

Northeast Wisconsin 2007 10-Year Transmission System Assessment Update

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

December 2007



www.atc10yearplan.com

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 document represents an update to our 2006 10-Year Assessment information based on further development of specific needs and projects during the past year. We did not undertake a complete set of new transmission system studies but used information from the 2006 10-Year Assessment to develop projects that will be put into service. These project changes are reflected in this summary.

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, projected growth in population and electricity usage and savings from energy efficiency efforts.

We look 10 years into the future because it can take up to eight years to plan, study route options, get approvals and build new transmission lines.

Federal oversight increases

In recent years, the federal government has taken additional steps to ensure that transmission-owning utilities, like ATC, have produced and shared planning information with the public and local stakeholders. Since 2001, we have engaged in open and collaborative efforts to share information and solicit input on our plans. We believe that in making our planning efforts transparent and available to the public, the proposals for needed facilities can be more readily understood and accepted by communities that stand to benefit from them. The underlying principles of this approach are now required from utilities that own and plan for new transmission lines. An overview of our planning process is available at www.atc10yearplan.com.



In the years 2008 and beyond, ATC will be conducting additional public outreach, gathering input from our stakeholders early in the 10-Year Assessment process to include in our assumptions and models. We will also meet with interested stakeholders in the middle of the process to review interim results. This process is intended to provide even more openness and

transparency and result in better planning.

Studies indicate need for \$2.8 billion investment over 10 years

In our assessment of the electric transmission system needs through 2016, we estimate \$2.8 billion in system improvements including 353 miles of new transmission lines and upgrades to 652 miles of existing lines across our service area.

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

Transmission is the vital link in bringing power to

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



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Northeast Wisconsin

Electric System Overview

Population, employment increasing

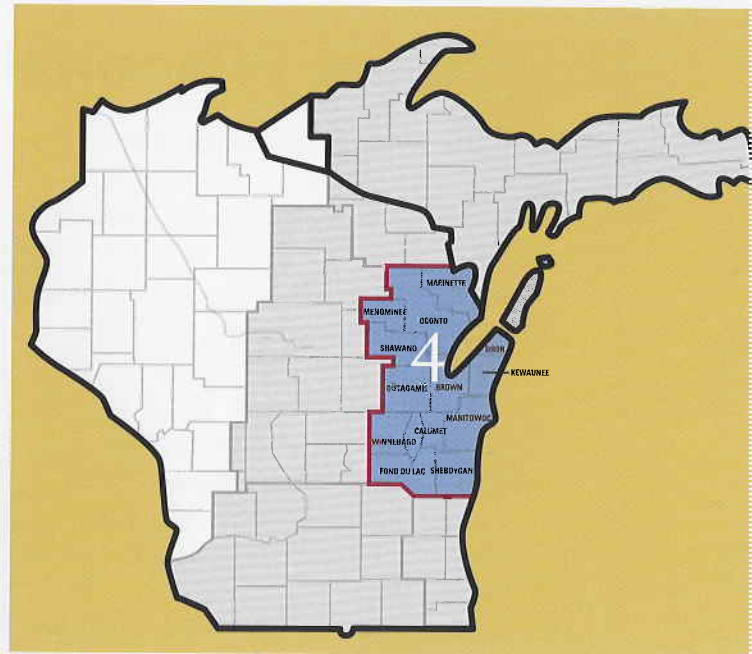
- Population in Zone 4 is projected to grow 0.7 percent annually through 2011. From 2001 to 2006, Brown County realized the largest increase in population, while Calumet County had the highest growth rate.
- Employment in Zone 4 is projected to grow 1.2 percent annually through 2011. From 2001 to 2006, Brown County realized the largest increase in employment, while Calumet County had 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.
- As depicted in the 2006 Assessment, electric load is projected to grow at approximately 2.4 percent annually through 2014. 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 2007 10-Year Transmission System Assessment Update outlines more than 35 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.

communities

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.

Northeast Wisconsin

Transmission system characteristics in Zone 4

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

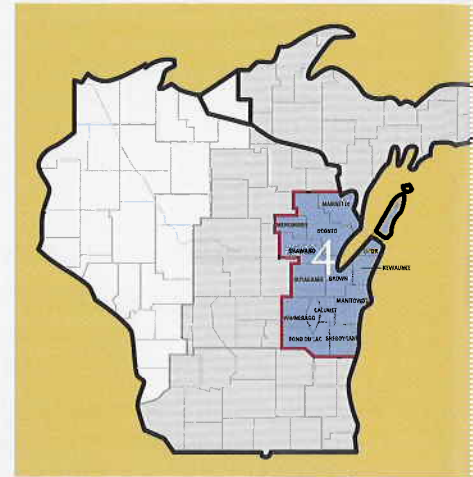
- four 345-kV lines extending from the Kewaunee and Point Beach nuclear plants,
- two 345-kV lines extending from the Edgewater Power Plant,
- an west-east 345-kV line extending from Stevens Point to the Appleton area,
- three 345-kV lines connecting a Fond du Lac area substation to Columbia, Edgewater and a substation north of Appleton
- one 345-kV line between the Iron Mountain area and the area west of Oconto 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

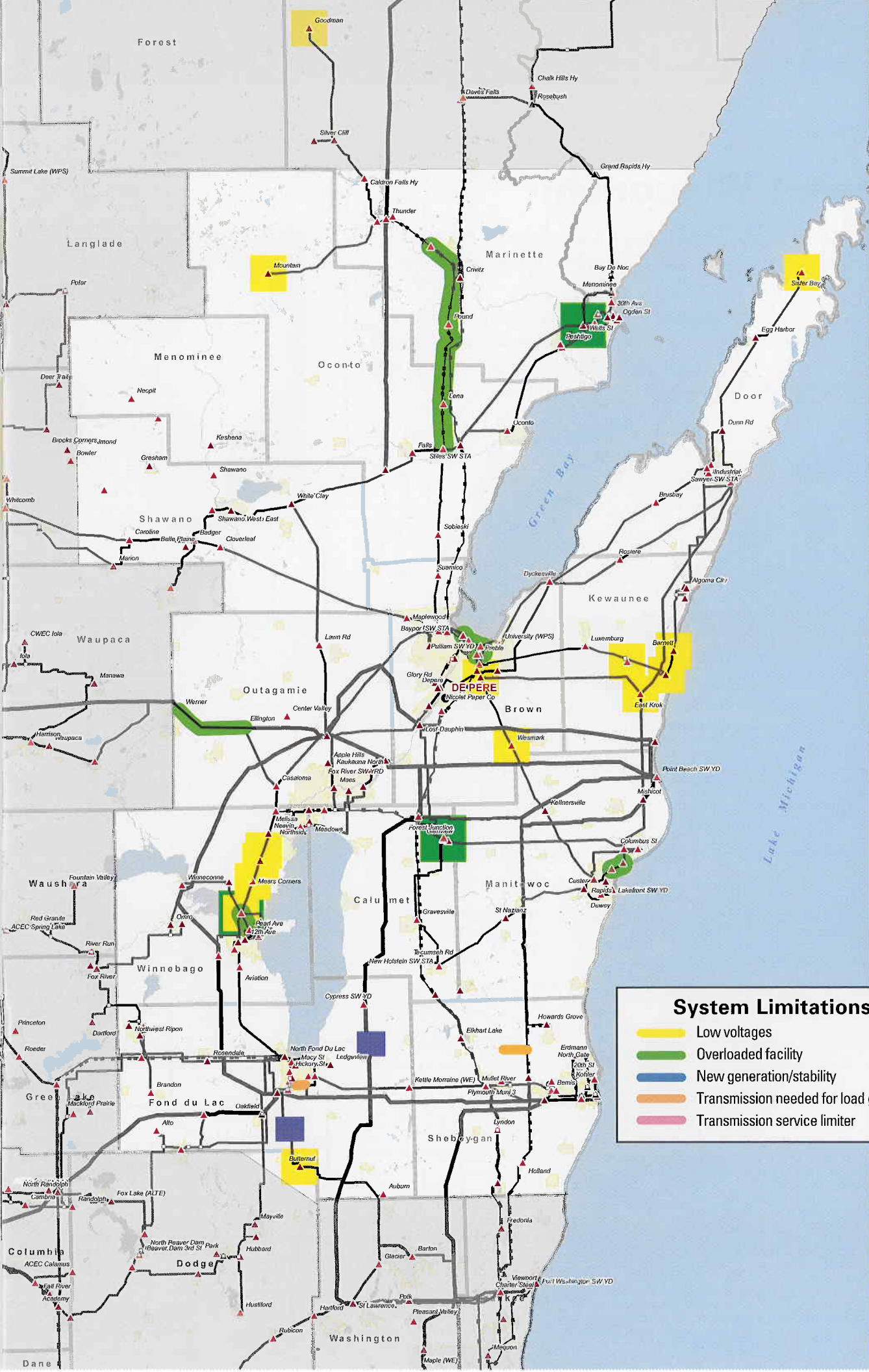
In the analysis of the year 2007 for Zone 4, performed in the 2006 Assessment, we identified low voltages, transmission facility overloads and transmission service limitations. In addition, transmission service limitations during off-peak periods provide very small operating margins. During these off-peak periods the Ludington Pumped Storage Facility is in its pump mode which contributes to heavy loading on facilities from south of Green Bay to Michigan.

Areas of this zone identified as vulnerable to low voltages include the upper Peshtigo River, Door County, north of Oshkosh and south of Fond du Lac. Areas with facility overloads include the West Marinette, Oshkosh and Green Bay areas. A previous Plains-Stiles 138-kilovolt line limitation was addressed with a project completed in 2006.



Zone 4 includes the counties of:

- | | | | |
|----------------------------|---------------------------------|---------------------------------------|-------------------------------|
| ■ Brown | ■ Fond du Lac (eastern portion) | ■ Menominee, Mich. (southern portion) | ■ Kewaunee |
| ■ Calumet | ■ Manitowoc | ■ Menominee, Wis. | ■ Shawano (eastern portion) |
| ■ Dodge (northeast corner) | ■ Marinette (southern portion) | ■ Oconto | ■ Sheboygan |
| ■ Door | | ■ Outagamie | ■ Winnebago (eastern portion) |



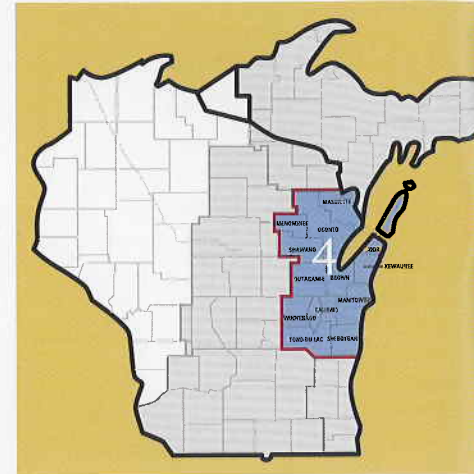
System Limitations

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

Northeast Wisconsin

We have completed three network projects in Zone 4 since the 2006 Assessment, most notably the construction of a 345/138-kV switchyard in western Outagamie County.

Our current plans in Zone 4 include 38 projects between 2007 and 2016. 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 (under construction)	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	Canal (Sturgeon Bay)-Dunn Road 138-kV line	2012	Addresses low voltages and facility overloads
4	Dunn Road-Egg Harbor 69-kV line	2016	Addresses low voltages and provides network service
	Provisional projects		
5	Shoto-Custer 138-kV line	2014	Addresses facility overloads
6	Bayport-Suamico-Sobieski-Pioneer 69-kV line rebuild & conversion to 138 kV	2016	Addresses facility overloads, addresses aging facilities in poor condition and provide network service
7	Northside-City Limits (Menasha) 138-kV line	2016	Addresses facility overloads

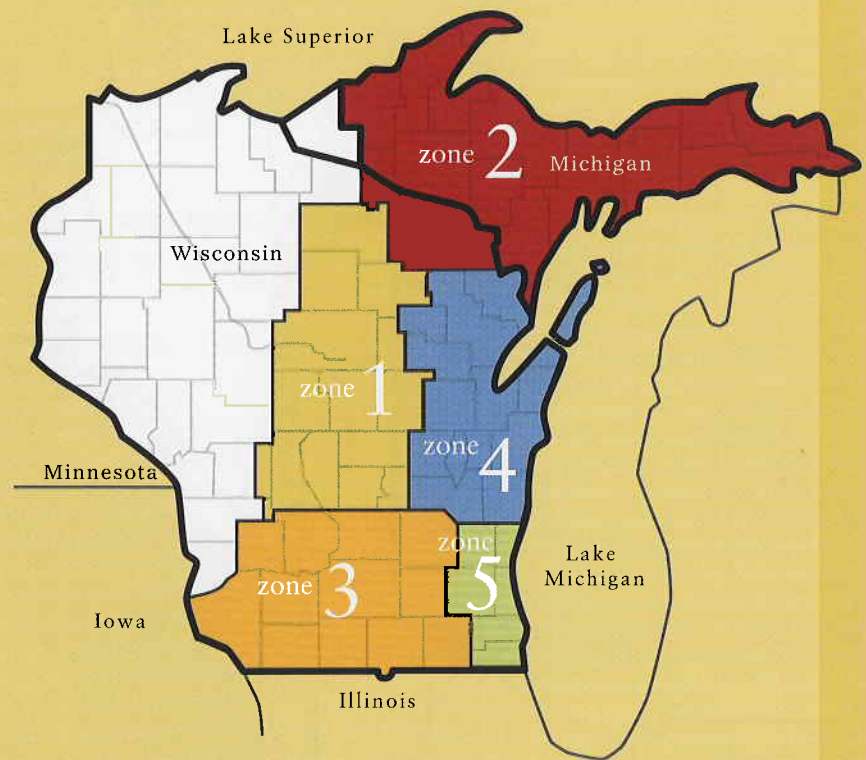


System Solutions

(SS)	New substation	●●●	345-kV transmission line
(SM)	Substation modifications	▨▨▨	115-, 138- or 161-kV transmission line
(PS)	Phase shifter	▨▨▨	Rebuilt 115- or 138kV transmission line
(T)	Transformer	▨▨▨	Transmission line voltage conversion
(C)	Capacitor bank	▨▨▨	69-kV transmission line
(R)	Reactor	▨▨▨	Rebuilt 69-kV transmission line
(T-D)	T-D interconnection		

ATC at a glance

- Formed in 2001 as the first multi-state, **transmission-only utility**.
- Owner and operator of approximately **9,100 miles of transmission line and 480 substations**.
- Meeting electric needs of approximately **five million people**.
- Transmission facilities in **66 counties** in Wisconsin, Michigan and Illinois.
- **\$1.8 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.



Helping to **keep the lights on,**
businesses running and communities strong.

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