



Zone 4 – 2021 study results

Refer to Table ZS-3 and Figure ZS-15

Summary of key findings

- Zone 4 is an active study area for potential wind generation additions,
- The updated load forecasts have resulted in the deferral of several projects identified in prior 10-Year Assessments,
- Additional reinforcements may be needed in the Manitowoc and eastern Calumet County areas, and
- Additional reinforcements may be needed in Northern Door County to facilitate maintenance outages and improve system intact as well as voltages under contingency conditions.
- The load forecasts have resulted in the deferral or absence of system performance issues identified in prior 10-Year Assessments.

The Sunset Point – Pearl Avenue 69-kV line continues to overload and the magnitude of the overload continues to increase in the 2021 summer peak models. The current in-service date for this reinforcement project is April 2012. Once complete, the limitation will be addressed. See Zone 4 – 2012 study results section for additional details.

A new limitation appeared in the 2021 analysis, the Glenview – Gravesville 69-kV circuit overloads for various contingencies. The ratings of this circuit were reduced in 2010 as a result of a Line Rating Study conducted by ATC. The result of this study was to develop a small Asset Renewal project to increase the conductor clearances to restore circuit ratings to an acceptable level. This project was completed in April 2011, thus the limitation can now be considered addressed.

There is an impending overload of the Manrap – Custer 69-kV circuit under single contingency conditions. A current project to address off-peak periods with certain generation patterns is currently proposed for a 2022 in-service date. This project may also address the Manrap – Custer loading issue. See Zone 4 – 2026 study results section for additional details of this project. Additional study of this impending overload will be needed to determine what mitigation measures are available or what potential reinforcements may be needed.

The proposed long-term solutions for northern Door County include implementing reinforcements in two phases. The first phase included implementing the Canal – Dunn Road 138 kV project with a planned in-service date of June 2012. The first phase is assumed complete in the base case model. The second phase includes adding a second 69-kV line between the Dunn Road and Egg Harbor substations. This is a provisional



project pending the Best Value Planning process to determine how best to support maintenance outages, voltages and radial loads served by the Egg Harbor and Sister Bay substations.

Point Beach generation upgrades

NextEra has submitted requests to the MISO to increase the output of both of their generation units at the Point Beach Nuclear Plant (MISO queue positions G833, G834, J022 & J023). ATC completed the reliability assessment of the proposed changes in October 2009. This assessment is performed to ensure that the generators can be operated without stability limitations and the output of the generators can be delivered to the MISO market reliably. This assessment showed that the additional output from these generating units will result in overloads and system instability if the transmission system in this area is not reinforced.

The proposed reinforcements identified by the reliability assessment include the following transmission projects:

- Construct a new 345-kV switching station (tentatively named Birch River) near the northern intersection of the Point Beach – Sheboygan Energy Center 345-kV circuit and the Forest Junction – Howards Grove 138-kV circuit,
- Construct a new 345/138-kV substation (tentatively named Barnhart) near the intersection of the Edgewater – South Fond du Lac 345-kV circuit and the Howards Grove – Holland 138-kV circuit,
- Convert the existing double circuit line (345-kV and 138-kV) between Forest Junction and the new Birch River Switching Station and between the new Birch River and Barnhart substations to double circuit 345-kV lines, and
- To keep the existing Plymouth and Howards Grove substations networked, a new 138-kV line is proposed between the new Barnhart and Erdman substations, including looping into the Plymouth and Howards Grove substations.

The scope of work described above is subject to approval by the Public Service Commission of Wisconsin and ATC is currently targeting a CPCN application submittal date of October 2012 for this project.

The scheduled in-service dates for the generator changes are spring 2011 for unit 2 and fall 2011 for unit 1 with a projected in-service date for the new 345-kV facilities described above of June 2018. Based on the in-service date difference between the proposed generator changes and the proposed 345-kV transmission line and substations, additional studies were performed to determine if any feasible projects exist for delivery of all or a portion of the generator capacity prior to the in-service date of the 345-kV projects. The interim generator interconnection studies identified the following projects that will allow the generator to operate during this interim period under certain operating limitations and



restrictions. These interim projects have all been completed and put in-service. Full generator operation, without restrictions, will not be allowed until all required 345-kV facilities are placed in service:

- Replacement of 345-kV terminal equipment at the North Appleton Substation,
- Replacement of system protection equipment on various 345-kV transmission lines at the Point Beach Substation,
- Improvements to the line conductor rating for two 345-kV transmission circuits, and
- Reconfiguration of the Kewaunee 345/138-kV Substation.(complete)

No performance limits were exceeded for Category A conditions for all 2021 analysis except the high voltage at the Kewaunee 138-kV bus in the 2021 minimum load model. The Kewaunee high voltage issue can be addressed by adjusting generation in the area.

The lead times necessary to implement the corrective plans that are scheduled for 2017 through 2021 were considered and taken into account prior to assigning an in-service date for each associated project. All of the projects scheduled for the longer term planning horizon have an “In-service date” that matches the “Need date”, except the following projects:

Projects whose “Need date” precedes the “In-service date”

- None

Projects whose “In-service date” precedes the “Need date”

- New Dunn Road – Egg Harbor 69-kV line: Past 10-Year Assessments have found reliability issues in northern Door County. These issues did not appear in the 2011 10-Year Assessment. This proposed project was retained for now until it can be determined in future 10-Year Assessments that these issues truly no longer exist.