



Zone 2 - 2011 study results

Refer to [Table ZS-1](#) and [Figure ZS-5](#)

Summary of key findings

- ❑ Low voltages throughout the Newberry area under contingency necessitate a project to transfer load off of line 6911,
- ❑ Maintaining reliability of service to load in and around the Escanaba area requires that system reinforcements be implemented in the near term, and
- ❑ High voltages and power flow in the eastern U.P. necessitate the need for system reinforcements in the near term.

There were a number of facility overloads and several facilities near their emergency ratings in Zone 2 based on the 2011 analysis. Many projects are either planned or proposed to address these near-term thermal problems by 2013. As a result, we propose the uprate of three 69-kV lines and two 138-kV lines. In addition, to address low voltages under contingency, two 8.0 MVAR capacitor banks will be installed at the Indian Lake Substation in 2010.

Eastern U.P.

High voltages have been experienced on an intact system in real time in the eastern U.P. The high voltages usually occur at lighter load levels. The primary sources are the Straits-McGulpin 138-kV submarine cables, which are significant reactive power sources (13 MVAR each) and act like capacitor banks which raise system voltages. To mitigate this operating limitation in the near term, two 13.8-kV reactors (total 25 MVAR) are proposed to be installed at the Straits Substation in late 2010.

Large market power flows through the eastern U.P. of Michigan result in inadequate voltage and loading performances, increased system losses, and high Locational Marginal Prices (LMPs) for local power purchases. Current measures taken to address the high flows include generation redispatch to adjust power flows and/or a manual split the U.P. system to eliminate the flows through the U.P. In order to eliminate these flow limitations, ATC is anticipating the use of flow control devices. One alternative being considered is back-to-back HVDC controls connected in series with the Straits-McGulpin 138-kV lines (9901/9903) for installation around the year 2014.

Power flow control in the eastern U.P. will adjust flows to more manageable levels and allow more economic dispatch of market generation due to the elimination of congestion, reduction of system losses, improved power quality and an increase in reliability of service for local customers, and more efficient scheduling of maintenance work. Further study is required to determine the best solution to control the flow of power into the eastern U.P.



In conjunction with the eastern U.P. power flow control, a project is being considered to energize the second circuit of the Hiawatha-Indian Lake line at 138 kV in the 2014 timeframe. This line energization project is contingent going forward with the eastern U.P. power flow control project. The Hiawatha-Indian Lake 138-kV project will increase the effectiveness of and help optimize the power flow control project. It will enhance reliability by relieving voltage limitations and by minimizing the need to operate area lines radially over an even greater range of daily system flows.

Escanaba area

As part of the ATC Energy Collaborative – Michigan, several projects were identified to address system issues in the Escanaba area:

- Install a second Chandler 138/69-kV transformer (2012),
- Construct Chandler-18th Road double-circuit 138-kV lines (2014), and
- Install Arnold 345/138-kV transformer (2015).

In addition, since the publication of the 2009 10-Year Assessment, some additional projects have been identified in order to address Escanaba area limitations:

- Install Delta 69-kV bus tie breaker (2011), and
- Replace five 69-kV breakers at Delta Substation (2012).

These Escanaba area projects were identified as a result of the analyses of several potential futures, which indicated low voltages and overloaded facilities throughout the 69-kV system in central Delta County. These projects also address System Operations and Asset Renewal limitations. There are numerous System Operations needs associated with the Escanaba area driven by outage coordination issues that make maintenance work very difficult and/or expensive to perform. In addition, there are local issues associated with the lack of generation availability and/or possible network transmission service additions.

The solution development process utilized in the ATC Energy Collaborative – Michigan, in addition to our ongoing studies, identified the above Escanaba area solutions to address various limitations based upon ATC's Planning criteria.

Munising/Newberry area

As part of the ATC Energy Collaborative – Michigan, an uprate of the Munising-Blaney Park 69-kV line was identified to address Asset Renewal, System Operations, and network system issues in 2014. In addition to this project, a second Gwinn-Forsyth 69-kV line was identified to address future area limitations. These projects will address low voltages and overloaded facilities throughout the Munising/Newberry area.



10-Year Assessment

An annual report summarizing proposed additions and expansions to the transmission system to ensure electric system reliability.

2010

September 2010 10-Year Assessment
www.atc10yearplan.com

Since the publication of ATC's 2009 10-Year Assessment, one additional project has been identified in order to address Munising area limitations:

- Engadine load move project
 - A facility outage of the Hiawatha-Engadine 69-kV line situates the Engadine load at the end of a long radial feed and causes the voltage criteria on the Newberry area 69-kV buses to be exceeded, and
 - This project will address these low voltages under low generation and single contingency conditions.

The solution development process utilized in the ATC Energy Collaborative – Michigan, in addition to ongoing studies, identified the above Munising/Newberry area solutions to address various Planning needs as well as the asset renewal and System Operations concerns.

Western area

As part of the ATC Energy Collaborative – Michigan, an uprate and minimum asset renewal of the Atlantic69 line is scheduled for completion in the 2014 timeframe. This project will address low voltages, overloaded facilities and facility condition throughout the Western area.

Projects whose "Need date" precedes the "In-service date"

- None

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- None

Please note that more information is presented fully in the ATC Energy Collaborative - Michigan section. This section presents a strategic flexibility approach to the multiple factors emerging across the U.P. and the status of current studies.