



## Zone 3 - 2014 study results

Refer to [Table ZS-2](#) and [Figure ZS-10](#)

### Summary of key findings

- ❑ The numerous low voltages and line overloads along with the potential for voltage collapse in the Madison area signal the need for another new 345-kV source on the west side of Madison.
- ❑ Significant load growth in the Rock and Green Counties, along with the mismatch of load to generation in the area, will result in the Monroe area 69-kV network being subjected to unacceptably low voltages and thermal overloads under both normal and contingency conditions in the summer of 2011. Rebuilding the 69-kV line Y-33 from Brodhead to South Monroe will address these issues.
- ❑ Load growth in Green County, west of Rock County and south of Dane County requires one additional 138-kV source into the area. Adding Bass Creek 138/69-kV transformation will address a number of potential low voltage problems and transformer overloads.
- ❑ As a result of the recent completion of the Rock River-Elkhorn 138-kV conversion project, it is feasible to uprate/rebuild the existing Colley Road-Brick Church 69-kV line for both reliability and maintenance needs.
- ❑ Potential thermal overloads and low voltage issues on the Fitchburg-Royster 69-kV line will require system reinforcements.

In response to low voltages in certain Zone 3 areas, a total of 165 MVAR of capacitor banks distributed at the Brick Church, Femrite and Verona substations in the 2011-2014 timeframe were proposed as preliminary solutions.

There were a number of facility overloads and several facilities near their emergency ratings in Zone 3 based on the 2014 analysis. Several projects are either planned or proposed to address these near-term thermal problems. As a result, we propose to uprate two 69-kV lines (Sheepskin-Dana line Y-61 and McCue-Milton Lawns Y-79). In addition, the Verona-Oregon 69-kV line and part of the Colley Road-Brick Church 69-kV line will be rebuilt due to reliability and condition issues (refer to [Zone 3 2010 study results](#)).

The Rockdale-West Middleton 345-kV line will address line overloads and low voltage issues in Dane County and is planned to be in-service in 2013. Demand in Dane County is projected to grow at an above-average rate for the ATC system. Above-average growth in demand coupled with potential generation retirements, concerns about the age, high cost, and limited amount of remaining generator capacity, and stress on the transmission lines that are critical for importing power to Dane County will continue to increase. By the end of 2011 Madison Gas and Electric (MGE) has plans to stop burning coal at the Blount Power Plant and MGE intended to retire units 3, 4 and 5 at the same time. However, due to reliability needs, the Midwest ISO is requiring that MGE defer retirement of these units, which would reduce the capacity of this power plant by 90 megawatts, until after the Rockdale-West Middleton 345kV line project is implemented. The remaining two units at Blount will remain in service and will use natural gas as the primary fuel.



# 10-Year Assessment

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2009

October 2009 10-Year Assessment  
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Significant load growth in the Rock and Green Counties, along with the mismatch of load to generation in the area, will result in unacceptable low voltages in the Monroe area. Under several single contingency conditions, thermal overloads also arise on the 69-kV line Y-33 sections Brodhead-Spring Grove, Spring Grove-Blacksmith, and Blacksmith-South Monroe. The preferred solution to address these issues is to rebuild the Brodhead-South Monroe 69-kV line (Y-33) using 138-kV construction standards and initially operate the line at 69 kV.

The Evansville and Brodhead areas are facing unacceptably low voltages under single contingency conditions. In addition, the North Monroe 138/69-kV transformer loading is approaching to its summer normal rating under system intact conditions. In conjunction with the rebuild of line Y-33 from Brodhead to South Monroe (2011), a new Bass Creek 138/69-kV transformer and the Townline Road–Bass Creek 138-kV line uprate in 2013 will address these problems and provide one additional 138-kV source into Green and Rock County. This project will also allow us to delay a new Brooklyn to Evansville 69-kV line project outside of our 10-year planning horizon.

The Fitchburg to Royster 69-kV line is susceptible to thermal overloads and the area experiences low voltages at Syene, Nine Springs, and Pflaum for loss of either end of the line. Looping the Nine Springs to Pflaum 69-kV line in and out of the Femrite Substation was proposed to address these issues. However, due to the project schedule constraints and Femrite substation constraints, it has been replaced by uprating Fitchburg-Nine Springs and Royster-Pflaum 69-kV lines, moving AGA to Femrite-Royster line and installing capacitor banks at the Nine Springs Substation.

A portion of the 69-kV Dane-Dam Heights line Y-8 will be rebuilt in the year 2012 as a part of an asset renewal project that addresses first contingency overloads in the year 2015. To address thermal overloads, the rating of the Portage-Trienda 138-kV line will be increased in 2016.

In addition, the withdrawal of the Nelson Dewey third generator and its associated transmission projects does not cause significant impact on the transmission system in Zone 3. Based on generation merit order in Alliant's control area, the dispatch scenario without the Nelson Dewey third generator facilitates a reduction of thermal loads on the following lines and transformers:

- McCue-Sheepskin 69-kV line,
- Stoughton-Sheepskin 69-kV line,
- Gran Grae-Boscobel 69-kV line,
- Spring Green 138/69-kV transformer, and the
- Hillman 138/69-kV transformer.

It has also been observed that the West Middleton-Stage Coach 69-kV line loading increases when the Nelson Dewey third generator is not in the model.

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

- Rebuild the Y-119 Verona-Oregon 69-kV line*  
The need year is listed as 2008. The in-service year is 2011. Distribution load shifting at Stoughton will eliminate potential system violations in the 2008-2010 timeframe.
- Bass Creek transformer and uprate Town Line Road-Bass Creek 138-kV line X-12*



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The need year is listed as 2010. The in-service year is 2013. Mitigation measures for the potential 2010-2012 system violations include installing a 5.7 MVAR distribution capacitor bank at the Union Townline 69-kV Substation (2009) and upgrading the existing Sheepskin capacitor bank from 10.8 MVAR to 16.2 MVAR (2009).

- ❑ *Uprate Fitchburg-Nine Springs and Royster-Pflaum 69-kV lines, move AGA to the Femrite-Royster 69-kV line and install Nine Springs capacitor bank*

The need year is listed as 2006. The in-service year is 2013. Post-contingency distribution load bridging will be utilized as an interim mitigation measure to alleviate potential single-contingency thermal and voltage issues.

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

As a result of in-service date flexibility, project cost saving and corresponding alignment with other ATC project needs, the following projects will be in service prior to the need date. Additionally, the projects listed below are asterisked in the Annual Project Tables.

- ❑ Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating
- ❑ Rebuild part of the Y-8 Dane-Dam Heights 69-kV line

Our asset renewal team initially identified 116 structures on the Gran Grae-Boscobel line to be replaced due to various maintenance issues. Based on the Y-40 thermal rating analysis, it was determined that the additional scope for uprating the line from 200 degrees F to 300 degrees F would be to replace an additional 19 structures. It makes sense to combine this uprate with the previously identified maintenance project because these structures are very close to the previously identified poles. There are significant cost savings that can be obtained from performing the additional work as part of the maintenance project rather than completing the work as a separate future project.