However, the three 345 kV projects that are presently under review by the Commission, along with a 230 kV line between Bemidji and Grand Rapids (Tracking Number 2005-NW-N2), were common to all of the scenarios examined.

Transmission planners foresee the need for significant additions to the high voltage network that serves Minnesota and surrounding states over the next few decades. The Vision Plan calls for a second 345 kV transmission ring around the Twin Cities metropolitan area with radial additions to large load centers, concentrations of generation, and neighboring systems. By providing a more robust network of 345 kV transmission lines, the system can continue to operate reliably while accommodating substantial growth. The three 345 kV CapX projects serve as a foundation upon which the rest of the Vision Plan can be built.

***Generation Outlet and Renewable Energy Support.*** Adding more renewable energy generation to the system has become a priority for the state. In 2007, the Minnesota Legislature established new Renewable Energy Standards requiring electricity providers to supply 25% of retail energy in Minnesota from renewable energy sources by 2025 (with interim milestones), and 30% by 2020 in the case of Northern States Power Company because it owns two nuclear generating facilities. Minnesota Laws 2007, chapter 3 (Renewable Energy Act). These renewable milestones and goals will further increase the pressure on the transmission system. For example, if all the recent legislative mandates are met with added wind energy generation, the renewable energy portfolio of the state's energy providers will increase by more than 5,000 MW by 2025, creating the need for additional transmission infrastructure to deliver that energy to Minnesota's consumers.

In passing the new Renewable Energy Act, the Legislature was aware of the CapX 2020 initiative, as CapX 2020 participants presented the Vision Plan to legislators. The generation resource analyses supporting the new law presumed a transmission system that was substantially enhanced beyond what exists today.

The CapX 2020 study process was not designed to analyze all of the transmission improvements needed to bring another 5,000 MW of renewable energy generation on line. New study work is underway to update the Vision plan through the year 2025 to include integrating the large amounts of wind based generation expected to meet Minnesota's renewable energy policy goals along with the community service reliability and growing system wide demand. But regardless of how the system might ultimately be configured, the three 345 kV projects that Applicants propose are a necessary and foundational step toward not only meeting Minnesota's renewable energy policy goals, including interim milestones in 2012 and 2016, but also addressing community reliability concerns and system wide load growth.

The Twin Cities – Brookings County 345 kV Project will allow wind farm development to continue along Buffalo Ridge in southwestern Minnesota and eastern South Dakota. It will open up parts of the Ridge that currently do not have adequate transmission support, and it will provide outlet capacity to support approximately 1,900 MW in the area. By the end of 2007 there will be just over 900 MW of wind farm generation operating near or on the Ridge. Wind developers have made applications to the Midwest ISO to connect 14,000 MW of additional generation in the area by 2014.

The Twin Cities - Fargo 345 kV line will increase the amount of generation that can be supported in northwestern Minnesota and North Dakota, areas with rich wind resources. The Twin Cities – LaCrosse line will help to reduce system constraints in the Rochester area and set the stage for future increases in the Minnesota – Wisconsin Stability Interface (Tracking Number 2003-TC-N13) and future capability for wind outlet. Once these three projects are constructed, they will become part of the network of 345 kV transmission lines that serve as the bulk power transport system that will allow generation development to continue.

The Midwest ISO is investigating a regional vision that would overlay a 765 kV network across a large portion of the eastern interconnect. With more states enacting renewable energy standards, combined with the fact that the upper Midwest contains some of the nation’s most reliable wind resource, it is foreseeable that much of the energy needed to fulfill these other states’ standards will come from Minnesota and the Dakotas. The Minnesota utilities have considered the impacts of such a vision. In order for such an overlay plan to be interconnected with the existing transmission grid, a strong 345 kV system will be needed to move the power to and from the 765 kV system. Therefore, a key first step to a successful 765 kV overlay is the existence of a robust 345 kV network. In addition to feeding load in the Twin Cities, the 345 kV network would also be used as a regional collector system to allow generation to be gathered and delivered to other utilities to fulfill their RES standards along with the present objectives. Whether or not the 765 kV vision comes to fruition, the 345 kV projects being envisioned by the CapX 2020 utilities are the right step to meeting Minnesota’s energy needs.

The following table summarizes the details about the three 345kV CapX 2020 Projects

### Project Specifics

	<b>Approximate Total Length</b>	<b>Approximate Cost (in 2007 \$)</b>	<b>Approximate In-Service Dates</b>
Twin Cities – La Crosse	150 Miles	\$330 to \$360 Million	North Rochester – Northern Hills 161 kV 2011 North Rochester – La Cross 2014 Remainder 2015
Twin Cities – Fargo	250 Miles	\$390 to \$560 Million	Monticello – St. Cloud 2011 St. Cloud – Alexandria 2013 Remainder 2015
Twin Cities – Brookings County	200 Miles	\$600 to \$665 Million	Brookings County – Helena 2013 Helena – Hampton Corner 2014

**Underlying Facilities.** As part of the development of the proposals in the Certificate of Need Application, preliminary analysis of the performance of the underlying transmission system was done to identify which lower voltage circuits may be overloaded with the addition of the new facilities. Planning engineers using computer simulations with year 2012 system parameters identified numerous lower voltage circuits that could be overloaded in some circumstances. In most cases, Applicants anticipate the best solution will be to replace conductors on the circuit

with higher capacity conductors while continuing to operate at the same voltage. A list of the identified improvements is included in the table below. More detailed engineering analysis and design will have to be done to verify preliminary results and to design cost effective solutions.

### Underlying Facilities

Overloaded Facility	Line or Sub	Voltage	Units (either mileage or count of equipment)
Stoughton Muni – Stoughton 69 kV 1	L	69	1
Sun Prairie South – Colorado 69 kV 1	L	69	4
Creston – Summit Lake North 69 kV	L	69	4
Ottumwa - South Ottumwa 69 kV	L	69	4
Summit Lake North – Summit Lake South 69 kV	L	69	1
Hayward – South Shore 69 kV 1	L	69	4
Thompson Lake – Remmele 69 kV	L	69	6
Crystal Tap – Arlington 69 kV	L	69	7
Crystal Tap – Gaylord 69 kV	L	69	1
Fort Ridgely – Schilling Tap 69 kV	L	69	1
Gaylord – Heartland 69 kV	L	69	6
Winthrop – Cornish 69 kV	L	69	3
Winthrop – Heartland 69 kV	L	69	1
Sauk River – Quarry 115 kV	L	115	1
Sauk River – West Saint Cloud 115 kV	L	115	1
Burnsville – Dakota Heights 115 kV	L	115	7
Dakota Heights – Kenrick 115 kV	L	115	5
Lake Marion – Kenrick 115 kV	L	115	4
Sheyenne – Fargo 230 kV	L	230	4
Blue Lake – Helena Switching Station 345 kV	L	345	25
Council Creek 138/69 kV transformer 1	S		1
Petenwell 138/69 kV transformer 1	S		1
Elk 161/69 kV transformer 2	S		1
Lansing 161/69 kV transformer	S		1
Hazleton 161/69 kV transformer	S		1
Hayward 161/69 kV transformer	S		1
Post 161/69 kV transformer	S		1
Lake Marion 115/69 kV transformer 2	S		1
Maple River 345/230 kV transformers 1 and 2	S		1
Franklin 115/69 kV transformer 1	S		1
Franklin 115/69 kV transformer 2	S		1
Monroe Co, 161/69 kV transformer	S		1
Morris 230/115 kV transformer	S		1

**Public Involvement.** The CapX 2020 utilities began the Certificate of Need process in 2006 when they filed proposed Notice Plans with the Public Utilities Commission. These plans have been approved with slight modifications. The utilities have undertaken significant efforts to advise the general public and affected landowners of the pending projects and of likely corridors for the lines. In summer 2007, two separate mailings were sent to more than 70,000 individual



landowners and ads were placed in local newspapers across the state about the proposed lines and upcoming public meetings. The CapX 2020 utilities hosted 24 public meetings on the three proposed 345 kV projects in September and October, and they participated in the 2007 annual public zonal meetings that the Minnesota Transmission Owners held in September as part of the biennial report process (see Section 4 of this Report).

More public meetings and hearings, including Department of Commerce environmental scoping meetings to be held in December 2007, will be upcoming as the Public Utilities Commission proceeds in 2008 with consideration of the Certificate of Need application and later with Route Permit applications.

## 5.4 The 230 kV Bemidji – Grand Rapids Project

**Tracking Number.** This project was discussed in the 2005 Biennial Report in the NW Zone section under the name Boswell-Wilton and is continued in this Report under Tracking Number 2005-NW-N2.

**Utilities.** The 230 kV Bemidji-Grand Rapids project is a joint effort by Minnesota Power, Otter Tail Power Company, and Minnkota Power Cooperative (the “Utilities”).

**Project Need.** The need for the Bemidji-Grand Rapids project is two-fold. First, the transmission system in the Bemidji area has specific voltage stability deficiencies that this line will alleviate. Second, the Bemidji-Grand Rapids project, together with the 345 kV Twin Cities-Fargo Line (2005-CX-1), will ensure adequate transmission capacity to handle the expected increase in load in the Bemidji and the Red River Valley areas over the next 15 years.

**Analysis.** Throughout 2006 and 2007, the Utilities engaged in a number of studies to refine the analyses of the Bemidji-Grand Rapids Line. An update of the 2002 TIPS analysis (2006 TIPS Update) assessed the combined impact of the Bemidji-Grand Rapids Line in the northern Red River Valley and the Twin Cities-Fargo Line in the southern Red River Valley, confirming these were the best transmission options for the Red River Valley region as a whole. The Utilities also studied a number of transmission options to address the specific voltage stability issues and load serving deficiencies in the Bemidji area. These studies confirmed that the proposed line is the most effective and efficient transmission alternative to remedy the voltage stability issues in the Bemidji area and electrical demand growth issues in the Bemidji area and northern Red River Valley.

**Certificate of Need Application.** The Utilities intend to file an application for a Certificate of Need for this new line and associated system connections in late 2007 or early 2008.

**Routing.** This line will be located in both the Northwest and Northeast Transmission Planning Zones. The Utilities have identified three corridors in which the line could be located and are still in the process of analyzing them. However, the Utilities consider the likely corridor to be the one that begins at the 230 kV Wilton Substation located just west of Bemidji, Minnesota (jointly owned by Otter Tail Power and Minnkota Power) and runs approximately 68 miles east to Minnesota Power’s 230 kV Boswell Substation in Cohasset, Minnesota, northwest of Grand Rapids, Minnesota. This “Central Corridor” is the shortest one between Bemidji and Grand

Rapids and has considerable existing rights-of-way along which the line can be routed. The Utilities intend to file a route application for this line in early 2008.

***Public Involvement.*** Minnesota Power, Otter Tail Power and Minnkota Power have undertaken significant efforts to advise local governmental officials, federal agencies, the Leech Lake Band, the general public and affected landowners of the pending project and of likely corridors and routes for the line. In June and October 2007 the Utilities held a series of public meetings in Bemidji, Cass Lake, and Cohasset. Two separate mailings were sent to individual landowners to inform them of these public meetings. In addition, the Utilities have had numerous meetings with the Leech Lake Band's Local Indian Councils and regular meetings with state, federal and tribal agencies including the Minnesota DNR, the U.S. Forest Service, and Leech Lake Band Department of Resource Management. In addition, information about this proposed line was made available at the 2007 public zonal meetings.