

10-Year Transmission System Assessment

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

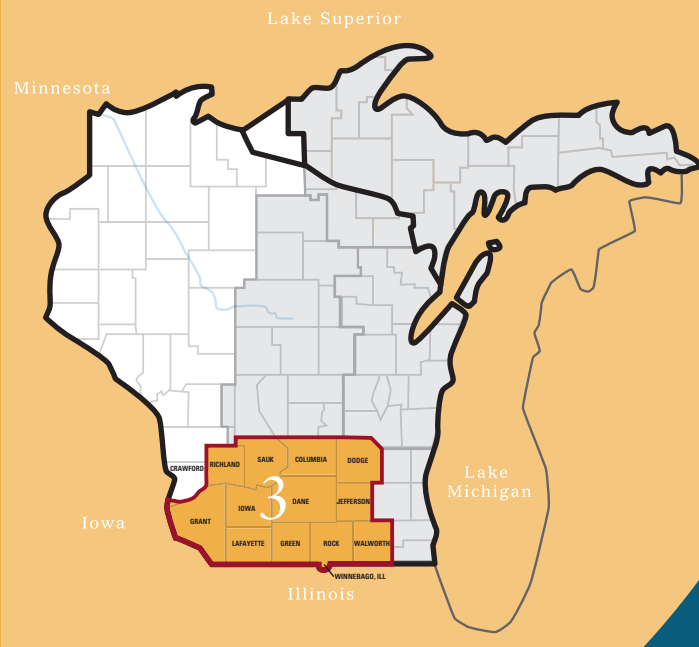
www.atc10yearplan.com

September 2008



- COLUMBIA**
- CRAWFORD**
(southern portion)
- DANE**
- DODGE**
- GRANT**
- GREEN**
- IOWA**
- LAFAYETTE**
- JEFFERSON**
- RICHLAND**
- ROCK**
- SAUK**
- WALWORTH**
- WINNEBAGO, ILL.**
(northern portion)

South Central/Southwest Wisconsin and North Central Illinois



zone 3



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

South Central/Southwest Wisconsin and North Central Illinois – Zone 3

Electric System Overview

Population, employment increasing

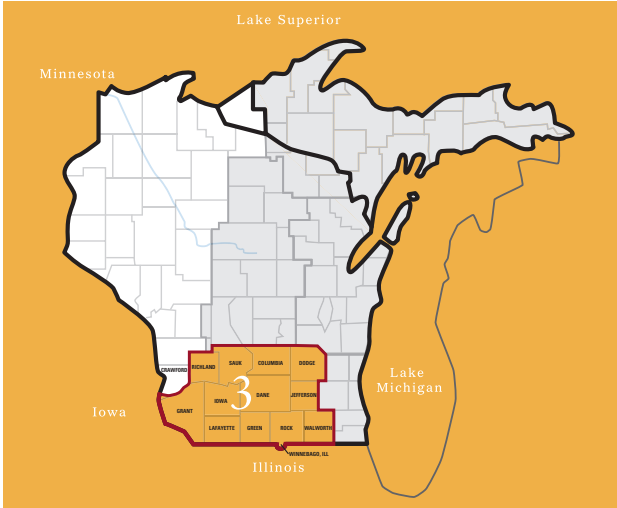
- Population in Zone 3 is projected to grow at 1.0 percent annually for both the 2008-2013 and 2013-2018 periods. From 2008 to 2013, Dane County is projected to realize the largest increase in population, while Walworth County is projected to have the highest growth rate.
- Employment in Zone 3 is projected to grow at 1.7 percent annually between 2008 and 2013 and at 1.6 percent from 2013 through 2018. From 2008 to 2013, Dane County is projected to realize the largest increase in population and Sauk County is projected to have the highest growth rate.

Electricity usage growing

- Electric load is expected to grow approximately 2.7 percent annually through 2018 for all of Zone 3.
- Demand in Dane County is projected to grow at an above-average rate for the ATC system. High demand coupled with generation retirements, concerns about the age and high cost of remaining generators, and stress on the transmission lines that are critical for importing power to Dane County will continue to increase.

Transmission projects completed or under way address electric needs

- **North Madison-Huiskamp project** – The PSC approved our application to build a new five-mile, 138-kV transmission line in Dane County. The addition of this line in 2009 resolves thermal overloads in the area.
- **Rubicon-Hustisford-Horicon project** – In 2008, we completed construction of a new five-mile, 138-kV transmission line and converted eight miles of existing 69-kV line to 138-kV operation. These projects will improve voltages in the Dodge County area.
- **Jefferson-Stony Brook project** – The PSC approved the addition of a new 12-mile, 138-kV line and upgrades to several substations. This 2009 project will address voltage violations in the area.

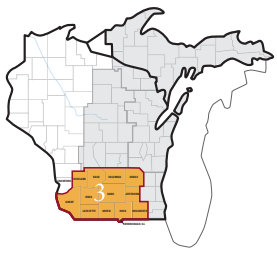


- **Paddock-Rockdale project** – The PSC approved our application to build a new 35-mile, 345-kV transmission line from southern Rock County to southeastern Dane County. This line improves power transfer capability and provides economic savings to ATC’s customers by providing access to lower cost sources of power outside Wisconsin.
- **Rockdale-West Middleton project** – We recently filed an application with the PSC to build a new 35-mile, 345-kV transmission line from southeastern Dane County to the west side of Madison. This line improves power transfer capability and improves voltages and thermal overloads.
- **Fitchburg-Verona project** – The PSC approved our application to build a nine-mile, 138-kV transmission line in southern Dane County. This new line will improve voltages and resolve thermal overloads in the southern Dane County area.

Our 2008 10-Year Transmission System Assessment outlines more than 60 projects to ensure electric system reliability in South Central/Southwest Wisconsin and North Central Illinois. These projects are in various stages of development. The following pages describe the system limitations in South Central/Southwest Wisconsin and North Central Illinois 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 South Central/Southwest Wisconsin and North Central Illinois – Zone 3

Transmission system characteristics in Zone 3

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

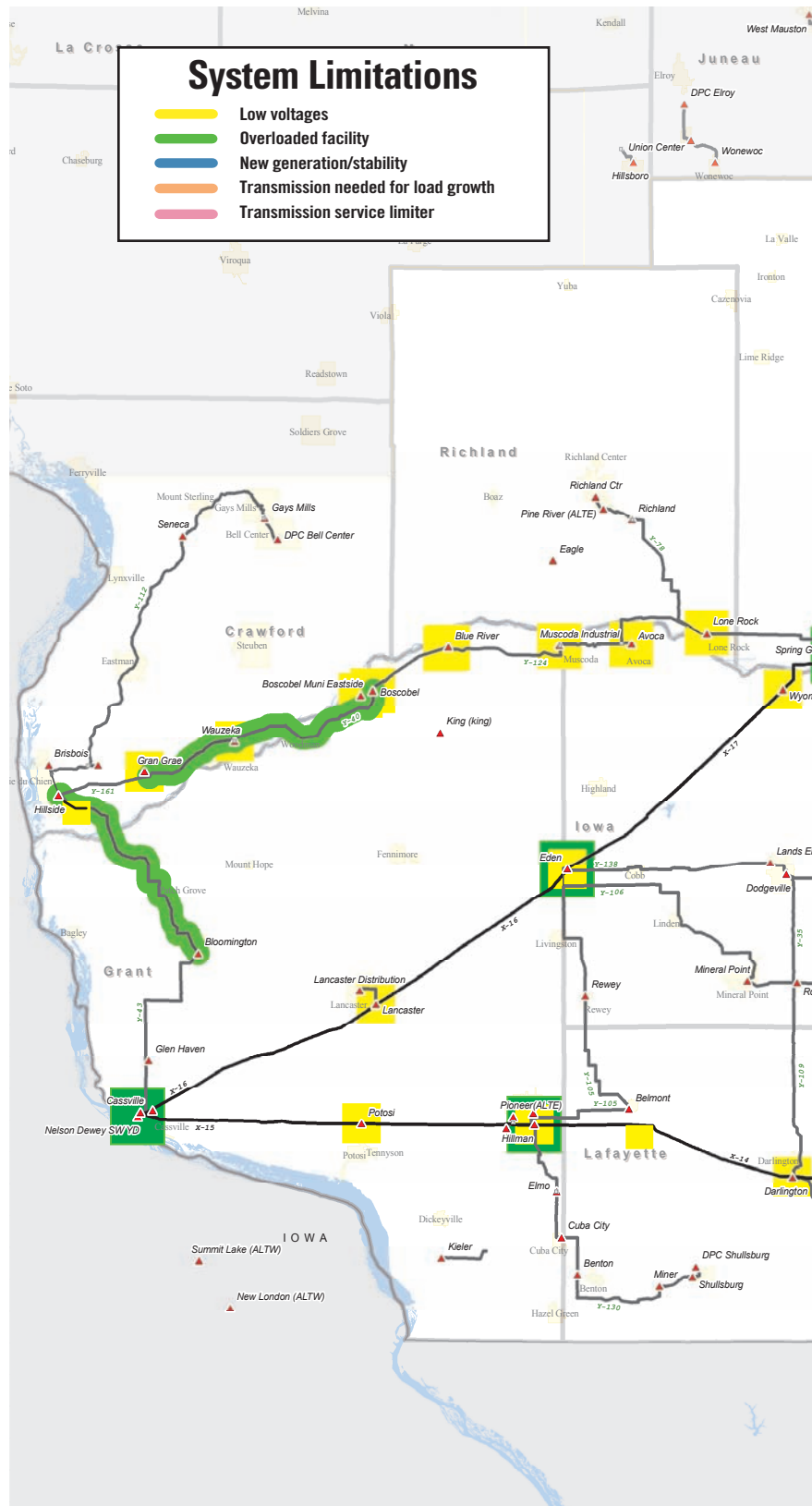
- a north-south 345-kV line from Illinois extending to the Columbia Power Plant
- a north-south 345-kV line from Illinois extending to Paddock Substation
- an east-west 345-kV line from Fond du Lac to Columbia Power Plant and
- 138-kV and 69-kV facilities throughout the remainder of the zone.

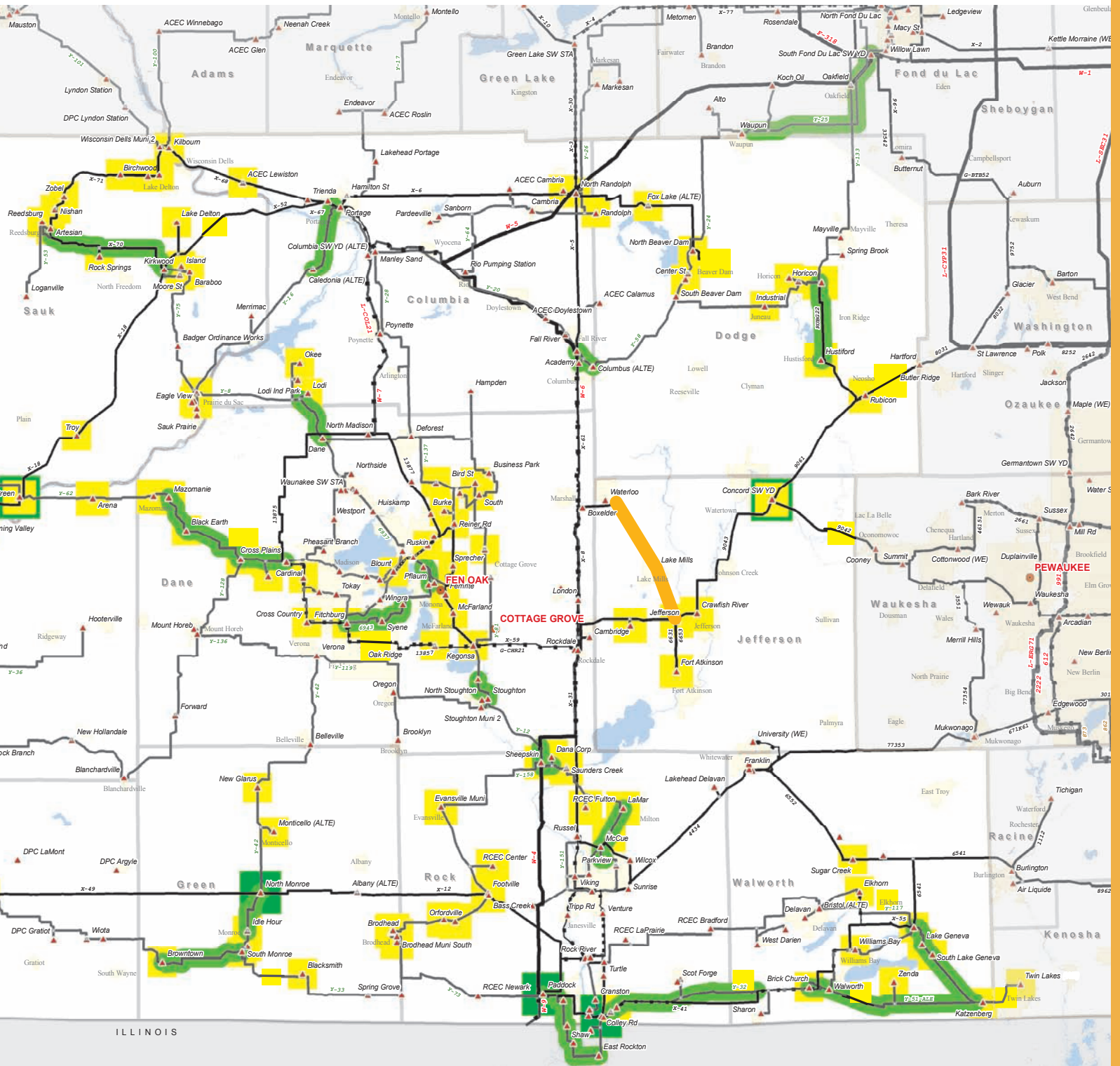
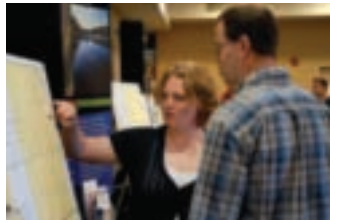
There are a number of transmission system performance issues in Zone 3 including voltage instability, limited import capability, overloaded lines and equipment, and low system voltages throughout the zone. The causes of these emerging problems include steady or rapid growth in certain areas, heavier flows of power due to import capability from Illinois, new power plants and different generation dispatch scenarios.

Transmission system limitations in Zone 3

In the analysis of Zone 3, we identified low voltages and transmission facility overloads. Low voltages are particularly serious in the Spring Green, Jefferson, Milton and Brodhead areas. Many overloads on 138-kV and 69-kV facilities throughout Zone 3 are current or emerging concerns.

Electric load growth in Dodge and Walworth counties is precipitating the need for major new 138-kV line reinforcements in those areas in the 2012-2018 timeframe. Load growth in southwestern Wisconsin will also necessitate reinforcements to the transmission system in the 2009-2016 timeframe. In addition, the potential for voltage collapse and major 138-kV line thermal overloads in the Madison area is emerging and will require significant transmission reinforcements within the next 10 years.





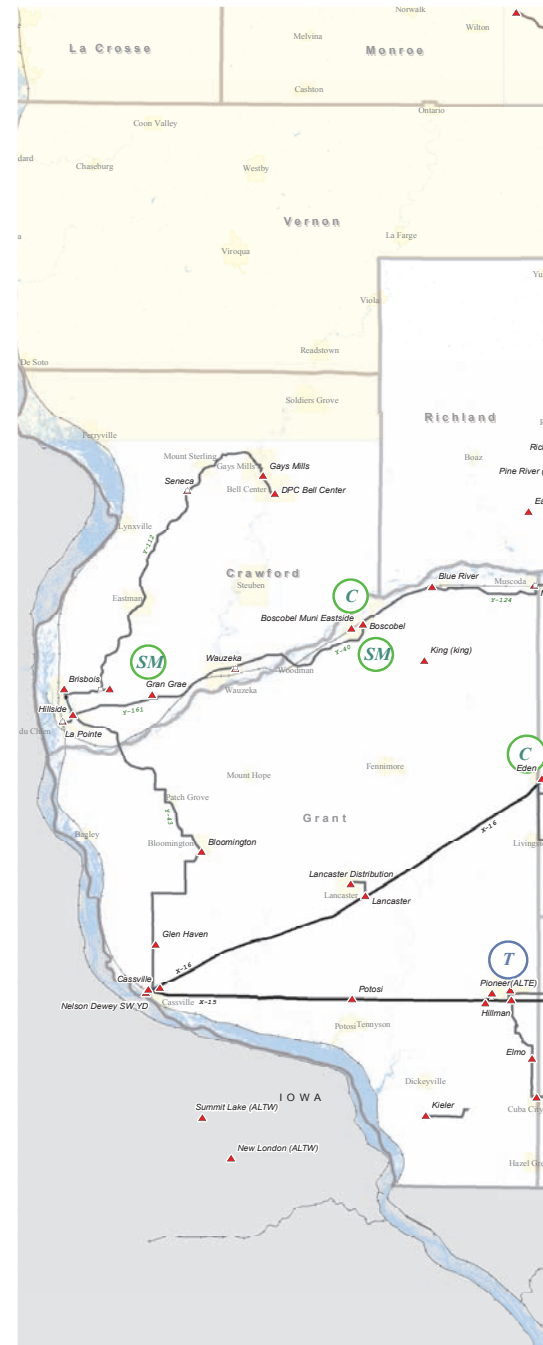
ILLINOIS

System Solutions

South Central/Southwest Wisconsin and North Cent

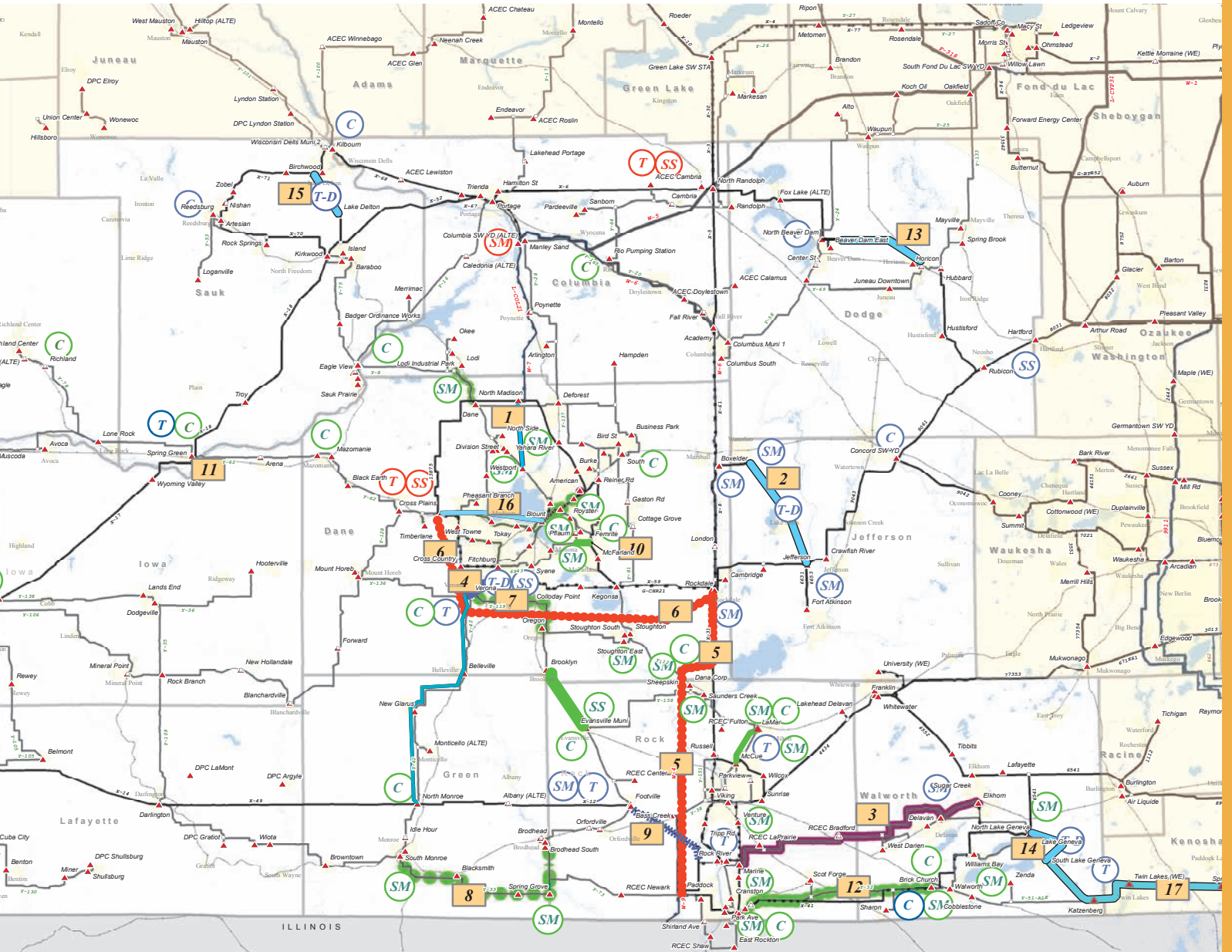
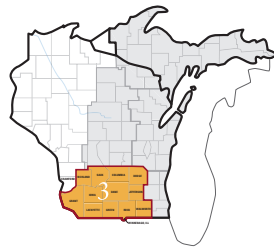
ATC has completed ten network projects in Zone 3 since the 2007 Assessment Update, most notably the new Rubicon-Hustisford 138-kV line and associated conversion of the Hustisford-Rubicon 69-kV line to 138-kV operation.

Keeping up with the rapidly increasing use of the transmission system in Zone 3 will require continued and close coordination with stakeholders. ATC's current plans in Zone 3 include more than 60 projects between 2008 and 2018 to address issues identified. These projects are in various stages of development. The most notable planned, proposed and provisional projects in Zone 3, along with their projected years of completion and the factors driving the need for the projects, are listed below.



	Project description	In-service year	Need driver
	Planned projects		
1	North Madison-Huiskamp 138-kV line	2008/09	Addresses low voltages, averts voltage collapse
2	Jefferson-Lake Mills-Stony Brook 138-kV line	2009	Addresses low voltages and overloaded facilities, accommodates T-D interconnection
3	Rock River-Bristol-Elkhorn 69-kV to 138-kV conversion	2009	Addresses overloads and low voltages
4	Oak Ridge-Verona 138-kV line	2010	Improve area voltages and address overloads
5	Paddock-Rockdale 345-kV line	2010	Improves access to lower cost sources of power
6	Rockdale-West Middleton 345-kV line	2013	Addresses overloads and low voltages, improves transfer capability to Madison area, averts voltage collapse, lowers system losses
	Proposed projects		
7	Verona-Oregon 69-kV line rebuild	2011	Improve area voltages and address overloads
8	Brodhead-South Monroe 69-kV line rebuild	2011	Improve area voltages and address overloads
9	Bass Creek 138/69 kV transformer	2013	Improve area voltages and address overloads
10	Loop Nine Springs-Pflaum line in and out of Femrite	2013	Improve area voltages and address overloads
11	Spring Green 138/69-kV second transformer	2013	Improve area voltages and address overloads
	Provisional projects		
12	Colley Road-Brick Church 69-kV line rebuild	2012	Address overloads and low voltages
13	Horicon-East Beaver Dam 138-kV line	2014	Addresses potential overloads and low voltages
14	North Lake Geneva-South Lake Geneva 138-kV line	2014	Addresses potential overloads and low voltages, transmission to distribution interconnection
15	Lake Delton-Birchwood 138-kV line	2015	Addresses overloads and low voltage issues in Reedsburg loop
16	West Middleton-Blount 138-kV line	2017	Addresses overloads and low voltages
17	Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2018	Addresses overloads and low voltages

Central Illinois – Zone 3

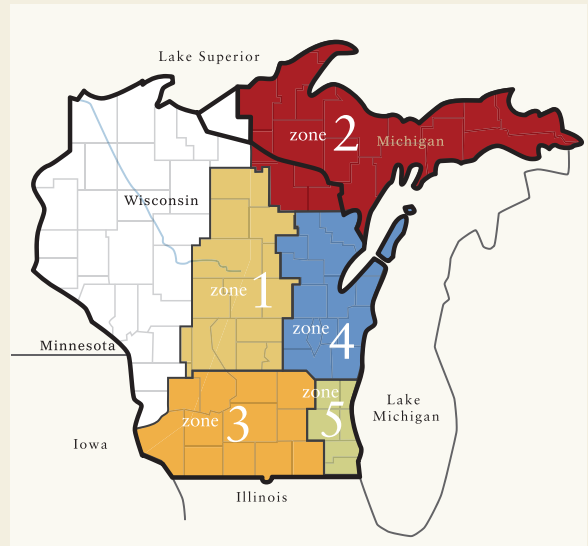


System Solutions

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

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.

www.atc10yearplan.com



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

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