BRIGGS
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March 10, 2008

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VIA E-MAIL ONLY

Michael Michaud
Matrix Energy Solutions
802 North Pine Creek Road
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Re: In the Matter for the Application of Great River Energy, Northern States Power Company (d/b/a Xcel Energy) and Others for Certificates of Need for the CapX 345-kV Transmission Projects
Docket No. ET-2, E-002, *et al.*/CN-06-1115
OAH Docket No. 15-2500-19350-2

Dear Mr. Michaud:

Attached and served upon you is Applicants' response to North American Water Office & Institute for Local Self Reliance ("NAWO/ILSR") Information Request Nos. 2 - 6.

Per the First Prehearing Order in the above-referenced matter, this response is being served by e-mail only.

Sincerely,

Lisa M. Agrimonti

LMA/lml
Enclosures
cc: George Crocker via email
John Bailey via email
LundbergChurch via email
Department of Commerce/ A. Hofschulte via email
WOW/ Elizabeth Goodpaster via email

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Xcel Energy
Docket No.: E002, ET2/CN-06-1115
Response To: George Crocker NAWO/ILSR
Information Request No. 2
Date Received: February 13, 2008

Question:

One of the stated purposes of the CAPX Projects is to provide transmission outlet capacity for new renewable energy generation capacity. On a per line basis, what percentage of the cost of each line of the project can be allocated to generation outlet capacity? Include the cost of any necessary lower voltage facilities as a separate item.

How many megawatts of new renewable energy generation capacity will each line provide outlet transmission capacity for?

Please provide the assumptions, data, and calculations used to determine these costs and the number of megawatts.

Response:

The first part of the request seeks information about each transmission line and the "percentage of the cost of each line of the project [that] can be allocated to generation outlet capacity." This information is not available. In developing cost estimates for transmission projects, utilities do not assign percentages of costs to parts of a project based on each type of benefit to be achieved, *e.g.*, reliability, load serving or generation outlet capability.

The second part of the request asks for a calculation of how much "renewable energy generation capacity" each transmission line will provide. The answer to this question is unknown at this time and cannot be determined until prospective generators complete the Midwest Independent Transmission System Operator, Inc. ("MISO") interconnection and transmission queuing processes to obtain service. MISO is obligated to implement the MISO Transmission and Energy Markets Tariff on a first come, first served, non-discriminatory basis and cannot favor one type of power producer over another.

In the Application, Xcel Energy and Great River Energy provided information about the potential generation outlet capability that would be achieved by the CapX2020 proposals. More specifically, the Application states that the Twin Cities – Brookings County 345 kV Project was expected to increase generation outlet capability on the Buffalo Ridge to approximately the 1,900 MW level. The Application also noted that the TIPS Update states that the addition of the Twin Cities – Fargo 345 kV line would likely result in the ability to transfer some 350 MW of additional power across the North Dakota export boundary. Until MISO determines which generators can interconnect, no one will know how much of this new capacity will be consumed by generators using renewable fuel sources.

Given the information provided above, no response is provided for the third part of the request.

Response By: Daniel Kline
Title: Transmission Planning Engineer
Department: Transmission Reliability and Assessment
Company: Xcel Energy
Telephone: 612-330-7547
Date: March 10, 2008

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Xcel Energy
Docket No.: E002, ET2/CN-06-1115
Response To: George Crocker NAWO/ILSR
Information Request No. 3
Date Received: February 13, 2008

Question:

One of the stated purposes of the CAPX Projects is to provide reliability to the interconnected system. On a per line basis, what percentage of the cost of the project can be allocated to reliability? Include the cost of any necessary lower voltage facilities as a separate item.

Please provide the assumptions, data and calculations used to determine these costs.

Response:

This information is not available. In developing cost estimates for transmission projects, utilities do not assign percentages of costs to parts of a project based on each type of benefit to be achieved, *e.g.*, reliability, load serving or generation outlet capability.

Response By: Daniel Kline
Title: Transmission Planning Engineer
Department: Transmission Reliability and Assessment
Company: Xcel Energy
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Date: March 10, 2008

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Xcel Energy
Docket No.: E002, ET2/CN-06-1115
Response To: George Crocker NAWO/ILSR Information Request No. 4
Date Received: February 13, 2008

Question:

One of the stated purposes of the CAPX Projects is to provide for load growth. On a per line basis what percentage of the cost of the project can be allocated to local growth? Include the cost of necessary lower voltage facilities as a separate item.

Please provide the assumptions, data and calculations used to determine these costs.

Response:

This information is not available. In developing cost estimates for transmission projects, utilities do not assign percentages of costs to parts of a project based on each type of benefit to be achieved, *e.g.*, reliability, load serving or generation outlet capability.

Response By: Daniel Kline
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Xcel Energy
Docket No.: E002, ET2/CN-06-1115
Response To: George Crocker NAWO/ILSR
Information Request No. 5
Date Received: February 13, 2008

Question:

The Bonneville Power Administration is using aluminum shunts, which are strands of aluminum added to a transmission line that provides another path for current to travel through to relieve strain on key line components, to allow transmission lines to carry more electricity capacity while also meeting more stringent outage standards. BPA said it was able to increase the amperage on one of its major 230-kV lines at far less cost than rebuilding and replacing existing equipment. [More information at http://www.piersystem.com/go/doc/1582/186166/]

Have the CAPX2020 utilities investigated using aluminum shunts as an alternative to replace or delay the need for the proposed CAPX2020 lines? Describe the outcome of the investigation in relation to each of the three lines and each of the three claimed categories of need.

If not, can the applicants please explain why this alternative is not viable for consideration to meet the claimed needs? If this alternative is viable describe the expected value of this technology in relation to each of the three 345-kV lines and each of the three claimed categories of need.

Response:

When conductors are spliced together along a transmission line, compression connectors are used. In some cases, the MVA capacity of the compression connectors is lower than the MVA capacity of the line. As a result, the capacity of such a line is limited by the capacity of the splice.

Aluminum shunts are used to increase the capacity of the spliced areas, which allows the line to reach its full MVA capacity. As applied here, shunts are aluminum wires that attach to the conductor and stretch across the compression connector, essentially creating a bypass where additional current can flow on the line. When aluminum

shunts are used, poles often need to be raised or rebuilt to increase ground clearance. The higher flows and increased conductor temperatures that result from allowing more current through the line will cause the line to sag more than its initial design allows.

Generally speaking, this technique is not viable to replace or delay the need for the three 345 kV Projects. With the exception of some older lines, transmission lines in the state of Minnesota are designed to use the full capacity of the conductor and are not limited by the compression connector or any other hardware used in construction of the line.

In addition, even if the capacity of a particular line were limited by the capacity of a compression connector, aluminum shunt installations would not eliminate the need for the proposed facilities.

In the case of the Twin Cities – Fargo 345 kV line, the need drivers in two of the benefit areas (southern Red River Valley and Alexandria area) are voltage-based and not related to the current-carrying capacity of transmission lines in the area. Because the critical contingencies in these areas result in low voltage, a solution such as this one that does not result in lower impedance (and, thus, more efficient delivery of power) to an area will not postpone the need for additional support in those areas. Additionally, in the St. Cloud area, the critical contingency is the loss of the Benton County – Granite City 115 kV double-circuit line. When this contingency occurs, the power for the area is forced to be delivered via the Monticello – St. Cloud 115 kV line. This line was rebuilt within the last five years. Because it is such new construction, it would have been designed such that its thermal capacity would be limited by the capacity of the wire and not any of the hardware used to support it. As such, bypassing the compression connectors on this line would not result in any increase in its capacity.

A primary focus of the Twin Cities – Brookings County 345 kV Project is generation outlet capacity. As generation is added in southwest Minnesota, there are more thermal limits that are observed, but these thermal limits are generally the limits of the conductors, not the limits of the compression connectors. For example, one of the greatest limiters to increasing outlet capacity is the Minnesota Valley – Blue Lake 230 kV line. This line becomes overloaded when certain generation levels are reached. The capacity of this line is not, however, limited by its compression connectors. The conductor is capable of being operated at the full rating of its conductor, meaning that installing shunts on its compression connectors would not yield any increase in the capacity of the line.

The need for the Twin Cities – La Crosse 345 kV Project is driven primarily by the growing community power demands needed for regional electrical system support, as well as strengthening the reliability of the Southeast portion of Minnesota with another strong 345 kV source. Similarly to the Fargo discussion above, the lines which are forced to deliver the power under contingency situations for Rochester and La Crosse are designed such that its thermal capacity would be limited by the capacity of the wire and not any of the hardware used to support it. As such, bypassing the compression connectors on this line would not result in any increase in its capacity.

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Response By:	Amanda King
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Company:	Xcel Energy
Telephone:	612-330-5931
Date:	March 10, 2008

Response By:	Jared Alholinna
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Department:	Transmission Planning, Contracts & Strategy
Company:	Great River Energy
Telephone:	763-241-5797
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Xcel Energy
Docket No.: E002, ET2/CN-06-1115
Response To: George Crocker NAWO/ILSR
Information Request No. 6
Date Received: February 13, 2008

Question:

Recently 3M has developed an Aluminum Conductor Composite Reinforced (ACCR) wire for use in transmission applications. See: http://solutions.3m.com/wps/portal/3M/en_US/EMD_ACCR/ACCR_Home/

Have the CAPX2020 utilities investigated using this ACCR wire as an alternative to replace or delay the need for the proposed CAPX2020 lines? Describe the outcome of the investigation in relation to each of the three lines and each of the three claimed categories of need.

If not, can the applicants please explain why this alternative is not viable for consideration to meet the claimed needs? If this alternative is viable describe the expected value of this technology in relation to each of the three 345 kV lines and each of the three claimed categories of need.

Response:

The predominant types of conductor used on the regional transmission system are Aluminum Core Steel Reinforced ("ACSR") and Aluminum Steel Supported ("ACSS"). There are, however, some instances where the 3M, ACCR conductor is being used (*e.g.*, Black Dog – Blue Lake 115 kV line).

The capacity of the ACCR conductor is greater than the capacity of the ACSR and ACSS conductors, however, the impedance characteristics of all three types of conductor are similar. On average, the ACCR conductor costs approximately four to eight times more than the ACSS conductor that is proposed for the three 345 kV Projects.

Reconductoring, using the ACCR conductor or any other type of conductor, is an improvement that can address overloads on individual lines. Typically by installing new conductors, the capacity of a line can be increased 20 to 50 percent. Planning

engineers have concluded that reconductoring is not a means for addressing the generation outlet capability and increased local and regional reliability needs identified in the Application.

In the case of the Twin Cities – Fargo 345 kV line, the reliability of the electrical system in the southern Red River Valley and Alexandria areas is compromised due to low voltage during certain critical contingencies. To improve voltages, additional power flow capability (*i.e.*, lower impedance on the existing ACSR and ACSS transmission lines) is needed. Replacing existing conductors with ACCR could improve individual line performance, but would not reduce the impedance of the transmission system in the area. As a result, there would be no increase in the system's injection capability and no improvement to low voltages would be recognized. To reduce the impedance of the transmission system serving the south Red River Valley and Alexandria areas, additional high voltage transmission facilities must be constructed.

Similarly, with respect to the Twin Cities – Brookings County 345 kV Project, reconductoring is not a viable option. As noted in the Application, the reconductoring strategy for improving outlet capability was largely exhausted with the Buffalo Ridge Incremental Generation Outlet ("BRIGO") study development. Application, Section 5.3. As more generation is added to the system in southwest Minnesota, there are more thermal (overload) limits on the existing transmission grid that are observed. The ACCR conductor could be utilized to relieve the overloading on a particular line or a series of lines but would not improve the overall capability of the system. Lower grid impedances are necessary to accommodate the transmission of large amounts of power over long distances. To improve the power flows, additional transmission facilities are needed.

Similarly, with respect to the Twin Cities – La Crosse 345 kV Project, reconductoring is not a viable option. As discussed in the Application, the system in La Crosse is beginning to experience low system voltages, only correctable by running expensive generation in advance of any contingencies. To improve voltages, additional power flow capability additional high voltage transmission facilities must be constructed. Replacing existing conductors with ACRR could improve individual line performance, but would not reduce the impedance and therefore no improvement to low voltages would be recognized. To reduce the impedance on existing transmission lines, additional high voltage transmission facilities must be constructed bringing a new 345 kV source to both the Rochester and La Crosse areas.

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