

10-Year Transmission System Assessment

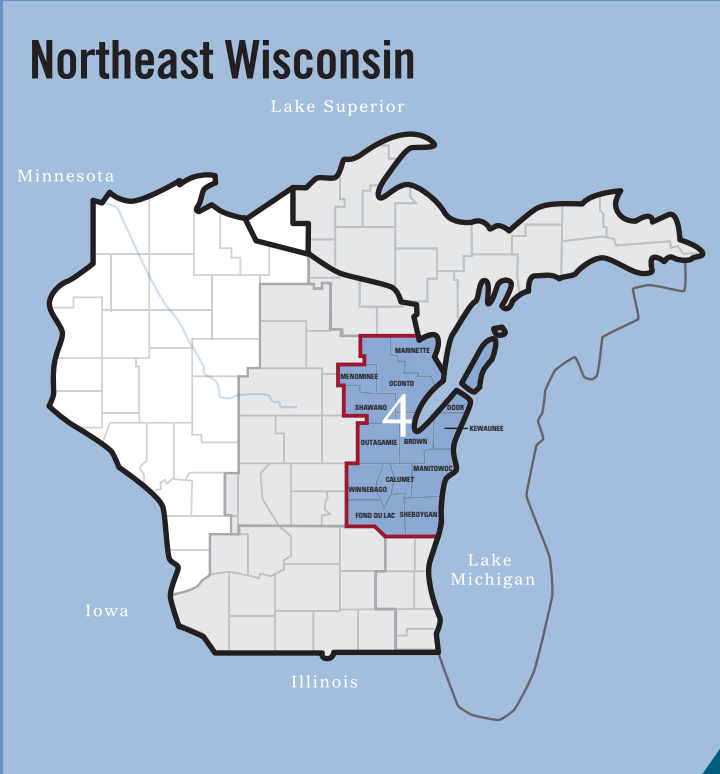
A look at electric transmission system limitations and proposed solutions for improving electric system reliability

www.atc10yearplan.com

September 2008



- BROWN**
- CALUMET**
- DODGE** (northeast corner)
- DOOR**
- FOND DU LAC** (eastern portion)
- KEWAUNEE**
- MANITOWOC**
- MARINETTE** (southern portion)
- MENOMINEE**
- OCONTO**
- OUTAGAMIE**
- SHAWANO** (eastern portion)
- SHEBOYGAN**
- WINNEBAGO** (eastern portion)



zone4



Looking at tomorrow's electric needs today

Advances in technology powered by electricity are improving our quality of life. At the same time, they've created a dependence on and expectation for an uninterrupted supply of electricity. However, the age of the transmission system and changes in the regional wholesale electricity market are impacting the reliability of the electric system upon which people and businesses have become so dependent.

American Transmission Co. was formed in 2001 to plan, permit, build, own, operate and maintain a transmission system that meets the reliability, economic and adequacy needs of our customers. Our planners continually conduct engineering studies on the electric transmission system looking for potential problems that may affect the future performance of the system.

Since 2001, ATC has produced annual assessments of the transmission system, identifying areas of need on the system and proposing solutions to those needs. This assessment covers the years 2008 through 2018. Our studies identify and prioritize future projects needed to improve system adequacy and reliability and meet evolving priorities for increased availability of renewable generation. As part of our technical studies, we take a comprehensive look at various factors affecting electricity utilization in the region, such as business development, employment trends, population and projected growth in electricity usage. We look 10 years into the future because it can take 5 to 10 years to plan, study route options, get approvals and build new transmission lines.

In this year's assessment, our studies identify and prioritize \$2.7 billion in future projects needed over the next 10 years to improve the adequacy and reliability of the electric transmission system for our customers and all electricity users in the region we serve. In this report we also identify new challenges facing the electric industry.

Clean energy objectives impact transmission planning

Concerns for climate change have caused many states, consumers and utilities to turn toward greater use of renewable generation of electricity, such as wind, solar, biomass or hydro power. With renewable resources often being located in remote locations, new interstate high voltage transmission lines will be needed to deliver large volumes of renewable

energy from where it's produced to population centers where it's used. As today's transmission system has neither the capacity nor the configuration to accommodate high volumes of renewable energy, we're reaching out to regulators and utilities across state lines to begin planning a regional transmission grid that can meet these challenges.

Annual energy efficiency and conservation efforts also are currently mandated by state law, and the energy savings from these efforts are factored in to each utility's load growth forecast and our needs analysis. Programs that are designed to reduce electricity usage during peak-use periods have greater potential to impact planning for new transmission lines than overall efficiency programs. However, increasing energy use is only one of many drivers of new transmission projects. Changing power flows, generation utilization and location, and shifts in population centers also contribute to the need for new transmission facilities.

Our progress continues

Since we were formed in 2001, we've invested \$1.9 billion to upgrade more than 1,350 miles of transmission line, improve 110 electric substations and build 32 new transmission lines totaling 344 miles. These investments have helped to raise the system's performance in meeting peak demand, supporting a new fleet of generation, increasing import capability, interconnecting wind projects, alleviating overloads and voltage instabilities, reducing energy losses and improving system reliability ratings. As we plan for new challenges of meeting renewable energy mandates and accommodating changing market power flows, we will do so with your input.

We seek your input

As part of the planning that occurs throughout the year, we proactively seek input from customers, regulators, community officials, residents and others in an effort to strike the right balance between the need for a safe and reliable system, and the potential impacts on costs, landowners and the environment. Public examination and discussion can improve projects by incorporating the perspectives of those most familiar with impacted areas. We believe that by working with the people and communities we serve, we can find better solutions that will meet future electricity demand.

The details of our studies can be found at www.atc10yearplan.com.



www.atc10yearplan.com

Northeast Wisconsin – Zone 4

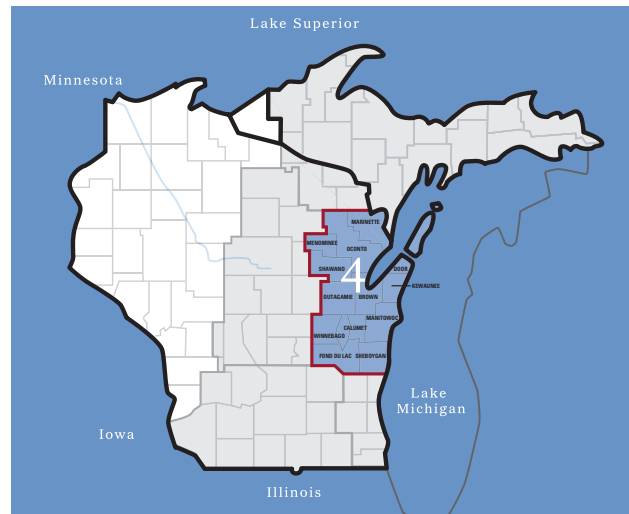
Electric System Overview

Population, employment increasing

- Population in Zone 4 is projected to grow annually at 0.9 percent for both the 2008-2013 and 2013-2018 periods. From 2008 to 2013, Brown County is projected to realize the largest increase in population as well as the highest growth rate.
- Employment in Zone 4 is projected to grow at 1.3 percent annually for both the 2008-2013 and 2013-2018 periods. From 2008 to 2013, Brown County is projected to realize the largest increase in employment, while Door County is projected to have the highest growth rate.

Electricity usage growing

- Peak electric demands typically occur during the summer months, although the northern portion of Zone 4 typically experiences nearly equal summer and winter peaks. Paper mills and foundries in the Green Bay and Appleton metropolitan areas are some of the largest electricity users in the zone.
- Electric load is projected to grow at approximately 1.6 percent annually through 2018. Comparing load with generation (at maximum output) within the zone indicates that Zone 4 has more generation than load during peak load periods. Actual operating experience indicates that during lighter load periods, Zone 4 is a net exporter of power.



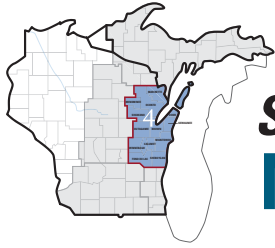
Transmission projects completed or under way address electric needs

- **Gardner Park-Highway 22 project** – The PSC approved our application to build a 50-mile, 345-kV line between two new substations in Wausau and Shawano County. This project is currently under construction.
- **Morgan-Highway 22-Werner West project** – The PSC approved our application to build a new 50-mile, 345-kV line between substations in Oconto Falls and New London. The line will relieve electric system congestion in and around Green Bay, provide additional transfer capability and improve electric system reliability. This project is currently under construction.

Our 2008 10-Year Transmission System Assessment outlines 24 projects to ensure electric system reliability in Northeast Wisconsin. These projects are in various stages of development. The following pages describe the system limitations in Northeast Wisconsin and our planned, proposed and provisional projects to address those limitations.

Transmission is the vital link in bringing power to communities

Transmission lines move electricity at high voltages over long distances – from power plants to communities where local utilities deliver power to homes and businesses via local electric distribution lines. A reliable transmission network provides access to many sources of power, whether they are local or regional. Having multiple paths to get power from producers to consumers lessens the chance that they will experience service interruptions. Multiple major transmission lines also give power generators and local utilities the flexibility to access regions where they can sell and buy electricity to control overall costs for everyone.



System Limitations **Northeast Wisconsin – Zone 4**



Transmission system characteristics in Zone 4

ATC delivers power in Zone 4 with various transmission facilities including:

- four 345-kV lines extending from the Kewaunee and Point Beach nuclear plants,
- two 345-kV lines extending from the Edgewater Power Plant,
- an east-west 345-kV line extending from the Appleton area to Stevens Point,
- three 345-kV lines connecting Fond du Lac to Columbia, Edgewater and North Appleton,
- one 345-kV line connecting Morgan to Plains, and
- numerous 138-kilovolt and 69-kilovolt lines throughout the zone.

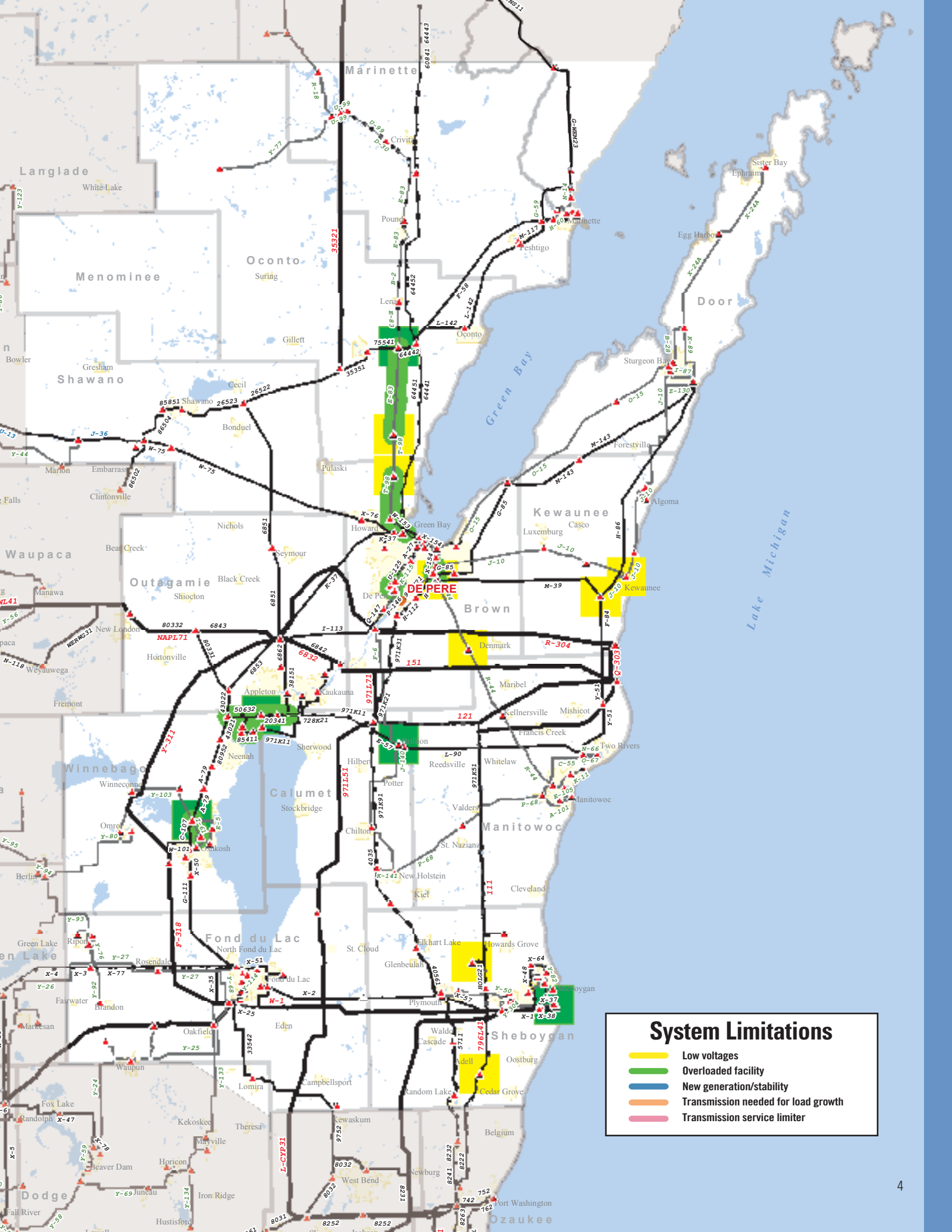
There are a number of transmission system performance issues in Zone 4, most notably insufficient transformer capability, limited transfer capability to and from Michigan's Upper Peninsula, aging facilities in poor condition and heavily loaded facilities in the Fox Valley and Green Bay areas. Primary drivers of these issues include steady load growth in certain areas, new power plants and increased desire to transfer power through the system.

Transmission system limitations in Zone 4

In the analysis of Zone 4, we identified low voltages, transmission facility overloads and transmission service limitations. In addition, transmission service limitations during off-peak periods provide very small operating margins. During these off-peak periods the Ludington Pumped Storage Facility is in its pump mode, which contributes to heavy loading on facilities between Wisconsin and Michigan's Upper Peninsula.

The areas identified as vulnerable to low voltages are Upper Peshtigo, Door County, areas near Beardsley and south of Sheboygan County. The most notable areas with facility overloads include the Marinette/Menominee, Appleton, Oshkosh and Green Bay areas. We are performing more detailed analyses to verify the system issues and develop robust solutions to address these issues. Currently, projects are under construction to reinforce the Upper Peshtigo and Marinette/Menominee areas.

Switchyard maintenance, offsite power reliability, and generation availability issues identified at the Kewaunee 345/138-kV Substation will necessitate significant system reinforcements at the substation.

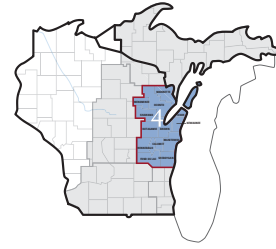


System Limitations

- Low voltages
- Overloaded facility
- New generation/stability
- Transmission needed for load growth
- Transmission service limiter

System Solutions

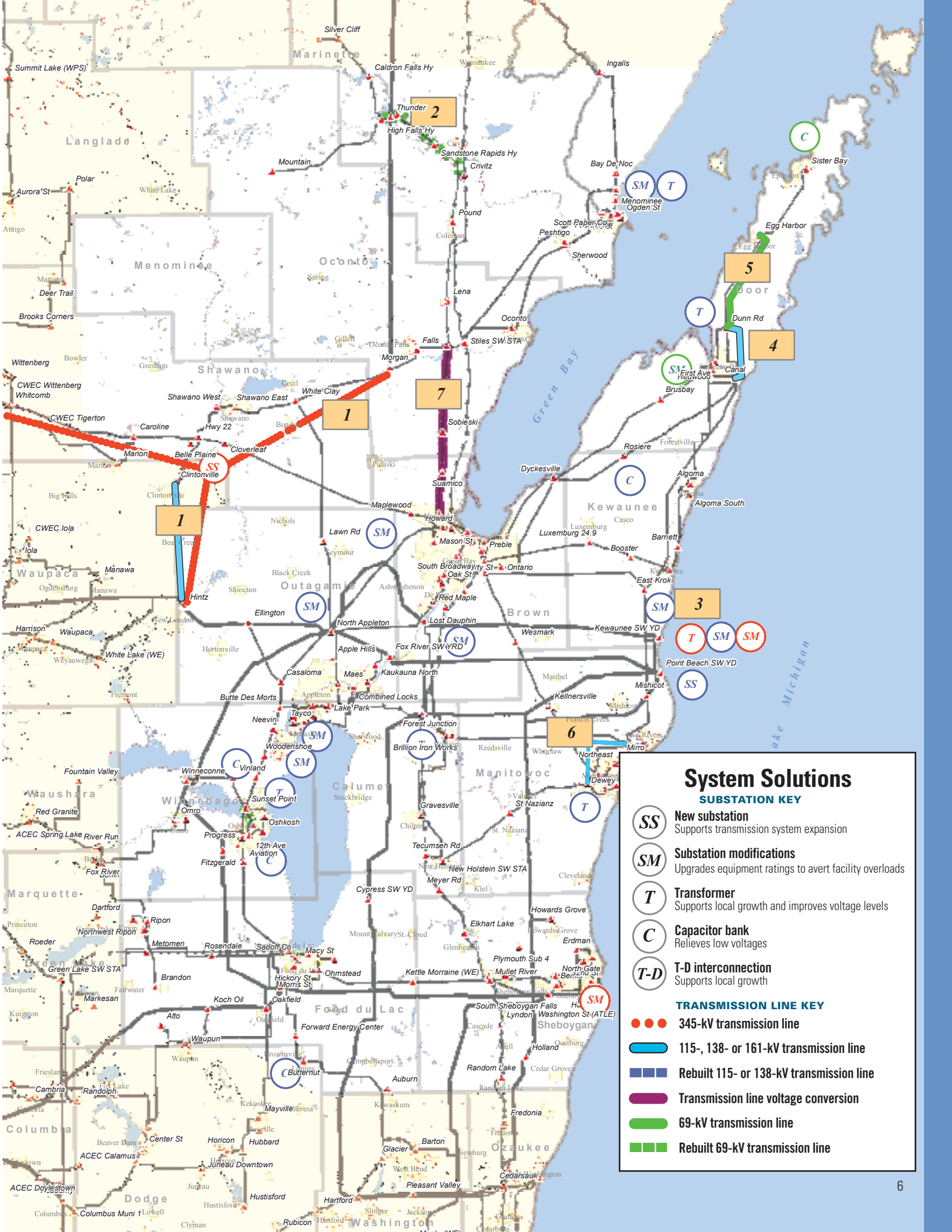
Northeast Wisconsin – Zone 4



We have completed eight projects in Zone 4 since the 2007 Assessment Update, most notably the construction of the Cypress 345-kV and Cedar Ridge 138-kV substations.

Our current plans in Zone 4 include 24 projects between 2008 and 2018. These projects are in various stages of development. The most notable planned, proposed and provisional projects in Zone 4, along with their projected year of completion and the factors driving the need for the projects, are listed below.

	Project description	In-service year	Need driver
	Planned projects		
1	Werner West-Morgan 345-kV line and Clintonville-Werner West 138-kV line	2009	Addresses chronic transmission service limitations in Green Bay, improves Wisconsin-UP transfer capability, lowers system losses
2	Crivitz-High Falls 69-kV double-circuit line rebuild	2009	Addresses low voltages and facility overloads
	Proposed projects		
3	Kewaunee bus reconfiguration and a new second 345/138-kV transformer	2011	Increase offsite power reliability, improve switchyard maintenance and operation flexibility, increase generation availability and meet present substation standards
4	Canal (Sturgeon Bay)-Dunn Road 138-kV line	2012	Addresses low voltages and facility overloads
5	Dunn Road-Egg Harbor 69-kV line	2016	Addresses low voltages and provides network service
	Provisional projects		
6	Shoto-Custer 138-kV line	2016	Addresses facility overloads
7	Bayport-Suamico-Sobieski-Pioneer 69-kV line rebuild and conversion to 138 kV	2016	Addresses facility overloads, addresses aging facilities in poor condition and provides network service



System Solutions

SUBSTATION KEY

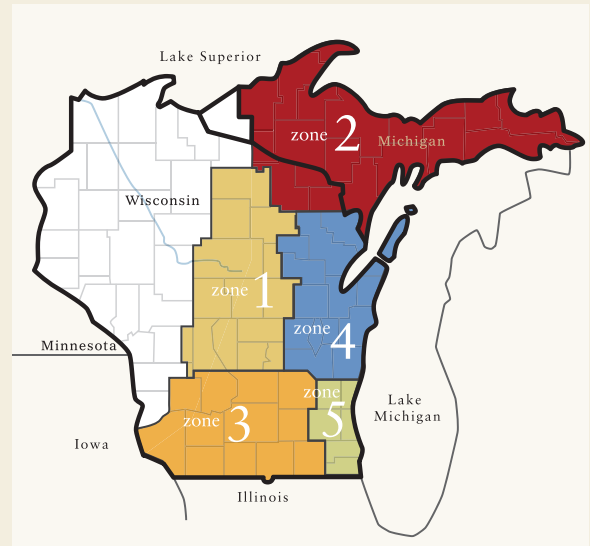
- SS** New substation
Supports transmission system expansion
- SM** Substation modifications
Upgrades equipment ratings to avert facility overloads
- T** Transformer
Supports local growth and improves voltage levels
- C** Capacitor bank
Relieves low voltages
- T-D** T-D interconnection
Supports local growth

TRANSMISSION LINE KEY

- 345-kV transmission line
- ▬▬▬▬ 115-, 138- or 161-kV transmission line
- ▬▬▬▬ Rebuilt 115- or 138-kV transmission line
- ▬▬▬▬ Transmission line voltage conversion
- ▬▬▬▬ 69-kV transmission line
- ▬▬▬▬ Rebuilt 69-kV transmission line

ATC AT A GLANCE

- Formed in 2001 as the first multi-state, **transmission-only utility.**
- Owner and operator of approximately **9,350 miles of transmission line and 500 substations.**
- Meeting electric needs of approximately **five million people.**
- Transmission facilities in **66 counties** in Wisconsin, Michigan and Illinois.
- **\$2.2 billion** in total assets.
- **Seven offices** in the communities of Cottage Grove, De Pere, Madison, Waukesha and Wausau, Wis.; Kingsford, Mich.; and Washington DC.



AS A PUBLIC UTILITY, WE HAVE DUTIES AND RESPONSIBILITIES TO:

- Operate the transmission system reliably,
- Assess the ability of the system to adequately meet current and future needs,
- Plan system upgrades to meet those needs in the most efficient, effective and economic ways,
- Construct upgrades in time to meet those needs,
- Maintain the transmission equipment and surroundings to minimize opportunity for failures.

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businesses running and communities strong.

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