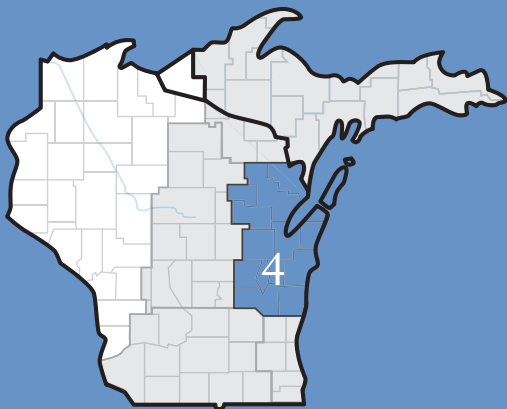




**An excerpt from ATC's 2010 10-Year Transmission System Assessment**  
An annual report describing economic and regional solutions to electric reliability needs



**Zone 4** Northeast Wisconsin

- |                                      |  |
|--------------------------------------|--|
| <b>BROWN</b>                         | <b>MENOMINEE, MICH.</b> (southern portion) |
| <b>CALUMET</b>                       | <b>MENOMINEE, WIS.</b>                     |
| <b>DODGE</b> (northeast corner)      | <b>OCONTO</b>                              |
| <b>DOOR</b>                          | <b>OUTAGAMIE</b>                           |
| <b>FOND DU LAC</b> (eastern portion) | <b>SHAWANO</b> (eastern portion)           |
| <b>KEWAUNEE</b>                      | <b>SHEBOYGAN</b>                           |
| <b>MANITOWOC</b>                     | <b>WINNEBAGO</b> (eastern portion)         |
| <b>MARINETTE</b> (southern portion)  |  |





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

## Economics, renewables increasingly in focus

# Planning for regional solutions

American Transmission Co. was formed in 2001 to plan, permit, build, own, operate and maintain a high-voltage electric grid that meets the reliability and economic needs of our customers. Our planners continually conduct engineering studies on the electric transmission system, looking for potential problems that may affect future performance. Our studies identify and prioritize future projects needed to improve the adequacy and reliability of the system and meet evolving public priorities.

After nearly 10 full years of operation and \$2.2 billion in new and upgraded infrastructure investment, electric system reliability remains our top priority. But looking forward, we see an increasing need for an expanded regional transmission system. Consequently, our planning focus has broadened to consider projects that provide economic and public policy benefits as well. Several factors, including the emerging wholesale market and federal and state policy, play a larger role in our planning process today than they did when we first began operation in 2001.

The majority of the grid's regional interconnections were made in the late 1950s through the early 1970s to accommodate local reliability needs. Nationally, the transmission system was not designed to accommodate the expanded energy flows required by the current wholesale marketplace.

Renewable portfolio standards also call for a more robust regional grid to move power from wind-rich areas west of Wisconsin to population centers where the electricity is consumed. The changed marketplace and increasing importance of renewable energy sources necessitate a broader view of the system, which influences planning policies and studies.

Since our inception, load growth and operational issues were the primary drivers for transmission improvements, and planning studies were conducted accordingly. Today, finding a way to build the system to allow states to meet their renewable energy standards and getting the full benefit of the Midwest ISO market for ATC customers have become more significant transmission needs. We continue to collaborate with customers and other stakeholders to plan best-value projects that meet system needs and provide multiple benefits.

The 2010 Assessment covers the years 2010 to 2019, and for the second year, we have included asset renewal projects through the full 10-year horizon. Our studies indicate \$3.4 billion in necessary transmission system improvements. The total includes \$1.0 billion for transmission network upgrades, \$0.7 billion for regional multi-value projects, along with \$1.7 billion in interconnection and asset renewal projects, infrastructure replacement and relocation, and other smaller network reliability improvements.

### Cost estimate of system improvements

	2006	2007	2008	2009	2010
Total 10-Year Capital Cost	\$3.1B	\$2.8B	\$2.7B	\$2.5B	\$3.4B



## Northeast Wisconsin – Zone 4

### Electric System Overview

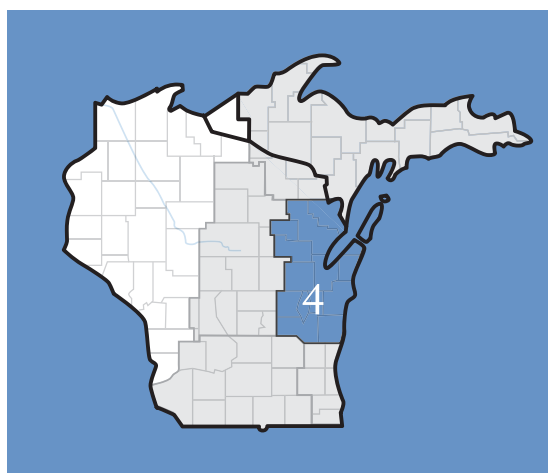
#### **Increases expected in population, employment**

Population in Zone 4 is projected to grow 0.7 percent annually between now and 2019. Brown County is expected to realize the largest increase in population. Employment is projected to grow 0.9 percent annually in the same time period, with the largest increase projected in Calumet County.

#### **Electricity usage is growing**

Peak electric demand typically occurs 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 percent annually through 2020. 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.



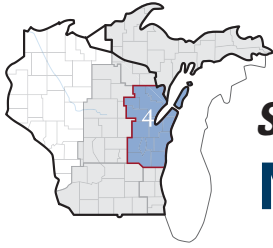
[www.atc10yearplan.com](http://www.atc10yearplan.com)



### **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 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. With an increasing emphasis on renewable energy, transmission system planning will become even more important to put the power of wind on the wires.





## 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 units,
- Two 345-kV lines extending from the Edgewater Power Plant,
- Four 345-kV lines connecting the Gardner Park, Werner West, Morgan, and Plains substations,
- Two 345-kV lines from North Appleton to Werner West and Fitzgerald, and
- Three 345-kV lines connecting South Fond du Lac Substation to the Columbia, Edgewater and Fitzgerald substations, and
- A 138-kV network in the Fox River Valley/Green Bay area.

### Transmission system limitations in Zone 4

In the analysis of Zone 4, we identified few voltage or thermal limitations as part of this Assessment. However, it should be noted that transmission service limitations during off-peak periods provide very small operating margins.

#### Zone 4 includes the counties of:

**BROWN**

**CALUMET**

**DODGE**

(northeast corner)

**DOOR**

**FOND DU LAC**

(eastern portion)

**KEWAUNEE**

**MANITOWOC**

**MARINETTE**

(southern portion)

**MENOMINEE, MICH.**

(southern portion)

**MENOMINEE, WIS.**

**OCONTO**

**OUTAGAMIE**

**SHAWANO**

(eastern portion)

**SHEBOYGAN**

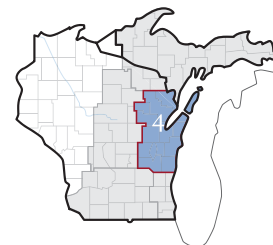
**WINNEBAGO**

(eastern portion)



## Transmission projects in Zone 4

# Northeast Wisconsin – Zone 4



We have implemented two projects in Zone 4 since the 2009 Assessment, most notably the Point Beach-Sheboygan Energy Center 345-kV line upgrade.

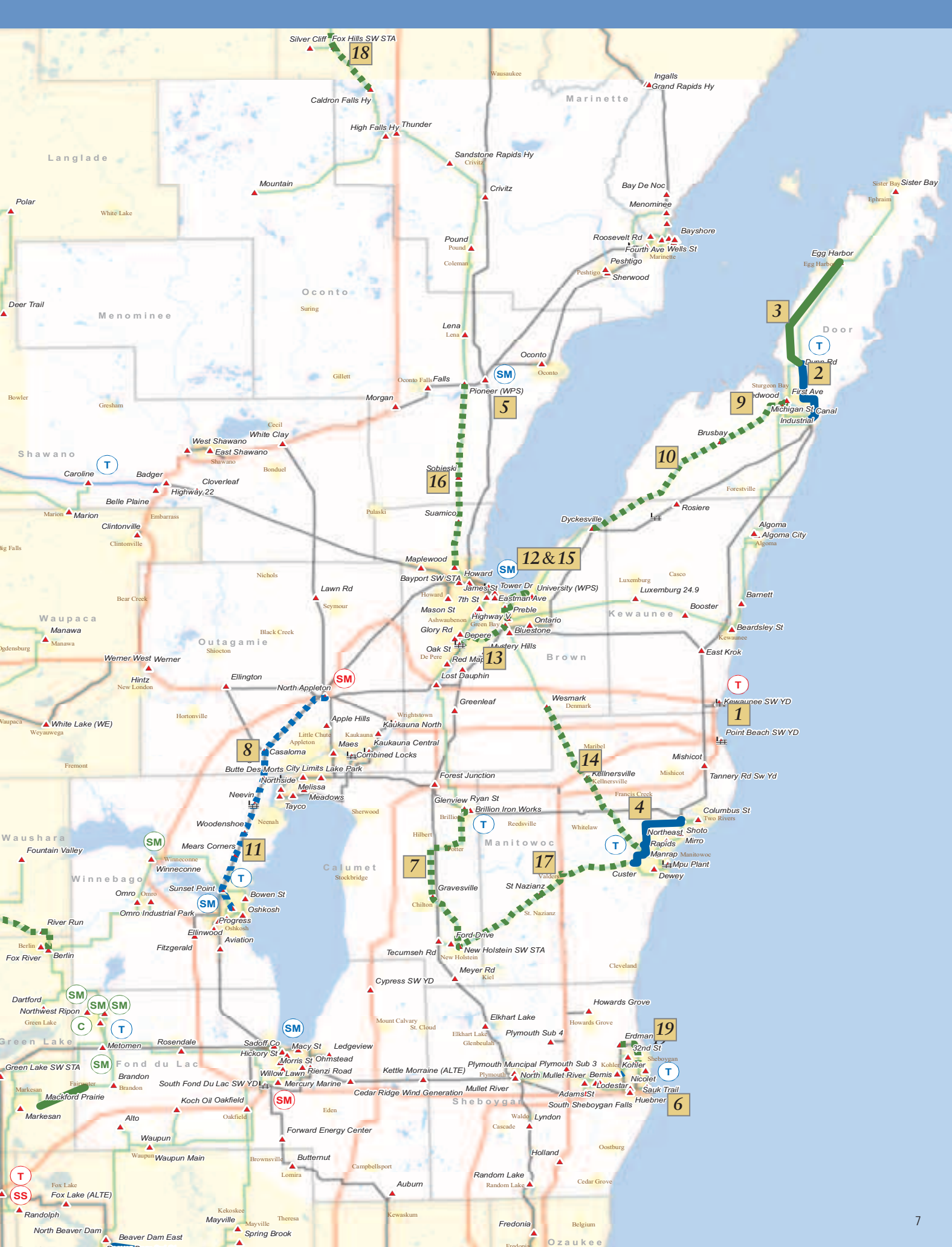
Our current plans in Zone 4 include nine system reliability and economic projects between 2010 and 2024. These projects are in various stages of development. The most notable planned, proposed and provisional projects, and the asset renewal projects in Zone 4, along with their projected year of completion and the factors driving the need for the projects, are listed below.

	Project description	In-service year	Need driver
	<b>Planned projects</b>		
1	Kewaunee bus reconfiguration and a second 345/138-kV transformer	2011	Increase offsite power reliability, improve switchyard maintenance/operation flexibility, generation availability
2	Canal (Sturgeon Bay)-Dunn Road 138-kV line	2012	Overloads and low voltages
	<b>Provisional projects</b>		
3	Dunn Road-Egg Harbor 69-kV line	2018	Low voltages and provides network service
4	Shoto-Custer 138-kV line	2022	Overloads
	<b>Asset Renewal projects</b>		
5	Replace shield wire on Pulliam-Stiles 138-kV line	2011	Condition and performance
6	Replace Edgewater 138/69-kV transformers #T31 and #T32	2012	Condition and performance
7	Glenview-New Holstein 69-kV line reconductor	2012	Condition and performance
8	North Appleton-Butte des Morts-Neevin 138-kV line rebuild	2015 - 2017	Condition and performance
9	First Avenue-Redwood 69-kV submarine cable replacement	2015	Condition and performance
10	Dyckesville-Sawyer 69-kV line rebuild	2016	Condition and performance
11	Neevin-Woodenshoe-Mears Corners-Sunset Point 138-kV line rebuild	2016	Condition and performance
12	Finger Road-Danz 69-kV line rebuild	2016	Condition and performance
13	Oak Street-Highway V 69-kV line rebuild	2016	Condition and performance
14	Wesmark-Manrap 69-kV line rebuild	2016	Condition and performance
15	University-Danz Avenue 69-kV underground cable replacement	2017	Condition and performance
16	Bayport-Sobieski-Pioneer 69-kV line rebuild	2018	Condition and performance
17	New Holstein-Custer 69-kV line rebuild	2019	Condition and performance
18	Caldron Falls-Goodman 69-kV line rebuild	2019	Condition and performance
19	Erdman-Lodestar 138-kV underground cable replacement	2019	Condition and performance

## System Solutions Key

SUBSTATION KEY		TRANSMISSION LINE KEY		EXISTING TRANSMISSION LINES KEY	
<b>SS</b>	<b>New substation</b> Supports transmission system expansion	● ● ●	345-kV transmission line		69 kV
<b>SM</b>	<b>Substation modifications</b> Upgrades equipment ratings to avert facility overloads		115-, 138- or 161-kV transmission line		161 kV
<b>T</b>	<b>Transformer</b> Supports local growth and improves voltage levels		Rebuilt 115- or 138-kV transmission line		115 kV
<b>C</b>	<b>Capacitor bank or reactor</b> Relieves low voltages or high voltages		Transmission line voltage conversion		230 kV
<b>T-D</b>	<b>T-D interconnection</b> Supports local growth		69-kV transmission line		138 kV
			Rebuilt 69-kV transmission line		345 kV







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

## ATC AT A GLANCE

- Formed in 2001 as the first multi-state, **transmission-only utility**
- Owner and operator of approximately **9,400 miles of transmission line and 510 substations**
- Meeting electric needs of more than **five million people** in 72 counties in four states: Wisconsin, Michigan, Minnesota and Illinois
- **\$2.75 billion** in total assets

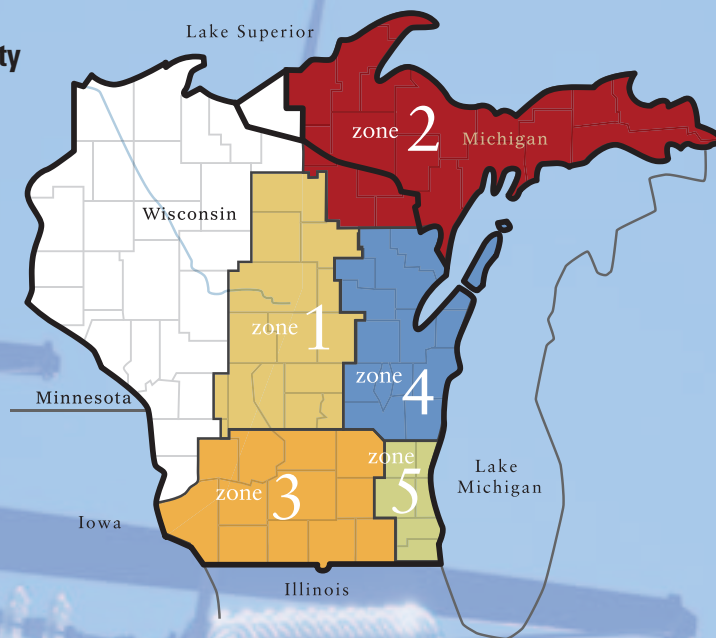
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More detailed information is available at [www.atc10yearplan.com](http://www.atc10yearplan.com)



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**Would you like a speaker from ATC to address your group?**  
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