

10-Year Transmission System Assessment



Zone 2 – Michigan's Upper Peninsula and Northern Wisconsin

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

September 2005



About transmission planning

American Transmission Co. annually produces a 10-Year Transmission System Assessment that identifies and begins to prioritize future projects needed to improve the adequacy and reliability of the electric transmission system. Our planners continually conduct engineering studies on the electric transmission system looking for potential problems that may affect the future performance of the system.

As part of our planning studies, we take a comprehensive look at various factors affecting electricity utilization in the region, such as business development, employment trends, proposed new generation and projected growth in electricity usage.

Our studies consistently show that the transmission system is operating at the limits of its capabilities primarily because the system is being used in vastly different ways than it was just 10 years ago. Throughout our service territory, increased electricity usage, more power transactions between utilities, new power producers and the condition of existing facilities are driving the need for new and/or upgraded facilities. Our studies have shown that, in general, it is not possible to provide for new usage, or continue to meet existing usage, without new and/or significantly upgraded transmission facilities. Consequently, we have been, and are, developing reinforcements to the transmission system that will serve customers reliably for years to come. We conduct this long-term planning because it generally can take 5 to 10 years to plan, secure approvals, construct and put into service new transmission lines. Our plans include \$3.4 billion in projects throughout our service area over the next 10 years.

About ATC

We own and operate the electric transmission system in portions of Wisconsin, Upper Michigan and north central Illinois. 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.

Understanding electric transmission

The electric transmission system serves as the vital link in bringing power to people, businesses and communities. The transmission system is the necessary connection between where power is produced and where power is used. The transmission grid is a network of high-voltage wires that link the many sources of electric generation to the lower-voltage electric distribution systems that deliver power to homes and businesses via a local utility. The electric transmission system also provides access to diverse and more economic sources of power, and it plays a critical supporting role in the vitality and growth of communities and businesses.



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Electric system overview

Population, employment increasing in Zone 2

- Population in Zone 2 is projected to grow 0.2 percent annually through 2010. Chippewa County is projected to realize the largest increase in population and the highest growth rate.
- Employment in Zone 2 is projected to grow 1.3 percent annually through 2010. Marquette County is projected to realize the largest increase in employment, while Forest County is projected to have the highest growth rate.

Electricity usage growing in Zone 2

- Peak electric demands typically occur during the winter months. Ore mining and paper mills are the largest electricity users in the zone.
- Electric load is projected to grow at approximately 0.8 percent annually from 2006 through 2014.

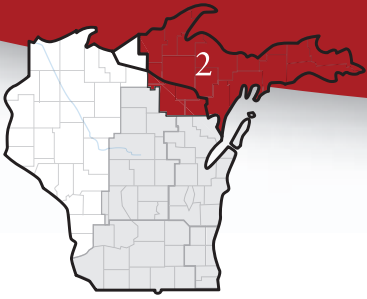
Transmission project under way addresses electric system needs

- **Plains-Stiles transmission line rebuild** – Construction is under way to upgrade and rebuild 110 miles of 69-kilovolt and 138-kilovolt transmission lines in Oconto and Marinette counties in Wisconsin, and Menominee and Dickinson counties in Michigan that are more than 80 years old. The lines are operating at their limits and often are overloaded limiting the transfer of power between northeastern Wisconsin and the Upper Peninsula of Michigan. We are phasing in construction and expect to complete the project in 2006.

Our 10-Year Assessment outlines more than 35 projects to ensure electric system reliability in Northern Wisconsin and Upper Michigan. The following pages describe the transmission system limitations in Northern Wisconsin and Upper Michigan and our planned, proposed and provisional projects to address those limitations.

For more information about current projects, please visit the Projects section of our Web site, www.atcllc.com

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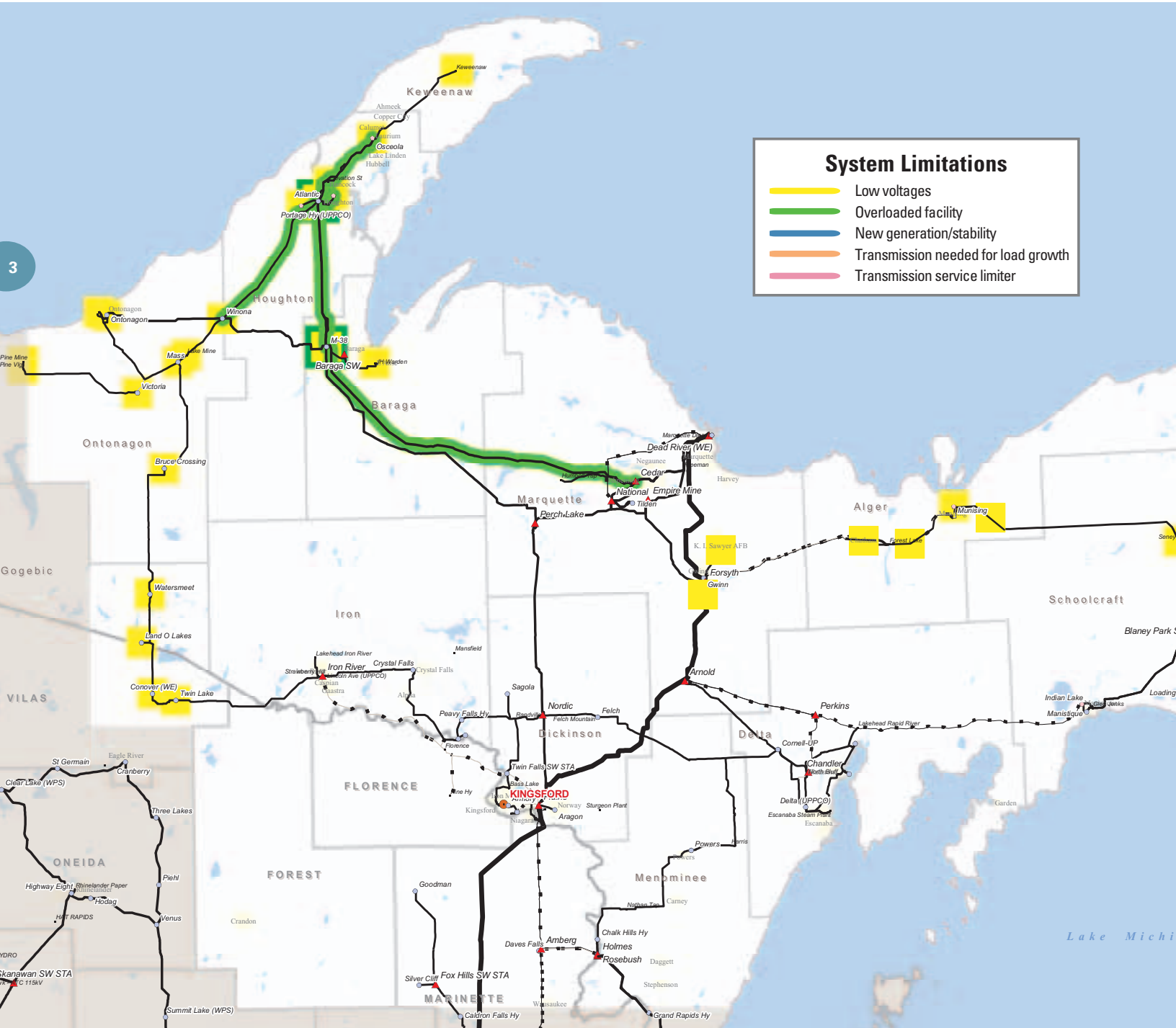


Michigan's Upper Peninsula and Northern Wisconsin

Transmission system characteristics of Zone 2

ATC delivers power in Zone 2 with various transmission facilities including:

- a north-south 345-kV line extending from near Marquette to Iron Mountain and southwest to Oconto,
- 138-kV lines from Arnold to the Manistique area,
- a 138/69-kV network in the western portion of the zone and
- a 69-kV network in the eastern portion of the zone.



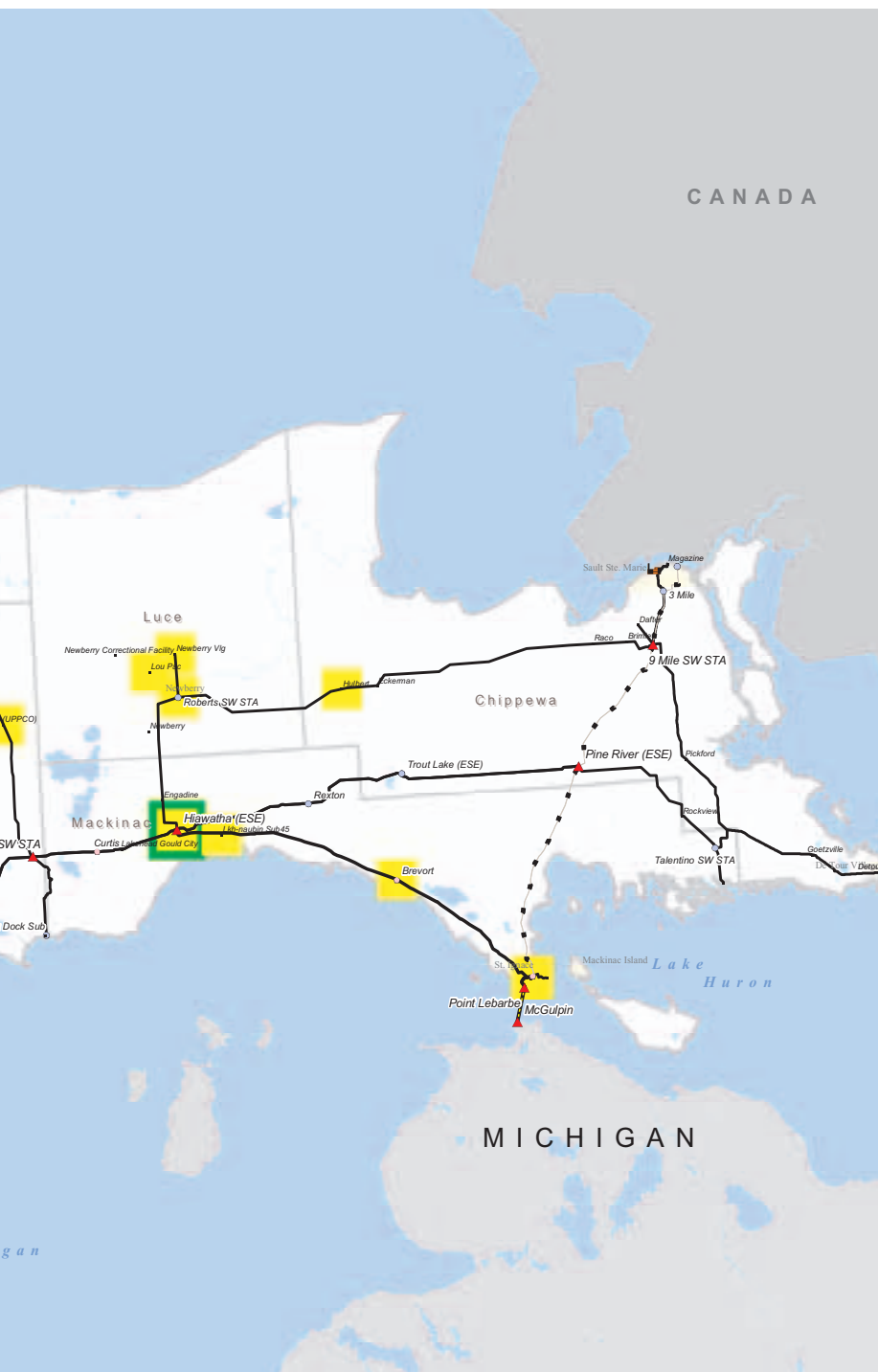
System Limitations

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

There are a number of transmission system performance issues in Zone 2 including limited ability to import or export power, generator instability, voltage instability, overloaded lines and equipment, low system voltages and chronic limitations to transmission service. Primary drivers of these issues include a mismatch of low-cost generation to load in the Upper Peninsula and aging facilities in poor or obsolete condition.

Transmission system limitations in Zone 2

In the 2006 analysis of Zone 2, we identified low voltages, transmission facility overloads and transmission service limitations. In addition, heavily loaded facilities during off-peak periods especially when the Ludington Pumped Storage Facility in Lower Michigan is in pumping mode continue to keep the system working with very small operating margins.



Areas in the western and far eastern Upper Peninsula are most vulnerable to low voltages. The most notable areas experiencing transmission service limitations include the Plains-Stiles 138-kV line and the Hiawatha-Indian Lake 69-kV line. Both of these lines are being addressed for the near term with projects planned for completion in 2006.

The potential for generation at Presque Isle Power Plant becoming unstable after certain disturbances on the transmission system has been a long-standing limitation and the reason for an automated tripping scheme in place at Presque Isle. We are evaluating alternatives to this complex scheme.

ZONE 2 INCLUDES THE COUNTIES OF:

- Alger, Mich.
- Baraga, Mich.
- Chippewa, Mich.
- Delta, Mich.
- Dickinson, Mich.
- Florence, Wis.
- Forest, Wis. (northern portion)
- Gogebic, Mich. (eastern portion)
- Houghton, Mich.
- Iron, Mich.
- Keweenaw, Mich.
- Luce, Mich.
- Mackinac, Mich.
- Marinette, Wis. (northern portion)
- Marquette, Mich.
- Menominee, Mich. (northern portion)
- Ontonagon, Mich. (eastern portion)
- Schoolcraft, Mich.
- Vilas, Wis. (northern portion)



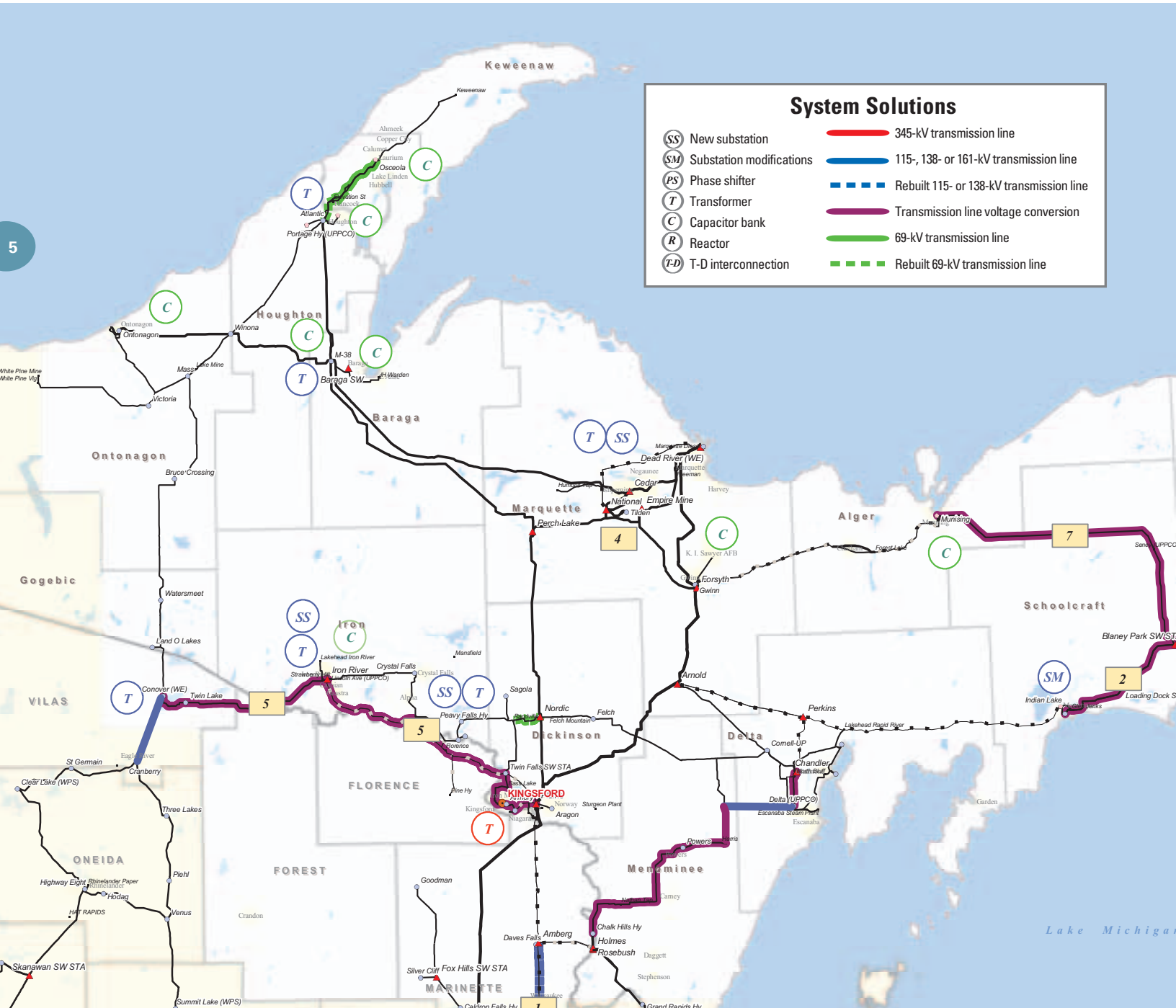
zone 2

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Transmission projects in Zone 2

ATC completed one project in Zone 2 since the 2004 Assessment Update. This involved rebuilding the Plains-Amberg portion of the Plains-Amberg-Stiles 138-kV line. The Stiles-Amberg portion will be rebuilt in early 2006.

Our current plans in Zone 2 include more than 35 projects between 2005 and 2015 to address issues and limitations. These projects are in various stages of development. The most notable planned, proposed and provisional projects in Zone 2, along with their projected year of completion and the factors driving the need for the projects, are listed at right.



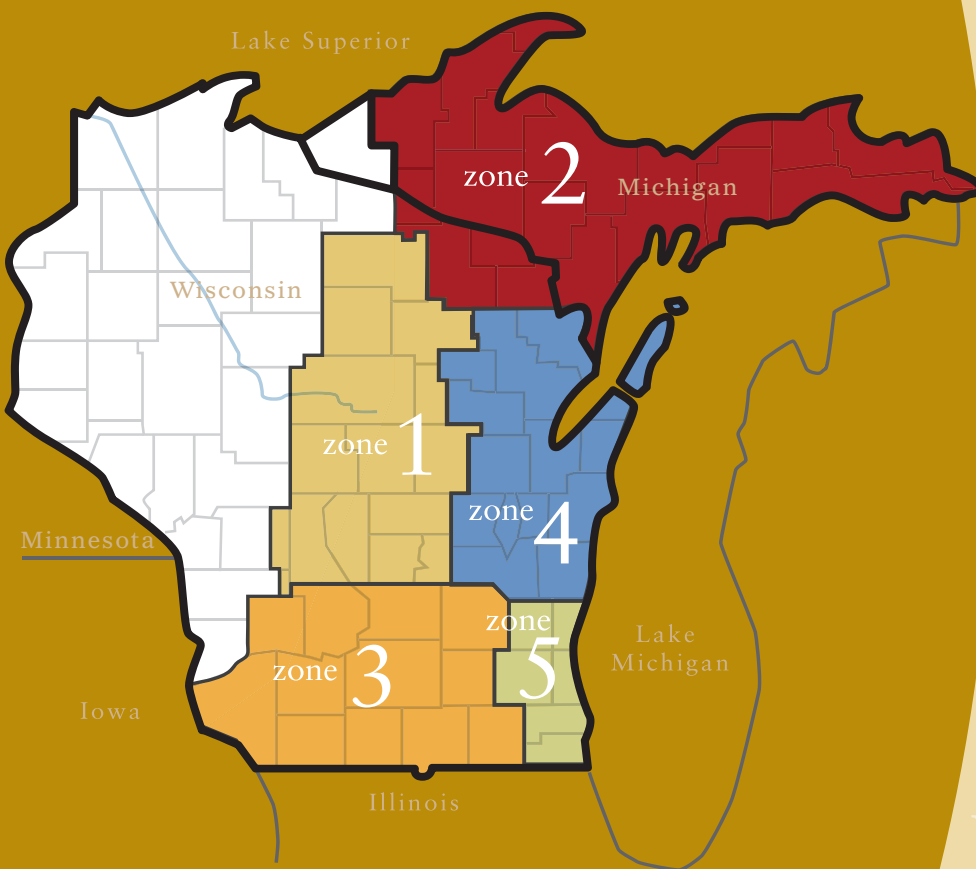
	Project description	In-service year	Need driver
Planned projects			
1	Stiles-Amberg 138-kV line rebuild	2006	Partially addresses chronic transmission service limitation, addresses line facilities in poor condition, lowers system losses
2	String second Hiawatha-Indian Lake circuit and convert both to 138 kV	2006/2009	Addresses chronic transmission service limitation, improves voltage profiles in the area, enhances value of another provisional project
Proposed Projects			
3	Replace the existing Straits Substation (Mackinac)	2007	Improves reliability in eastern UP, addresses substation facilities in poor condition, provides for future expansion
4	Relocate Cedar Substation (North Lake)	2007	Improves reliability in the area, addresses aging facilities in poor condition
5	Cranberry-Conover 115-kV line and Conover-Iron River-Plains rebuild and conversion to 138 kV	2008	Part of Cranberry-Conover project (Zone 1) for Rhinelander Loop, improves voltage profile in the area, addresses aging facilities with condition issues
Provisional Projects			
6	Hiawatha-Pine River-Mackinac 69-kV line rebuild and conversion to 138 kV	2009	Addresses potential overloads of existing lines in the area, addresses aging facilities in poor condition, improves voltage in the profile area, accommodates future expansion in the area
7	Blaney Park-Munising 69-kV line rebuild and conversion to 138 kV	2012	Addresses low voltages in the area, improves stability of Presque Isle generation, addresses aging facilities in poor condition





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ATC at a glance

- Formed in 2001 as the first multi-state, **transmission-only utility**.
- Owner and operator of approximately **8,900 miles of transmission line** and **460 substations**.
- Meeting electric needs of approximately **five million people**.
- Transmission facilities in **66 counties** in Wisconsin, Michigan and Illinois.
- **\$1.3 billion** in total assets.
- **Seven offices** in the communities of Cottage Grove, De Pere, Madison, Waukesha and Wausau, Wis.; Kingsford, Mich.; and Washington DC.

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