



10-YEAR TRANSMISSION SYSTEM ASSESSMENT



2015

Summary
Report

Improvements increase reliability, access to regional markets

ATC continues to focus on its duty and responsibility to plan, operate, build and maintain a robust electric transmission grid serving portions of Wisconsin and the Upper Peninsula of Michigan. The five million electricity consumers who receive power over the ATC system have experienced improved reliability, and the grid is providing our customer utilities with greater access than ever before to regional energy markets. This has helped moderate electricity costs for consumers and bring renewable energy to market.

ATC continues to evaluate the grid to meet future electric system needs. We expect the next 10 years will bring new challenges, including changes in generation sources due to the Clean Power Plan. We expect that ATC's build-out of the transmission system in our service area will be slowing down, while the need to efficiently maintain and upgrade older assets already is ramping up. Our investment forecast for the next 10 years is a reflection of this reality.

Because the grid is interconnected across a vast multi-state area, one of the best ways to take care of our own backyard is to understand what our neighbors are doing in theirs. Regional planning continues to play a prominent role in maintaining and operating ATC's transmission system. ATC is a leader in the Midcontinent Independent System Operator process to efficiently adapt and expand transmission resources to meet the changing needs of the regional energy marketplace.

This report contains a summary of ATC's planning initiatives, as well as an overview of network and asset renewal projects in each of our planning zones. The 2015 10-Year Assessment covers the years 2015-2024 and forecasts \$3.7 billion-\$4.5 billion in system improvements.

For more detailed information, please visit www.atc10yearplan.com.

Ronald C. Snead

Ron Snead
Vice President, System Planning

John F. McNamara

John McNamara
Vice President, Asset Management

Transmission investments

The 10-year projections from past and current Transmission System Assessments

	2011	2012	2013	2014	2015
Specific Network Projects	\$1.0B	\$1.9B	\$1.2B	\$1.4B	\$1.4B
Regional Multi-Value Projects	\$0.7B	\$0.8B	\$0.5B	\$0.5B	\$0.5B
Asset Maintenance	\$1.0B	\$1.1B	\$1.1B	\$1.2B	\$1.4B
Other Capital Categories	\$1.1B/\$1.7B	\$0.1B/\$1.0B	\$0.2B/\$0.8B	\$0.2B/\$0.8B	\$0.4B/\$1.2B
Total 10-Year Capital Cost	\$3.8B/\$4.4B	\$3.9B/\$4.8B	\$3.0B/\$3.6B	\$3.3B/\$3.9B	\$3.7B/\$4.5B

Regional and economic planning update

ATC continues to participate in a variety of efforts to address regional and inter-regional planning initiatives designed to maintain a reliable grid and capture economic benefits in a dynamic energy marketplace. Policy initiatives to curb greenhouse gas emissions and expand renewable energy usage continue to evolve, and we work closely with our customers to plan for a system that will meet their needs well into the future.



Midcontinent Independent System Operator Transmission Expansion Planning

MISO planning studies address long- and short-term issues as well as targeted needs. Long-term studies primarily look at value-based options that provide economic benefits in the 10- to 20-year horizon. Short-term planning is primarily driven by transmission owners' reliability and North American Electric Reliability Corp. compliance needs in a five- to 10-year period.

MTEP 15

Our staff participates in the short-term reliability and economic studies in a variety of ways: ensuring accurate project information is included in the MISO database, building and reviewing models, correlating needs identified by MISO analyses with specific ATC projects and participating in various studies and stakeholder forums.

ATC has developed a guideline for placing projects into MTEP appendices based on project status and in-service date. The guideline is based on typical lead times for projects, which can be affected by regulatory filings or time to procure equipment.

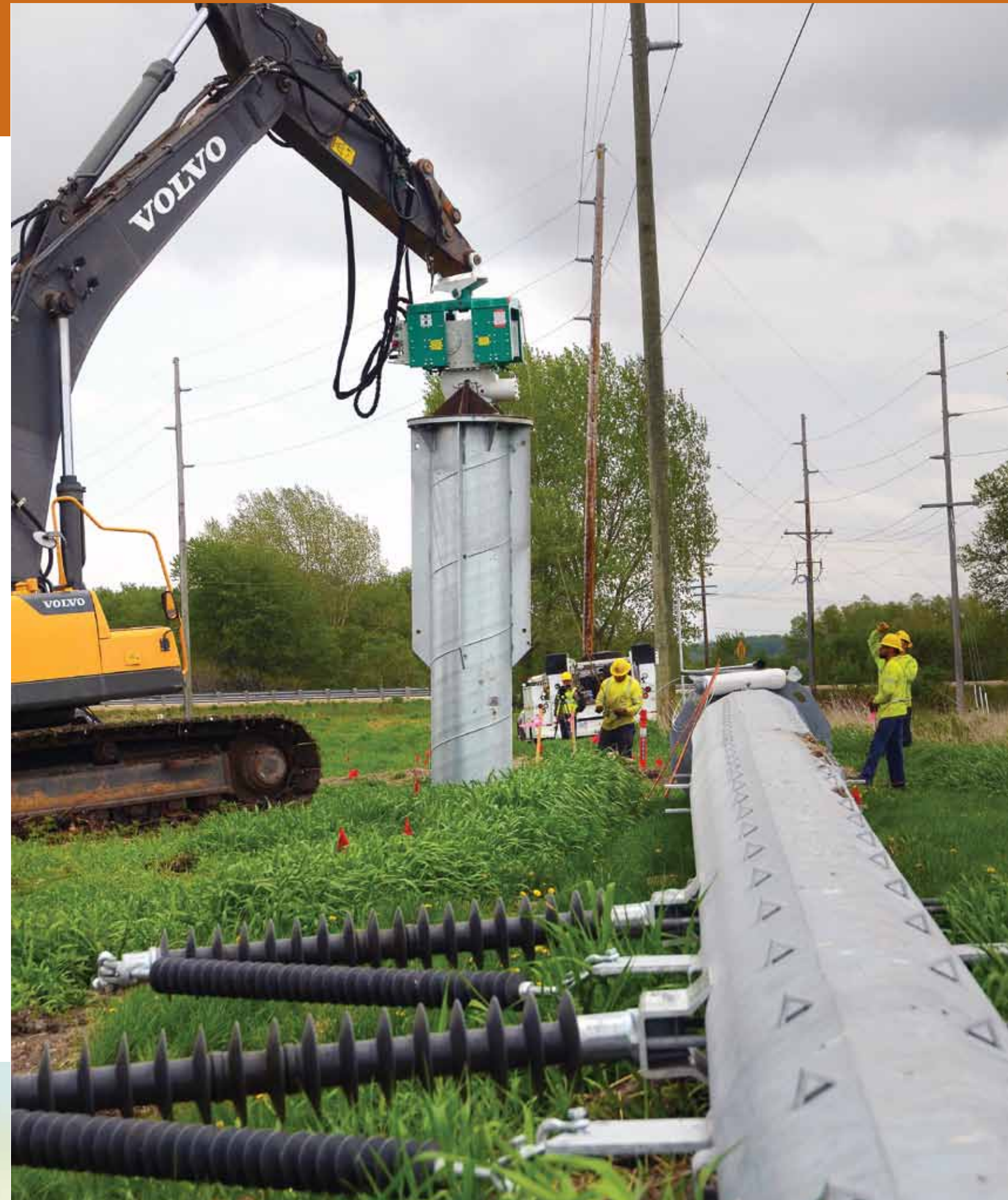
Market constraints

Two of the five narrowly constrained areas identified in the MISO region are associated with ATC, and we continue to track these as well as other constraints. Such tracking assists in planning projects that alleviate congestion within the MISO market. The Badger Coulee project should help alleviate congestion on the Minnesota to Wisconsin Exports Interface, which has been one of the most significant constraints for ATC over the last several years.

Other MISO planning activities

Our planning staff participates in various technical and policy discussions and provides future direction for MTEP activities. We also are involved in joint planning studies with neighboring regional transmission organizations, including PJM and SPP. MISO and PJM coordinated, conducted and analyzed several market efficiency project studies. This analysis is reviewed by an inter-regional planning stakeholder advisory committee and typically examines economic projects that could benefit both RTOs and qualify for cross-border cost-sharing.

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Major project update



Badger Coulee

Badger Coulee, one of MISO's 17 Multi-Value Projects, was approved by the Public Service Commission of Wisconsin in April 2015. The 180-mile, 345-kV line between the La Crosse and Dane County areas will deliver reliability, economic and public policy benefits. Sponsored jointly with Xcel Energy, the project will:

- Offset the need for about \$150 million in lower-voltage upgrades in western Wisconsin,
- Increase access to the wholesale energy market and provide between \$118 million and \$702 million in net economic benefits over the life of the project and
- Establish another pathway for renewable energy into Wisconsin with a connection to key load centers.

Construction is set to begin in 2016 to meet an in-service date of 2018.

Bay Lake

The Bay Lake Project is a package of proposals intended to address the delicate, shifting balance between generation, load and transmission in the northern portion of our service area.

Construction of the \$120 million Holmes-Old Mead Road portion of Bay Lake began earlier this year. It includes a single 58-mile, 138-kV line from the Holmes Substation in Menominee County to the Old Mead Road Substation in Escanaba, Mich. Anticipated in-service date is mid-2016.

The North Appleton-Morgan portion includes 345-kV and 138-kV lines from our North Appleton Substation in Outagamie County to the Morgan Substation in Oconto County, Wis.; both substations will

be expanded. A new substation, Benson Lake, will be required to accommodate a large voltage-control device at the site of our Amberg Substation in Marinette County. Additional work will be required at 11 other substations. The project was approved by the Public Service Commission of Wisconsin in May 2015. Construction of the \$328 million project is expected to begin in 2017 with an in-service date of 2019.

Cardinal-Hickory Creek

American Transmission Co. and ITC Midwest LLC have plans for a high-voltage transmission line connecting northeast Iowa and western Wisconsin. A study area from Dubuque County, Iowa, to Dane County, Wis., has been identified for the approximately 125-mile, 345-kV line.

The Cardinal-Hickory Creek project is another of MISO's Multi-Value Projects. Studies indicate that Cardinal-Hickory Creek is a multi-value project that would deliver benefits to local communities and the Midwest region by:

- Improving electric system reliability locally and regionally
- Delivering economic benefits for utilities and electric consumers
- Expanding infrastructure to support public policy for greater use of renewables

If approved by Wisconsin and Iowa regulators, construction is anticipated to begin in 2019.

Mackinac HVDC Station

The HVDC flow-control device placed into operation in 2014 has improved electric reliability in the Upper Peninsula of Michigan and northern Wisconsin. Previously, the transmission facilities in the eastern U.P. were tied to Lower Michigan, and the western U.P. facilities to northern Wisconsin because the system could not support the flow of power across the width of the peninsula. The HVDC device now facilitates that support, and provided benefits almost immediately. An unplanned outage on transmission facilities in northern Wisconsin in fall 2014 almost surely would have caused customers in the U.P. to lose service without the new facility, but the HVDC device provided system support, maintaining reliability by allowing a continuous flow of power.

Northern Area Reliability Assessment

ATC initiated an effort in 2014 to engage stakeholders and identify potential reinforcements due to generation uncertainties in the northern portion of the ATC system. The 10-year project list includes the following preliminary projects:

- Plains-National 138-kV line
- Plains-Arnold 138-kV line upgrade
- Increased Plains 345/138-kV transformer capacity
- Morgan-Thunder-Crivitz 138-kV project

ATC is collaborating with MISO to include these projects in MTEP 15. ATC is supportive of efforts in Michigan to add generation in the area and will continue to assess the need for these projects as generation proposals mature.

Southeast Wisconsin-Northeastern Illinois Interface

We are studying a reinforcement project to address reliability concerns associated with the Southeast Wisconsin – Northeastern Illinois Interface. The project consists of reconfiguring two 345-kV lines in Wisconsin and Illinois, linking them with about three miles of double-circuit 345-kV lines and a new substation.

ATC has introduced the proposed project to the MISO regional planning process. The preliminary cost is estimated to be \$52 million, with a projected in-service date of 2020.

Spring Valley-North Lake Geneva

New and upgraded transmission facilities are needed to meet an increase in electric demand in Walworth and Kenosha counties in Wisconsin. The project involves:

- Construction of a new 138-kV transmission line of approximately 25 miles, stretching from the North Lake Geneva Substation in southern Walworth County to the Spring Valley Substation in western Kenosha County
- Construction of a new 138- and 69-kV substation on an ATC-owned parcel along Highway 50 in the Town of Wheatland or at the Richmond Road Substation site in the Town of Randall
- Construction of a new 69-kV transmission line to connect the new substation to the existing Twin Lakes Substation in Twin Lakes
- Depending on the route and substation site, other power line modifications may be needed

The \$71 million to \$91 million project is being reviewed by the Public Service Commission of Wisconsin. If approved, construction would begin in 2017 to meet a 2019 in-service date.



Our progress

1,944

MILES OF TRANSMISSION LINE

UPGRADED

6,000^{MW}

OF NEW GENERATION AT 24 SITES

CONNECTED

\$100^{MILLION}

IN ENERGY COSTS
PER YEAR

SAVED

One of the first efforts ATC undertook when it began operations in 2001 was to improve transmission capacity through better coordination of planning, construction and operation of transmission assets. Prior to ATC's creation, the transmission grid in our service area was operating at its limits. There was little incentive for transmission owners to make investments in the system; it was geographically constrained by its presence between two of the Great Lakes and outages of major generators exposed weaknesses in the capability of the grid.

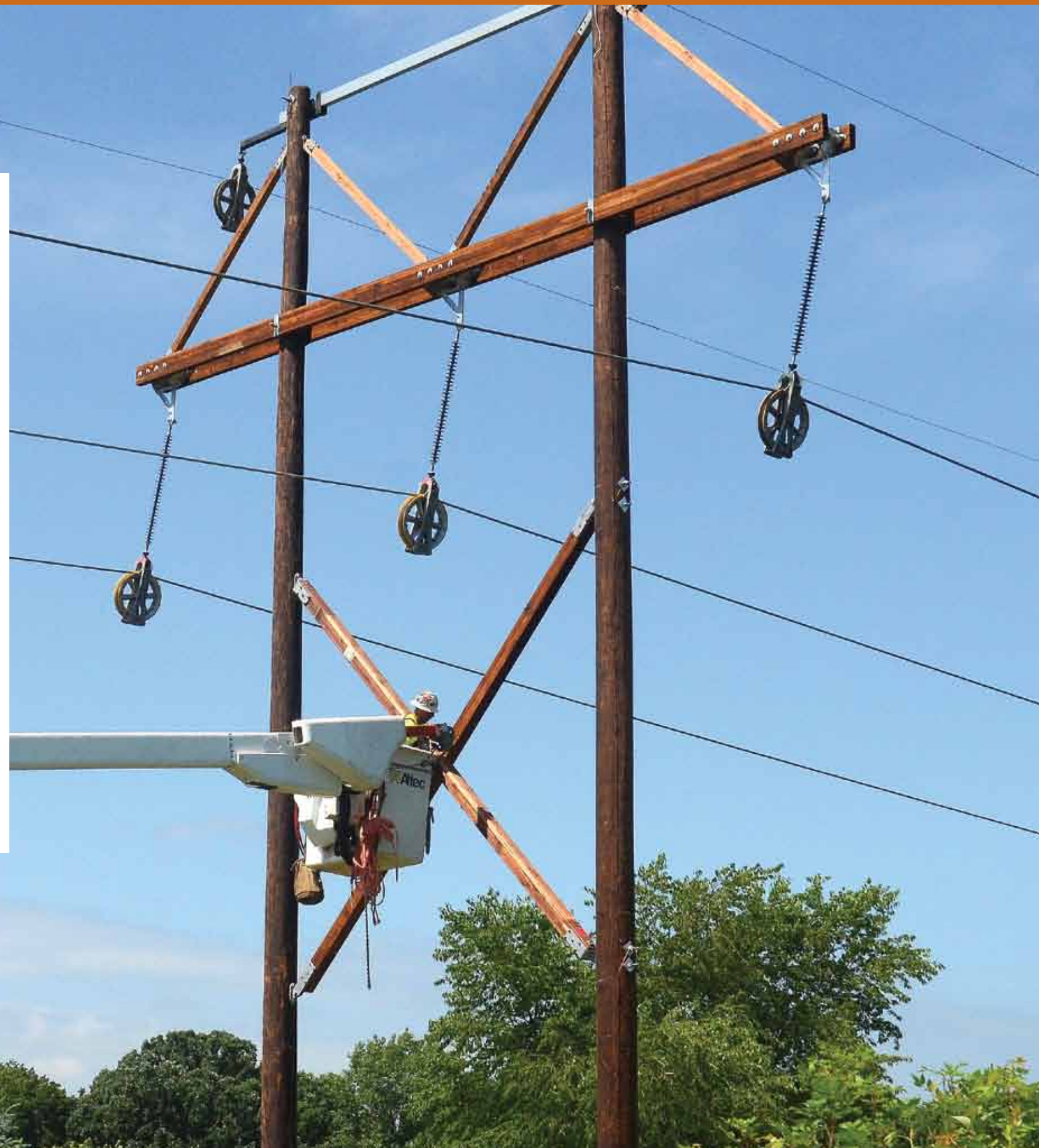
ATC developed a system-wide planning process to effectively and economically improve electric reliability. Today, after \$3.5 billion in investment, we have created a grid that enables our customers to participate in and reap the benefits of the wholesale energy market. Our flexible, responsive planning process also is adapting to the changing ways the grid is being used to realize the economic opportunities provided by that marketplace.

Due in large part to our asset management efforts, our reliability has remained best-in-class in several industry benchmarking studies. For 2014, we scored in the top decile for 100-kV to 161-kV performance and top quartile for 345- to 500-kV and 69-kV performance with our peer transmission operators.

The value of our single-focus, transmission-only company is highlighted by our unparalleled success in planning, siting, building, maintaining and operating electric transmission.

Since we were formed in 2001, we have:

- Upgraded more than 1,944 miles of transmission lines,
- Improved 170 electric substations,
- Built 51 new transmission lines (621 miles),
- Connected 6,000 MW of new generation at 24 sites,
- Saved customers more than \$100 million a year in reduced energy costs with access to the marketplace and lower line losses,
- Increased import and export capability and
- Improved transmission reliability.



What drives the need for transmission system improvements?

Our planning strategy complements our asset management efforts to effectively maximize reliability and economic benefits.

Early in our operational existence, we focused on “seams” issues – finding the logical places in our service area to link transmission assets to create a smooth-flowing electrical highway to serve our customers. Those major network-driven projects accounted for significant expenditures in the build-out of our 345-kV system. As we were making our network more interconnected and reliable, we also focused on the life cycle maintenance of our existing assets and on an asset management strategy to complement and create synergies with our network additions.

Today, our effective management of transmission components complements our planning strategy for reliability and economic benefits.

In a collaborative process, asset management and planning work with other functional groups and stakeholders to achieve the best solutions to transmission system needs. Asset management staff monitor the system through maintenance and inspection programs to identify issues related to equipment performance or condition. Equipment needing attention is discussed with planning to determine if other reliability needs exist on that line or within the geographical area. Projects are evaluated using various options to determine the best means of maintaining reliability.

Common needs that drive system improvements include:

- **New or retiring generating units** – changes in generation impact transmission
- **Economics** – greater access to the wholesale energy marketplace provides economic opportunities to utility customers
- **Public policy** – renewable energy mandates and pending air quality regulations will affect how the transmission system will be built and used
- **Asset renewal** – maintaining the system in good operating condition extends its life and improves safety and performance
- **New technologies** – synchronized phasor measurements, demand-side management and distributed resources affect how the grid is planned and operated to maintain reliability
- **Communications** – improvements in communication technology, such as fiber optics, are incorporated to support an ever-increasing need to see and control what is happening on the transmission system in real time
- **Interconnections** – changes in how our customers distribute electricity to consumers require new or modified transmission facilities

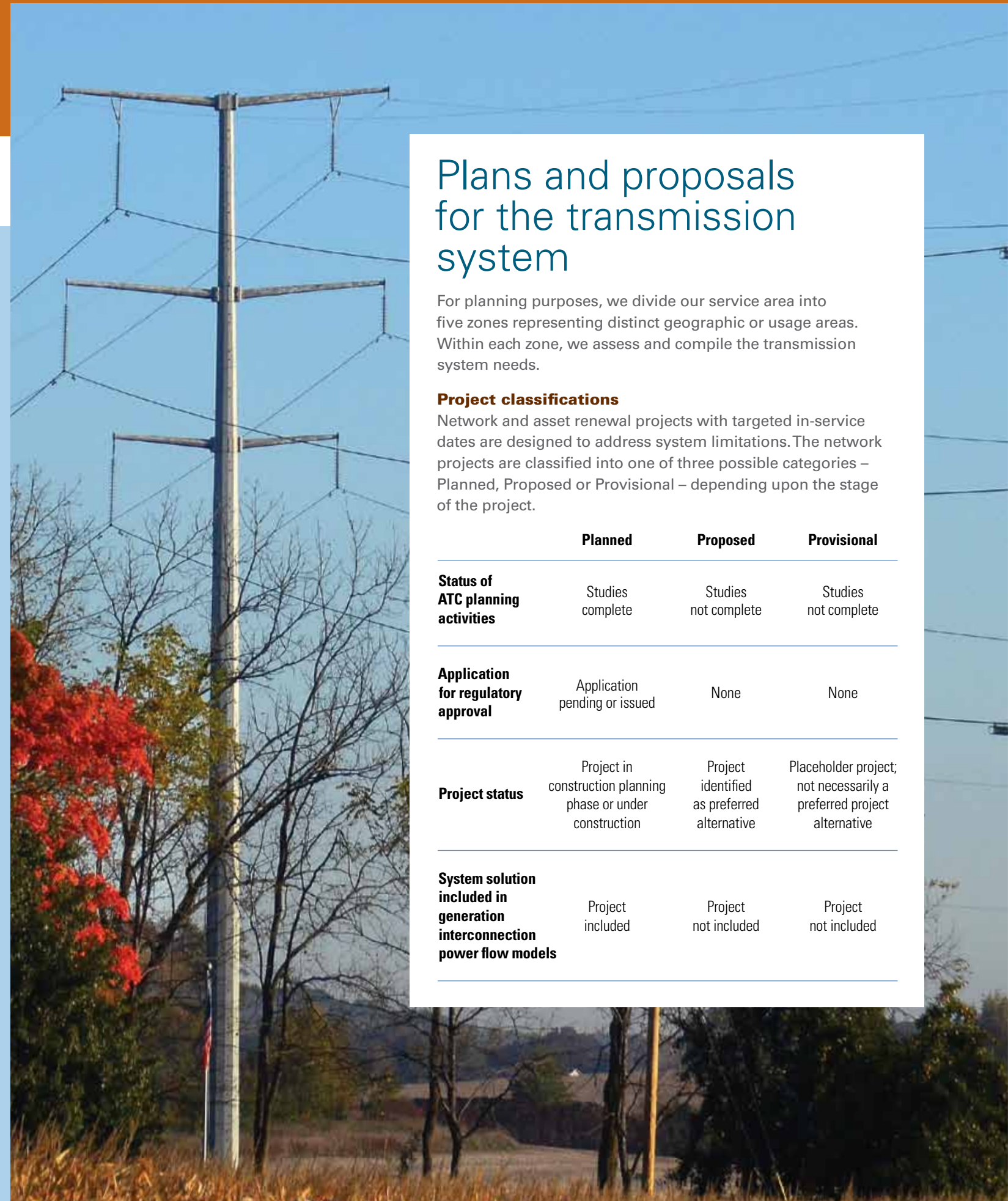
Plans and proposals for the transmission system

For planning purposes, we divide our service area into five zones representing distinct geographic or usage areas. Within each zone, we assess and compile the transmission system needs.

Project classifications

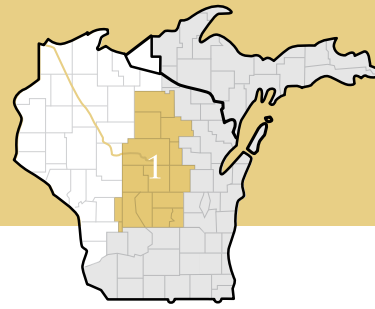
Network and asset renewal projects with targeted in-service dates are designed to address system limitations. The network projects are classified into one of three possible categories – Planned, Proposed or Provisional – depending upon the stage of the project.

	Planned	Proposed	Provisional
Status of ATC planning activities	Studies complete	Studies not complete	Studies not complete
Application for regulatory approval	Application pending or issued	None	None
Project status	Project in construction planning phase or under construction	Project identified as preferred alternative	Placeholder project; not necessarily a preferred project alternative
System solution included in generation interconnection power flow models	Project included	Project not included	Project not included



NORTH CENTRAL WISCONSIN

Zone 1



Counties included in Zone 1 – North Central Wisconsin

- Adams
- Forest
(southwestern portion)
- Fond du Lac
(northwestern portion)
- Green Lake
- Juneau
- Langlade
- Lincoln
- Marathon
- Marquette
- Monroe
(eastern portion)
- Oneida
- Portage
- Shawano
(western portion)
- Vernon
(eastern portion)
- Vilas
(southern portion)
- Waupaca
- Waushara
- Winnebago
(western portion)
- Wood

Transmission system characteristics in Zone 1

ATC delivers power in Zone 1 with various transmission facilities including:

- East-west 345-kV line from Arpin Substation through Stevens Point extending to the Appleton area,
- 345-kV line extending from Wausau to northeastern Minnesota,
- 345-kV line extending from Stevens Point north to Wausau toward eastern Shawano County (Highway 22),
- 115-kV network in the northern portion of the zone and
- 138-kV and 69-kV network in the southern portion of the zone.

Transmission system limitations in Zone 1

Key system performance issues in Zone 1 include low voltages and thermal overloads in the southern portion of the zone. These issues will necessitate a combination of reinforcements. For the northern portion of the zone, other ongoing studies have identified voltage and thermal limitations. The most severe limitations occur during both peak and off-peak periods.

ELECTRIC SYSTEM OVERVIEW

Slight increases expected in population, employment

Population in Zone 1 is projected to grow at 0.6 percent annually between now and 2024. Employment is projected to grow at 1.0 percent annually between now and 2024. Marathon County is projected to realize the largest increase in population and employment, while Adams County is projected to have the highest growth rate in population and employment.

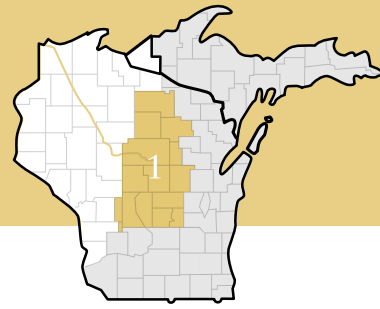
Electricity usage

Peak electric demand typically occurs during the summer months, with some winter peaks appearing in the northern portion of the zone. Primary electricity users in Zone 1 include a number of large paper mills and food processing plants.

Electric load is forecasted to grow approximately 0.4 percent annually through 2025.



NORTH CENTRAL WISCONSIN Zone 1

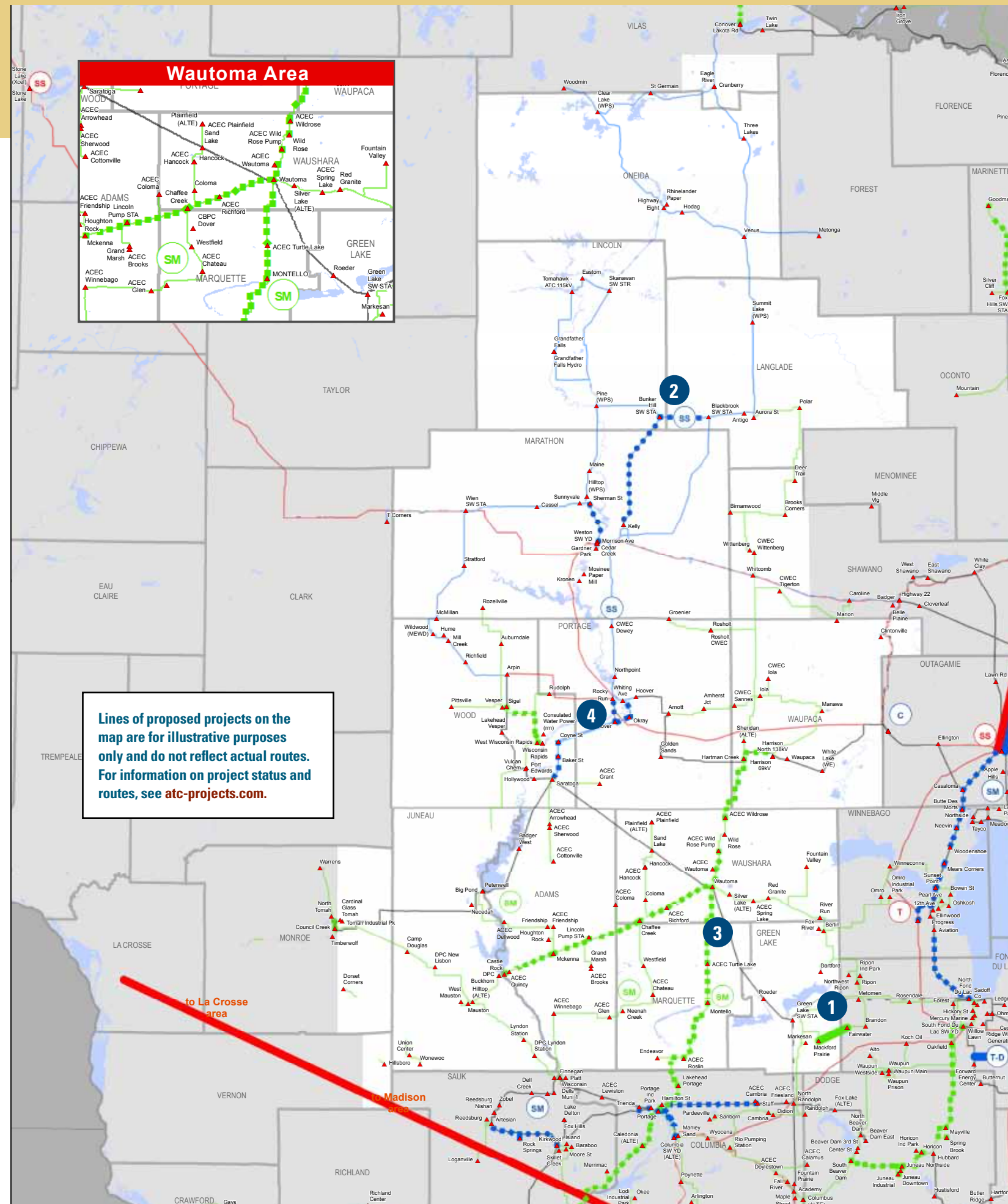


TRANSMISSION PROJECTS IN ZONE 1

The most notable planned, proposed and provisional network projects and asset renewal projects in Zone 1, 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 Fairwater-Mackford Prairie 69-kV line construction	2017	Network service, condition, overloads and low voltages
Proposed Projects		
2 M13 Reinforcement Bunker Hill-Blackbrook	2019	Overloads and condition
Provisional Projects		
None		
Asset Renewal Projects		
3 Montello-Wautoma 69-kV line rebuild	2016	Condition and performance
4 Plover-Whiting 115-kV line rebuild	2019	Condition and performance

Additional projects may be found in the full 10-Year Assessment at atc10yearplan.com.



System Solutions Key

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 or reactor Relieves low voltages or high voltages T-D T-D interconnection Supports local growth	TRANSMISSION LINE KEY 345-kV transmission line 115-, 138- or 161-kV transmission line 69-kV transmission line Rebuilt 115- or 138-kV transmission line Rebuilt 69-kV transmission line 115- or 138-kV transmission line rating upgrade 69-kV transmission line rating upgrade	EXISTING TRANSMISSION LINES KEY 69 kV 161 kV 115 kV 230 kV 138 kV 345 kV
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MICHIGAN'S UPPER PENINSULA AND NORTHERN WISCONSIN

Zone 2



Counties included in Zone 2 – Michigan's Upper Peninsula and Northern Wisconsin

- 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.
- Marquette, Wis.
(northern portion)
- Marquette, Mich.
- Menominee, Mich.
(northern portion)
- Ontonagon, Mich.
(eastern portion)
- Schoolcraft, Mich.
- Vilas, Wis.
(northern portion)

Transmission system characteristics in Zone 2

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

- Morgan-Plains and Plains-Dead River 345-kV lines,
- Plains-Stiles 138-kV double-circuit line,
- Lakota Road-Plains 138-kV line and
- 138-kV facilities tying the Upper Peninsula of Michigan to Lower Michigan.

Transmission system limitations in Zone 2

There are a number of transmission system performance issues in Zone 2 including limited ability to import or export power, generator instability, overloaded lines and equipment, low system voltages and chronic limitations to transmission service. Primary drivers of these issues include a mismatch of load to generation in the Upper Peninsula and aging facilities in poor condition. In addition, other ongoing studies, including Northern Area Studies performed by ATC and MISO, have identified several voltage and thermal limitations. The most severe limitations occur during both peak and off-peak periods.

While not specifically identified in the project list for this assessment, ATC's capital forecast anticipates reinforcements

needed to address pending generation retirements such as White Pine. The scope for a project to address White Pine retirements is under review. It might include conversion of the 69-kV facilities between the Conover Substation in northern Wisconsin and the Winona Substation in Michigan to 138-kV operation.

ELECTRIC SYSTEM OVERVIEW

Small increases expected in population, employment

Population in Zone 2 is projected to grow about 0.3 percent annually between now and 2024, and employment is expected to grow about 0.9 percent each year in the same time period. Marquette County, Mich. is projected to realize the largest increase in both employment and growth rate.

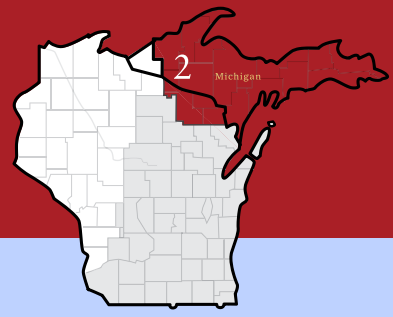
Electricity usage

Zone 2 typically experiences peak electric demand during the winter months. Ore mining and paper mills are the largest electricity users in the zone.

Electric load is forecasted to increase by 0.3 percent annually through 2025. Also, locally generated electricity is declining in the area with smaller, coal-fired generators most at risk. This includes generation owned by industry, municipalities and utilities.



MICHIGAN'S UPPER PENINSULA AND NORTHERN WISCONSIN Zone 2



TRANSMISSION PROJECTS IN ZONE 2

The most notable planned, proposed and provisional network projects and asset renewal projects in Zone 2, along with their projected year of completion and the factors driving the need for the projects, are listed on page 19.

PROJECT DESCRIPTION	IN-SERVICE YEAR	NEED DRIVER
Planned Projects		
1 Bay Lake: Holmes-Old Mead Road 138-kV project	2016	Overloads and low voltages
2 Bay Lake: Benson Lake 138-kV Substation – Installation of SVC	2019	Overloads and low voltages
Proposed Projects		
None		
Provisional Projects		
3 Plains-National 138-kV project	2020	Overloads and low voltages
4 Plains 345/138-kV project	2020	Overloads and low voltages
5 Plains-Arnold 138-kV uprate	2020	Overloads and low voltages
6 Winona-Atlantic 69-kV line rebuild	2022	Overloads and low voltages
Asset Renewal Projects		
7 Pine River-Hiawatha 69-kV line partial rebuild	2018	Condition and performance
8 Munising-Gwinn 69-kV line partial rebuild	2018	Condition and performance

Additional projects may be found in the full 10-Year Assessment at atc10yearplan.com.

System Solutions Key

SUBSTATION KEY

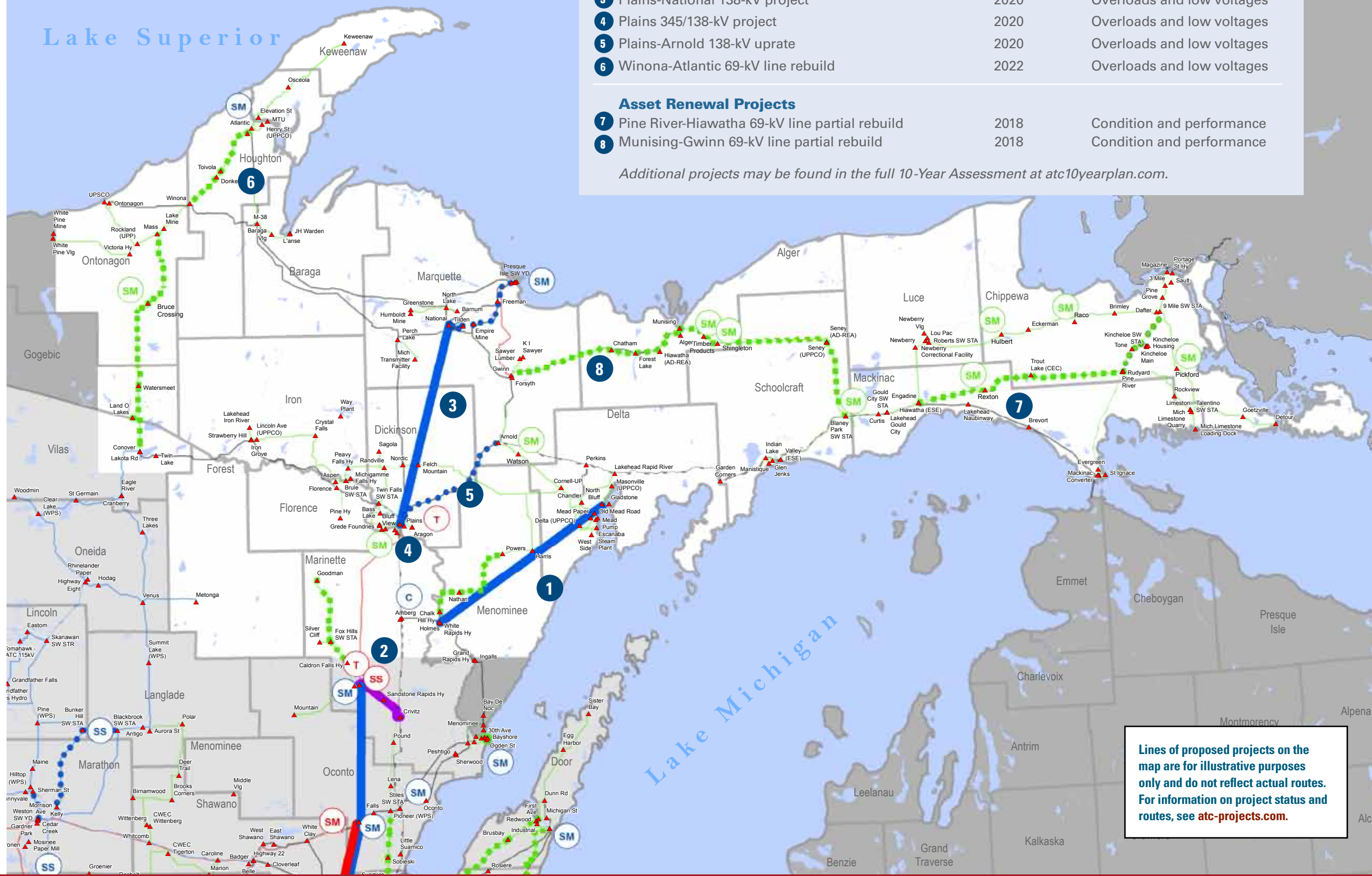
- SS** New substation
Supports transmission system expansion
- SM** Substation modifications
Upgrades equipment ratings to avert facility overloads
- T** Transformer
Supports local growth and improves voltage levels
- C** Capacitor bank
Relieves low voltages or high voltages
- T-D** T-D interconnection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

TRANSMISSION LINE KEY

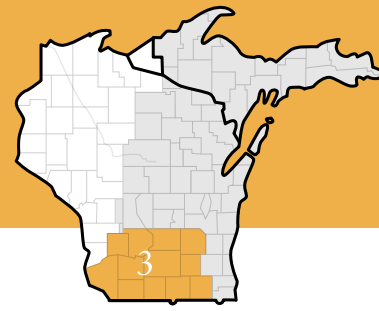
- Orange line: 345-kV transmission line
- Blue line: 115-, 138- or 161-kV transmission line
- Green line: 69-kV transmission line
- Purple line: Transmission line voltage conversion
- Blue dashed line: Rebuilt 115- or 138-kV transmission line
- Green dashed line: Rebuilt 69-kV transmission line
- Blue dotted line: 115- or 138-kV transmission line rating upgrade
- Green dotted line: 69-kV transmission line rating upgrade

EXISTING TRANSMISSION LINES KEY

- Green line: 69 kV
- Blue line: 115 kV
- Orange line: 138 kV
- Pink line: 161 kV
- Yellow line: 230 kV
- Red line: 345 kV



Lines of proposed projects on the map are for illustrative purposes only and do not reflect actual routes. For information on project status and routes, see atc-projects.com.



**Counties included
in Zone 3 –
South Central/
Southwest Wisconsin
and North Central
Illinois**

Columbia

Crawford
(southern portion)

Dane

Dodge

Grant

Green

Iowa

Lafayette

Jefferson

Richland

Rock

Sauk

Walworth

Winnebago, Ill.
(northern portion)

**Transmission system
characteristics in Zone 3**

ATC delivers power in Zone 3 with various transmission facilities including:

- Columbia-North Madison 345-kV lines,
- Columbia-Rockdale 345-kV line,
- Paddock-Rockdale 345-kV line,
- Paddock-Wempletown 345-kV line,
- Rockdale-Wempletown 345-kV line,
- Rockdale-Cardinal 345-kV line and
- 138-kV facilities from the Nelson Dewey Power Plant, around the Madison area, and in the northwest and southeast portions of Zone 3.

**Transmission system
limitations in Zone 3**

In our analysis of Zone 3, we identified low voltages, high voltages and transmission-facility overloads. Low voltages are located in the Verona, Lake Geneva and Hustisford areas. Several overloads on 138-kV and 69-kV facilities in Zone 3 are emerging concerns. The causes of these emerging issues include steady growth in certain areas, power plant retirements and different generation dispatch scenarios.

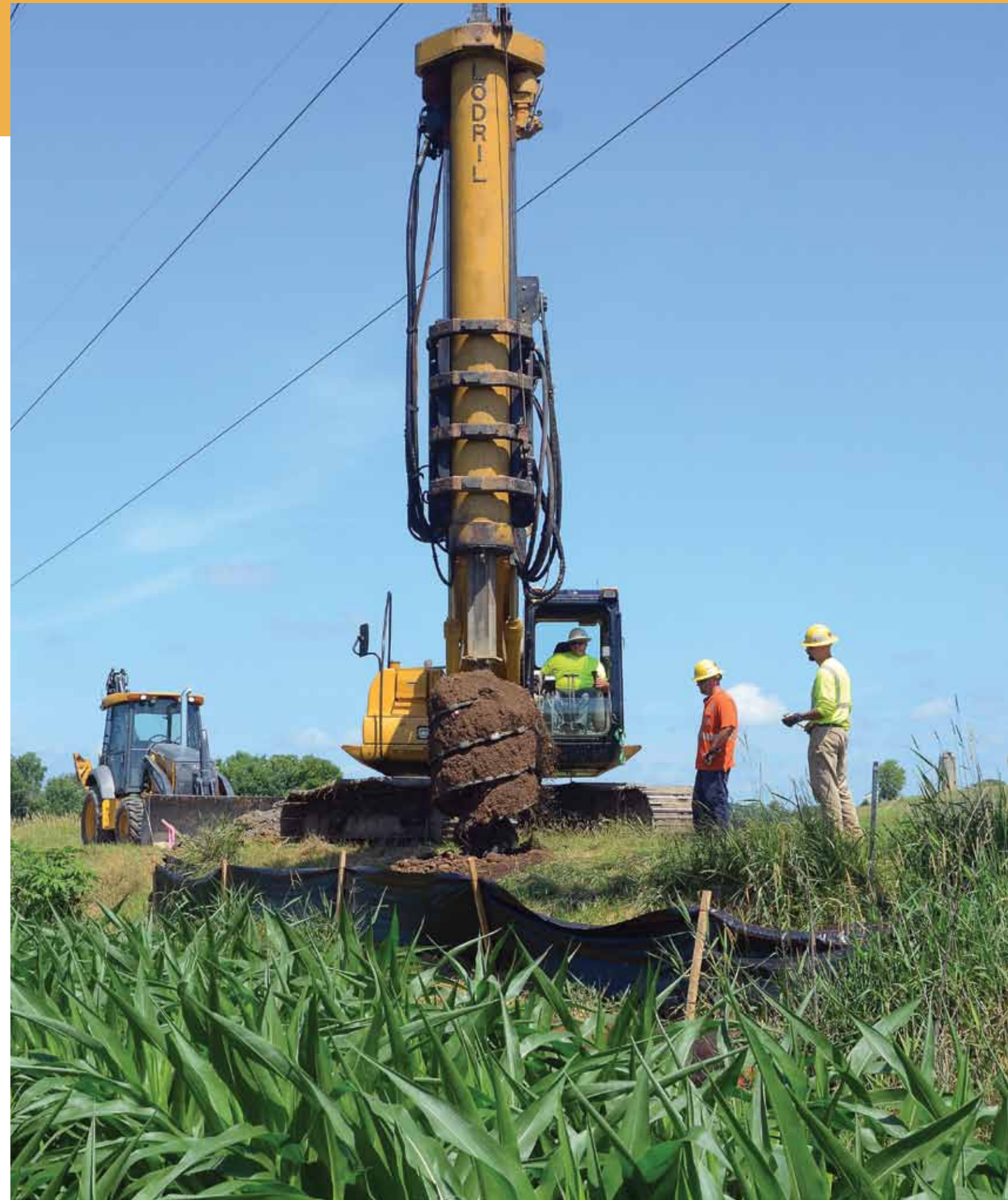
ELECTRIC SYSTEM OVERVIEW

**Increases expected in
population, employment**

Population in Zone 3 is projected to grow about 0.9 percent annually between now and 2024, and employment is projected to grow about 1.4 percent each year for the same time period. Dane County is projected to realize the largest increase in population and employment.

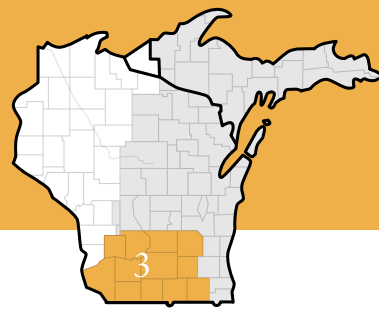
Electricity usage

Electric load is forecasted to grow approximately 1.0 percent annually through 2025.



SOUTH CENTRAL/SOUTHWEST WISCONSIN AND NORTH CENTRAL ILLINOIS

Zone 3



TRANSMISSION PROJECTS IN ZONE 3

The most notable planned, proposed and provisional network projects and asset renewal projects in Zone 3, along with their projected year of completion and the factors driving the need for the projects, are listed on page 23.

Lines of proposed projects on the map are for illustrative purposes only and do not reflect actual routes. For information on project status and routes, see atc-projects.com.

PROJECT DESCRIPTION	IN-SERVICE YEAR	NEED DRIVER
Planned Projects		
1 Colley Road-Brick Church 69-kV line	2018	Overloads, low voltages and condition
2 Badger Coulee: La Crosse area-North Madison-Cardinal 345-kV line construction	2018	Reliability, economics and public policy
3 Spring Valley-North Lake Geneva 138-kV line	2019	Overloads and low voltages, provide network service
Proposed Projects		
4 Cardinal-Hickory Creek	2020	Reliability, economics and public policy
Provisional Projects		
5 Cardinal-Blount 138-kV line construction	2029	Overloads and low voltages
Asset Renewal Projects		
6 Dam Heights-Dane 69-kV line re-route at dam	2015	Condition and performance
7 Concord-Rubicon 138-kV line rebuild (portion of Quad County Electric Reliability Project)	2016	Condition and performance
8 Dam Heights-Portage 69-kV line rebuild	2017	Condition and performance
9 Boscobel-Lone Rock 69-kV line rebuild	2019	Condition and performance

Additional projects may be found in the full 10-Year Assessment at atc10yearplan.com.

System Solutions Key

SUBSTATION KEY

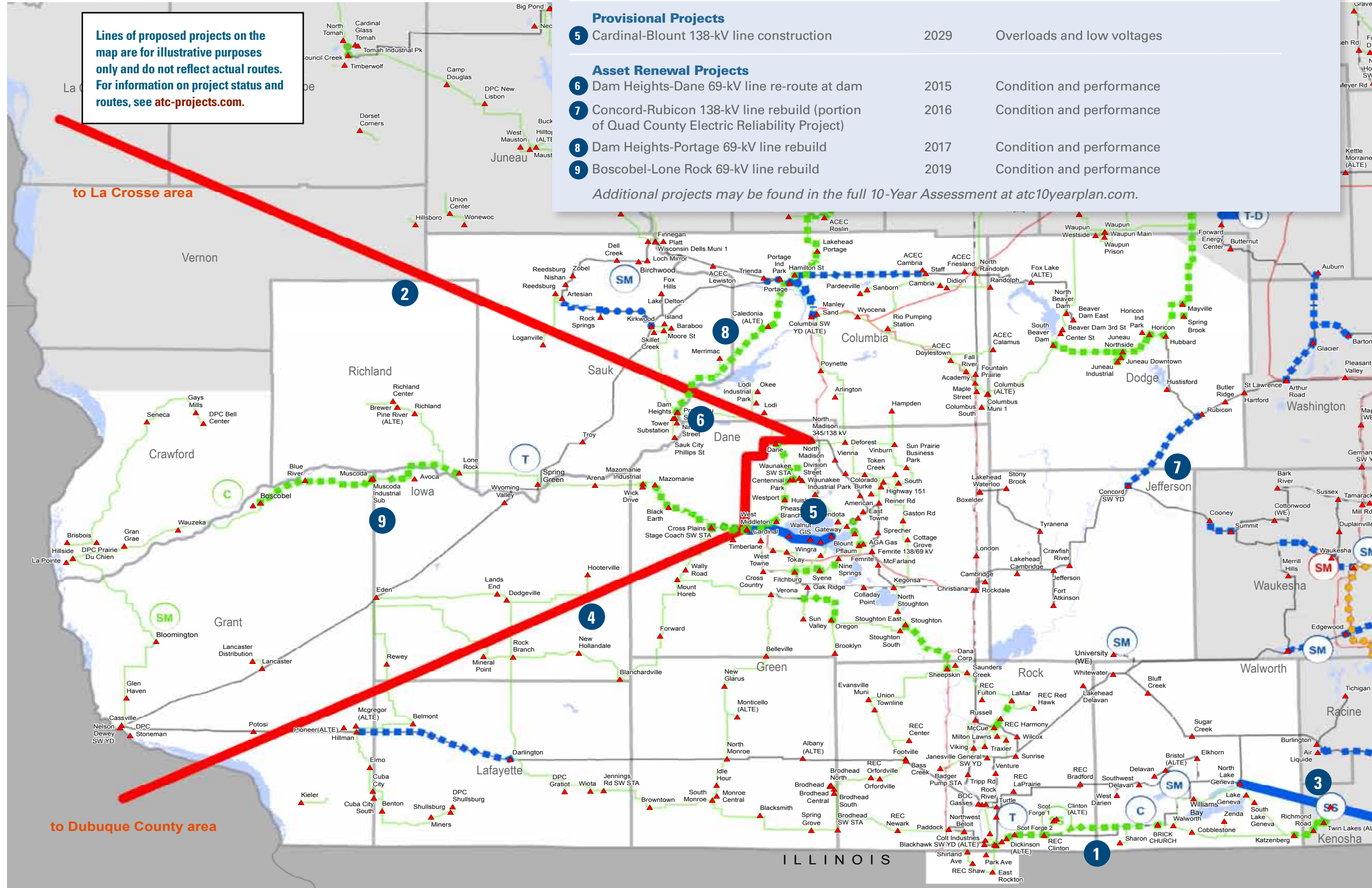
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Supports transmission system expansion
- SM** Substation modifications
Upgrades equipment ratings to avert facility overloads
- T** Transformer
Supports local growth and improves voltage levels
- C** Capacitor bank
Relieves low voltages or high voltages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

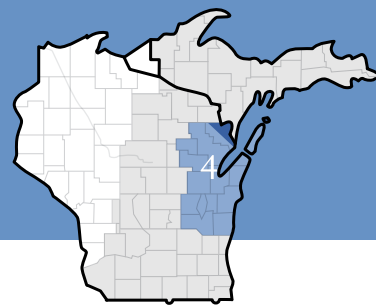
TRANSMISSION LINE KEY

- Red line: 345-kV transmission line
- Blue line: 115-, 138- or 161-kV transmission line
- Green line: 69-kV transmission line
- Blue dashed line: Rebuilt 115- or 138-kV transmission line
- Green dashed line: Rebuilt 69-kV transmission line
- Blue dotted line: 115- or 138-kV transmission line rating upgrade
- Green dotted line: 69-kV transmission line rating upgrade

EXISTING TRANSMISSION LINES KEY

- Green line: 69 kV
- Blue line: 115 kV
- Red line: 138 kV
- Pink line: 161 kV
- Yellow line: 230 kV
- Orange line: 345 kV





Counties included in Zone 4 – Northeast Wisconsin

- Brown**
- Calumet**
- Dodge**
(northeastern 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)

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

- Four 345-kV lines extending from the Point Beach Nuclear Plant,
- 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,
- 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 our analysis of Zone 4, we continue to monitor potential high voltages in the Outagamie and Calumet counties and impending low voltages in Brown County. In addition, other ongoing studies have identified several voltage and thermal limitations. The most severe limitations occur during both peak and off-peak periods.

ELECTRIC SYSTEM OVERVIEW

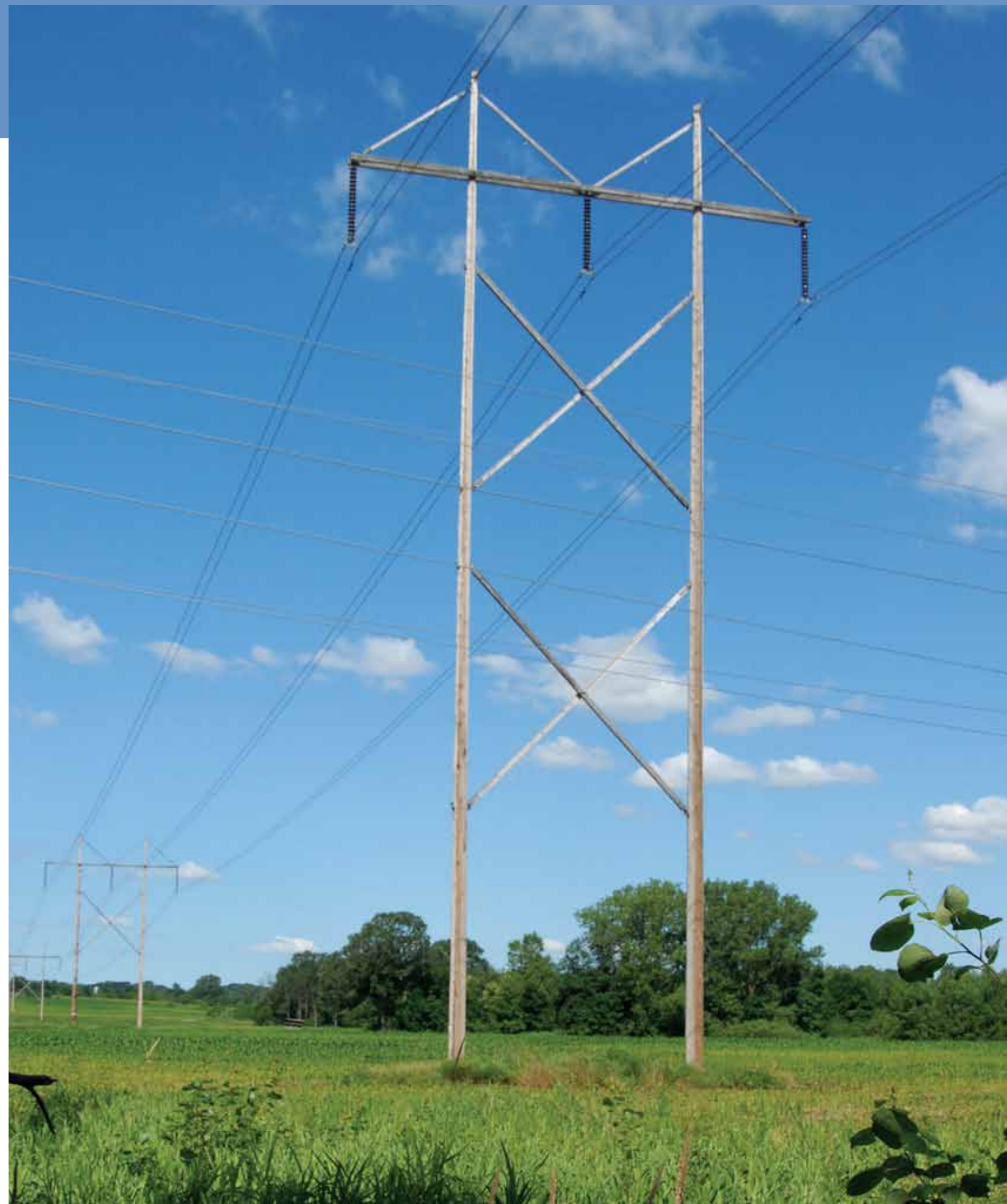
Increases expected in population, employment

Population in Zone 4 is projected to grow 0.7 percent annually between now and 2024. Brown County is expected to realize the largest increase in population. Employment is projected to grow 1.1 percent annually in the same time period, with the largest increase projected in Brown County.

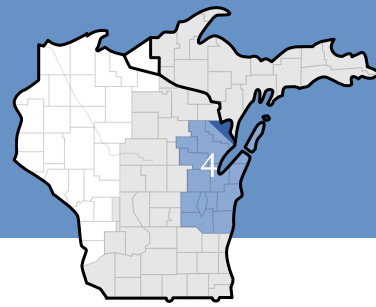
Electricity usage

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 forecasted to grow at approximately 0.5 percent annually through 2025. Also, locally generated electricity is declining in the area with smaller, coal-fired generators most at risk. This includes generation owned by industries, municipalities and utilities.



NORTHEAST WISCONSIN Zone 4

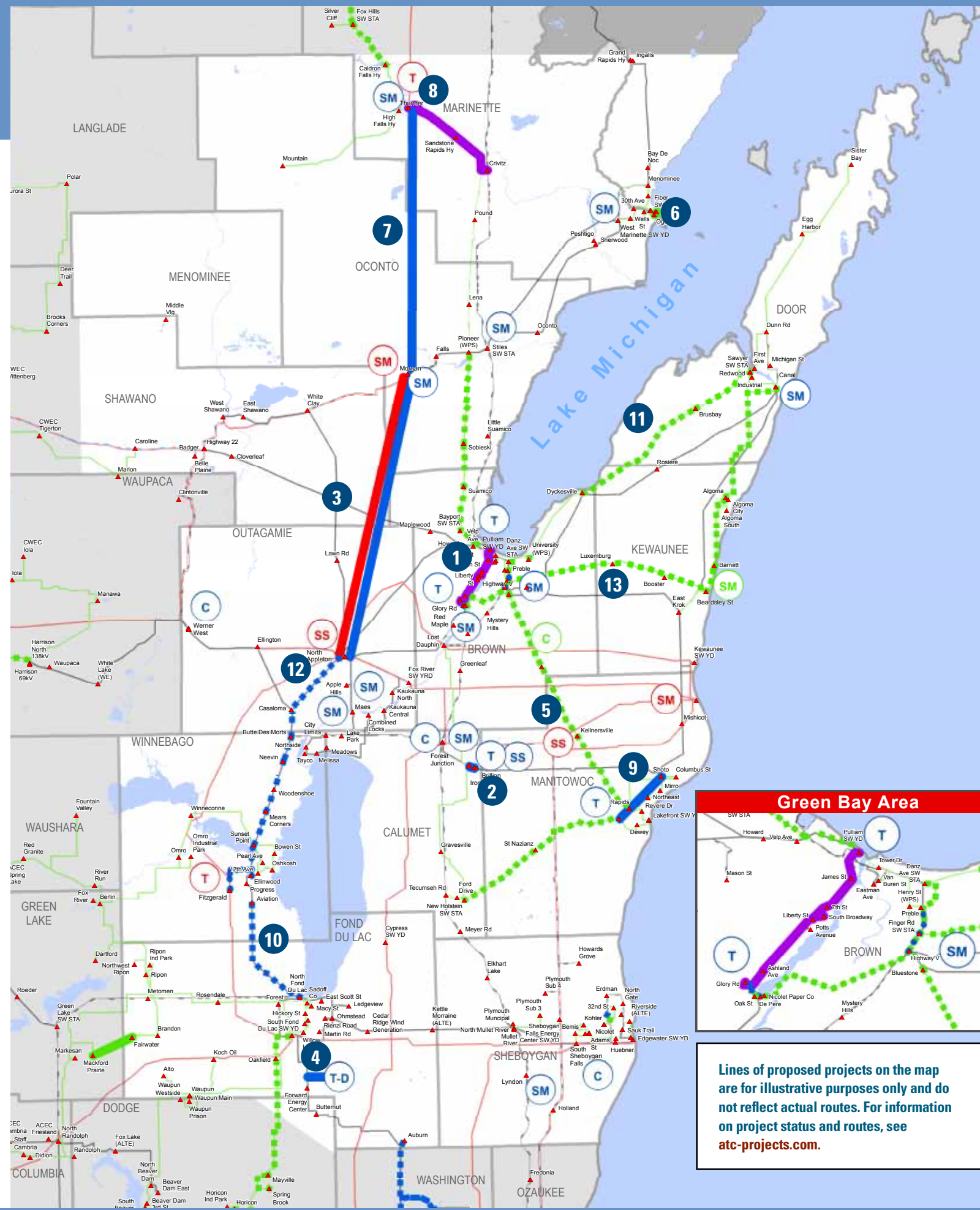


TRANSMISSION PROJECTS IN ZONE 4

The most notable planned, proposed and provisional network projects and 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
Planned Projects		
1 Pulliam-Glory Road 138-kV line conversion	2016	Overloads and low voltages
2 Iron Foundry 138/69-kV Substation construction and Glenview-Iron Foundry 69-kV line extension	2016	T-D interconnection Overloads and low voltages
3 Bay Lake: North Appleton-Morgan 345-kV and 138-kV line construction	2019	
4 Creekview Substation: 138-kV line construction to serve T-D interconnection	2017	T-D interconnection 2017
5 Branch River 345-kV Substation construction	2018	Accommodate new generation
Proposed Projects		
6 Ogden St.-Bayshore 69-kV line construction	2018	Provide network service
Provisional Projects		
7 Morgan-Thunder 138-kV project	2020	Overloads and low voltages
8 Morgan-Plains 345-kV loop into new Thunder 345-kV Substation	2020	Overloads and low voltages
9 Shoto-Custer 138-kV line	2022	Overloads and low voltages
10 Aviation-North Fond du Lac 138-kV line rebuild	2025	Overloads
Asset Renewal Projects		
11 Dyckesville-Sawyer 69-kV line rebuild	2016	Condition and performance
12 North Appleton-Butte des Morts 138-kV rebuild	2017	Condition and performance
13 Finger Road-Canal 69-kV line rebuild	2019	Condition and performance

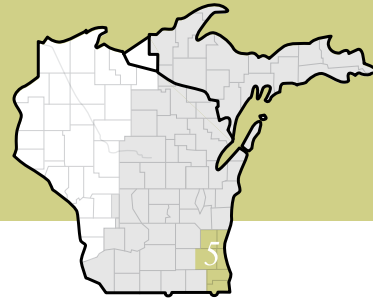
Additional projects may be found in the full 10-Year Assessment at atc10yearplan.com.



System Solutions Key

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

Lines of proposed projects on the map are for illustrative purposes only and do not reflect actual routes. For information on project status and routes, see atc-projects.com.



Counties included in Zone 5 – Southeast Wisconsin

- Kenosha
- Milwaukee
- Ozaukee
- Racine
- Washington
- Waukesha

Transmission system characteristics in Zone 5

ATC delivers power in Zone 5 with various transmission facilities including:

- The southern portion of 345-kV lines from Point Beach and Edgewater,
- The Saukville, Arcadian, Granville, Oak Creek, and Racine 345/138-kV substations,
- The transmission lines emanating from the Pleasant Prairie and Oak Creek power plants,
- 230-kV facilities near Milwaukee and
- A significant 138-kV network in the Milwaukee area, a portion of which is underground.

Transmission system limitations in Zone 5

Transmission system performance issues in Zone 5 are generally related to heavy market flows to and from the south, resulting in high 345-kV and 138-kV line loadings and the need to monitor potential multiple contingency conditions.

ELECTRIC SYSTEM OVERVIEW

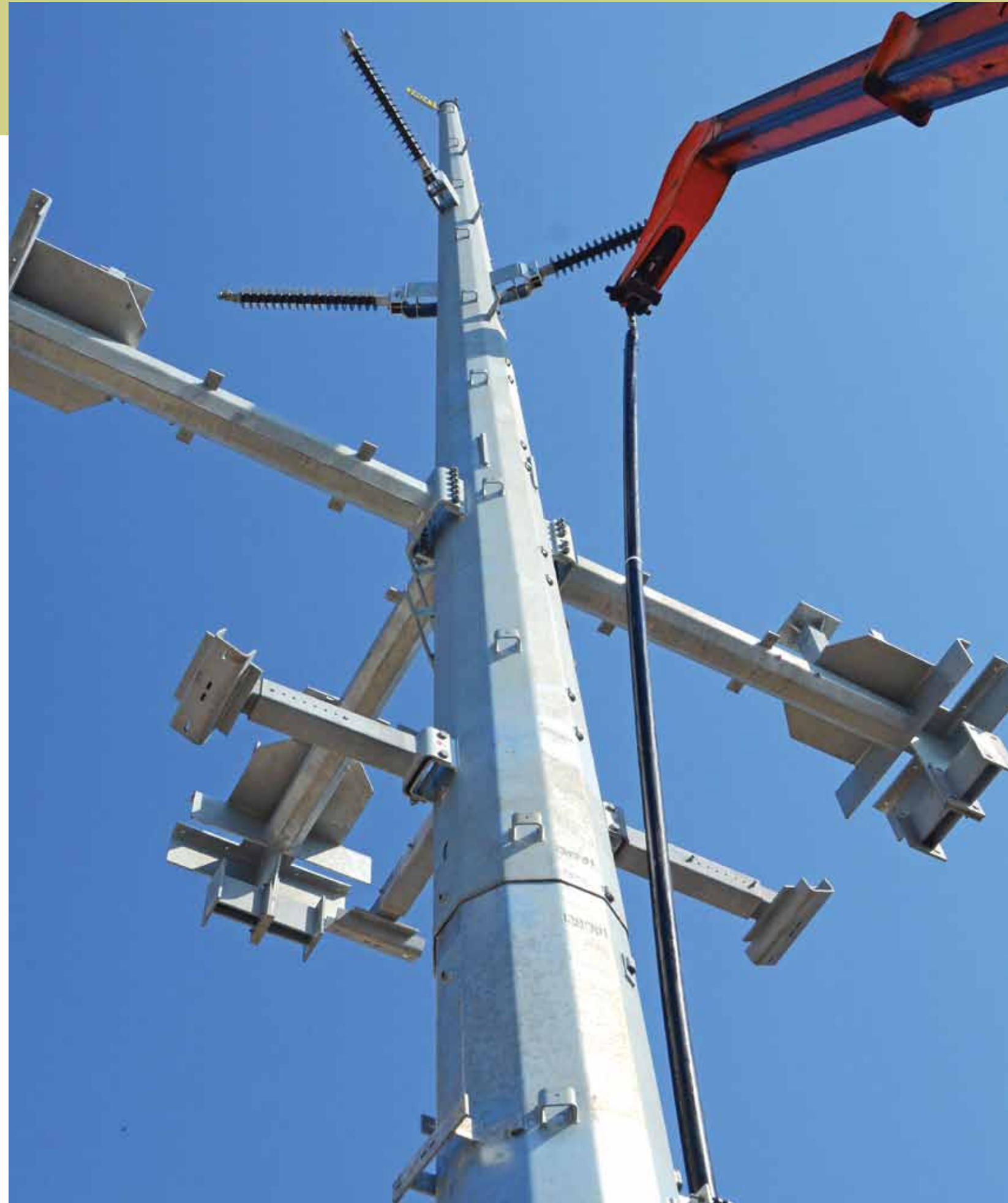
Increases expected in population, employment

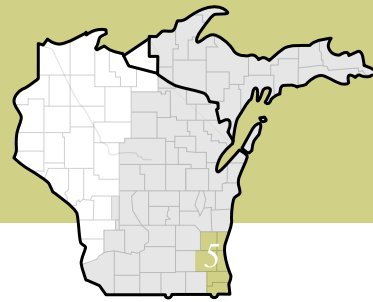
Population in Zone 5 is projected to grow 0.5 percent annually between now and 2024, and employment is projected to grow 1.1 percent in the same time period. Waukesha County is projected to realize the largest increase in both population and employment.

Electricity usage

Peak electric demand typically occurs during the summer months. Large industrial loads in the Milwaukee metropolitan area, including Charter Steel and Miller Brewing, are among the largest electricity users in the zone.

Electric load is forecasted to grow approximately 0.7 percent annually through 2025.



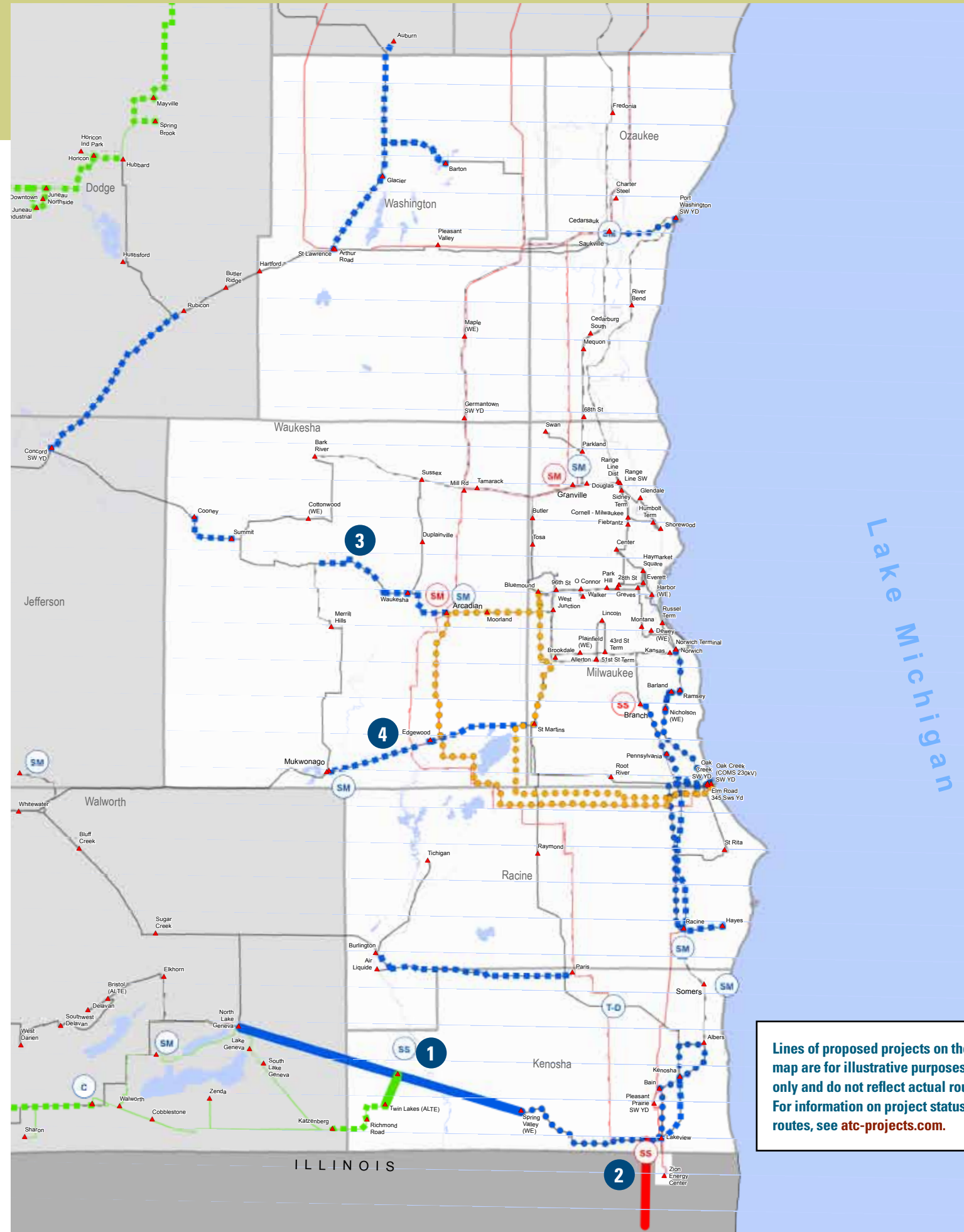


TRANSMISSION PROJECTS IN ZONE 5

The most notable planned, proposed and provisional network projects and asset renewal projects in Zone 5, 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 Spring Valley-North Lake Geneva line 138-kV construction	2019	Overloads and low voltages, provide network service
Proposed Projects		
2 Southeast Wisconsin-Northeastern Illinois Interface Project	2020	Overloads
Provisional Projects		
None		
Asset Renewal Projects		
3 Waukesha-Merrill Hills 138-kV line partial rebuild (portion of Quad County Electric Reliability Project)	2015	Condition and performance
4 Mukwonago-Edgewood-St. Martins 138-kV line rebuild	2018	Condition and performance

Additional projects may be found in the full 10-Year Assessment at atc10yearplan.com.



Lines of proposed projects on the map are for illustrative purposes only and do not reflect actual routes. For information on project status and routes, see atc-projects.com.

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 or reactor
Relieves low voltages or high voltages
- T-D** T-D interconnection
Supports local growth

TRANSMISSION LINE KEY

- 345-kV transmission line
- 115-, 138- or 161-kV transmission line
- 69-kV transmission line
- ▬▬▬ Rebuilt 115- or 138-kV transmission line
- ▬▬▬ Rebuilt 69-kV transmission line
- 115- or 138-kV transmission line rating upgrade
- 69-kV transmission line rating upgrade
- 230-kV transmission line rating upgrade

EXISTING TRANSMISSION LINES KEY

- 69 kV
- 161 kV
- 115 kV
- 230 kV
- 138 kV
- 345 kV



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

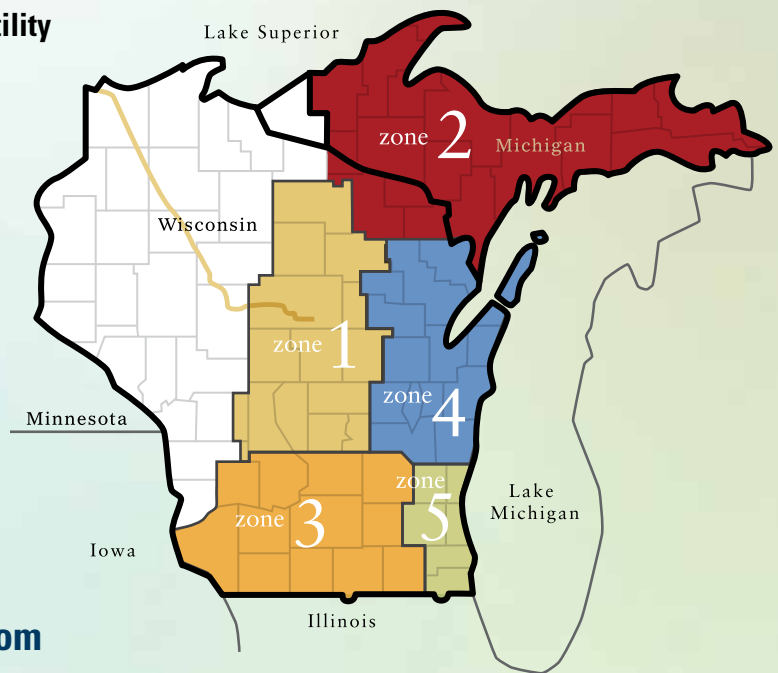
ATC AT A GLANCE

- Formed in 2001 as the first multi-state, **transmission-only utility**
- Owner and operator of **more than 9,530 miles of transmission lines and 530 substations**
- Meeting electric needs of more than **five million people** in 72 counties in four states: Wisconsin, Michigan, Minnesota and Illinois
- **\$3.8 billion** in total assets

CONTACT

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atcllc.com

**Would you like a speaker from ATC to address your group?
Give us a call, toll-free, at 866-899-3204, ext. 6922.**

