



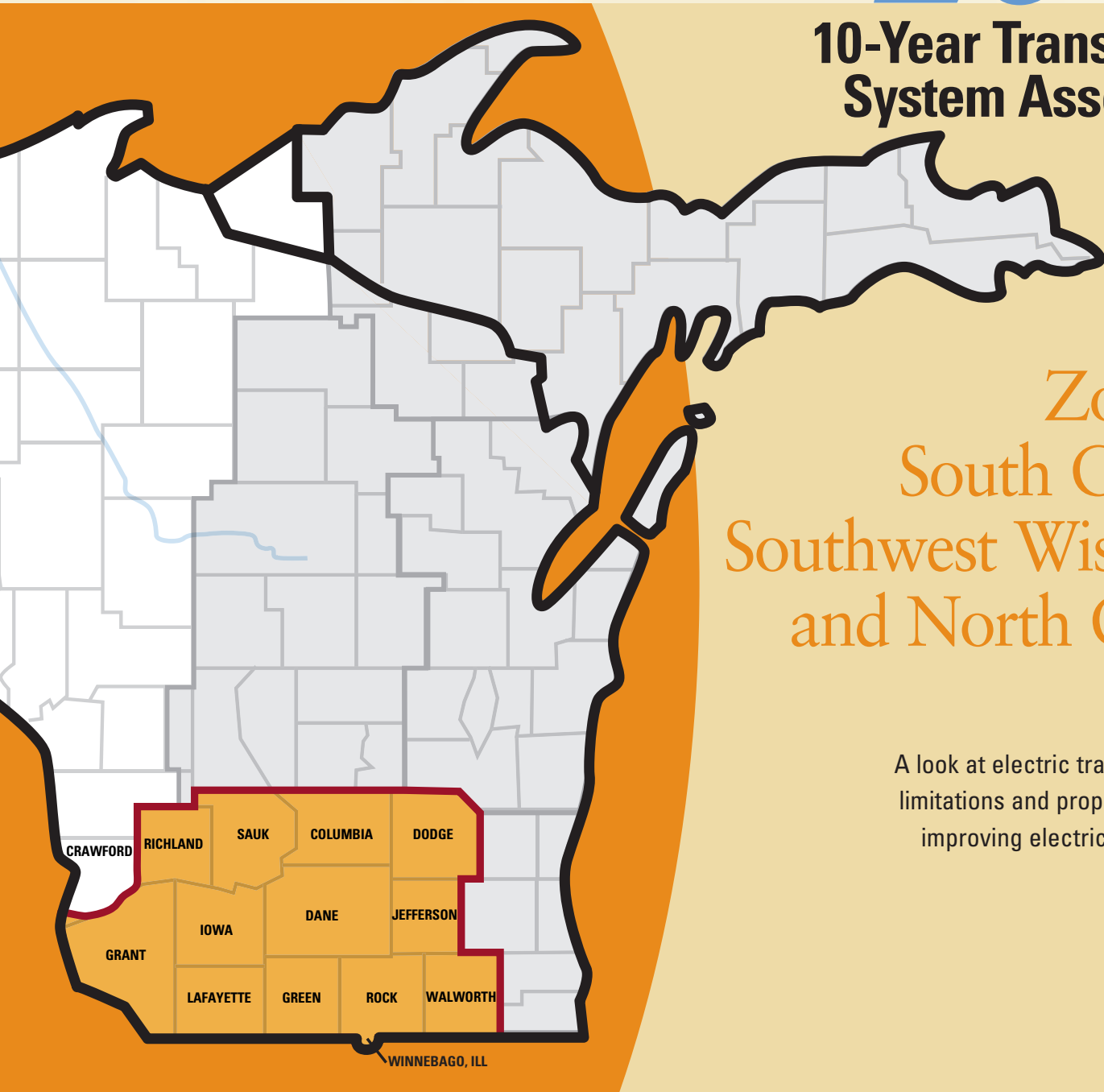
An excerpt from ATC's

# 2005

## 10-Year Transmission System Assessment

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

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



September 2005

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



## 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.



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

## Electric system overview

### Population, employment increasing in Zone 3

- Population is projected to grow 0.8 percent annually through 2010. Dane County is projected to realize the largest increase in population and to have the highest growth rate.
- Employment is projected to grow 1.5 percent from 2005 through 2010. Dane County is projected to realize the largest increase in employment, while Sauk County is projected to have the highest growth rate.

### Electricity usage growing in Zone 3

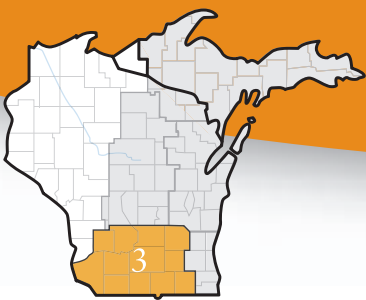
- Peak electric demands typically occur during the summer months. Manufacturing, food processing, state government and institutional loads are among the largest electricity users in the zone.
- Electric load is projected to grow approximately 3.3 percent annually through 2014 – higher than the state average. In some Dane County communities, electric load is increasing as much as 8 percent per year.

### Transmission projects completed or under way address electric system needs

- **Waplestown-Paddock project** – In 2004, we added a second 345-kilovolt circuit to an existing line strengthening a key connection between Wisconsin and Illinois.
- **Sauk County project** – In 2004, we built 33 miles of new transmission line and rebuilt three substations in Sauk County to accommodate increased electricity usage in the region.
- **East Beaver Dam project** – The Public Service Commission of Wisconsin approved our application to build a 1.5-mile line to serve a new distribution substation to be built by Alliant Energy. Both are needed to serve growing electricity usage by the residential and commercial sectors in Beaver Dam. The project is expected to be in service in 2006.

Our 10-Year Assessment outlines more than 90 additional projects to ensure electric system reliability in South Central/Southwest Wisconsin and North Central Illinois. The following pages describe the transmission system limitations in South Central/Southwest Wisconsin and North Central Illinois, 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](http://www.atcllc.com)*



# zone 3

## South Central/Southwest Wisconsin and North Central Illinois

### Transmission system characteristics in Zone 3

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

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

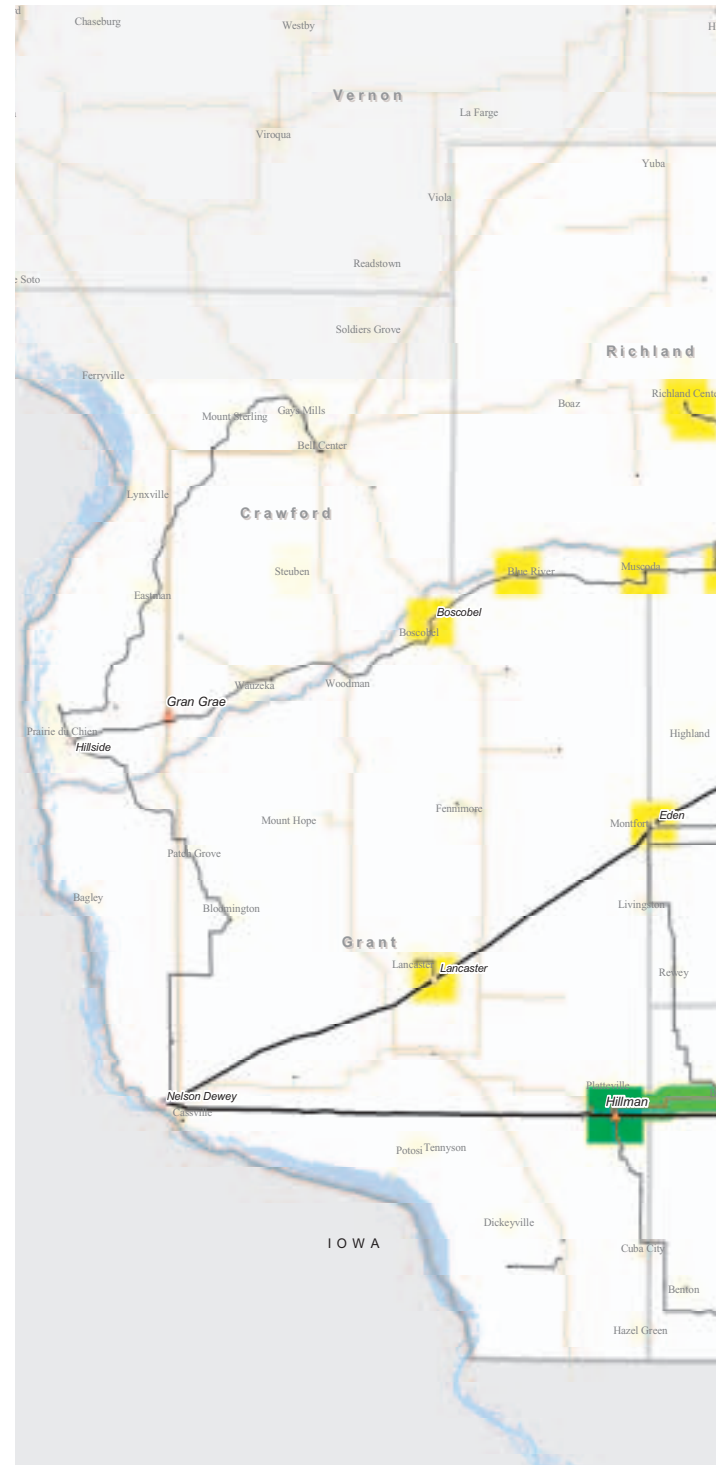
#### ZONE 3 INCLUDES THE COUNTIES OF:

- Columbia
- Crawford (southern portion)
- Dane
- Dodge
- Grant
- Green
- Iowa
- Jefferson
- Lafayette
- Richland
- Rock
- Sauk
- Walworth
- Winnebago, Ill. (northern portion)

There are a number of transmission system performance issues in Zone 3 including voltage instability, generator instability, limited import capability, chronic transmission service limitations, 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, two new power plants and parallel path flows from new generation in northern Illinois.

### Transmission system limitations in Zone 3

In the 2006 analysis of Zone 3, we identified low voltages and transmission facility overloads. Low voltages are particularly serious in the Madison area. The potential for voltage collapse in the Madison area is emerging and will require significant transmission reinforcements within the next 10 years. Facility overloads on 138-kV and 69-kV facilities throughout Zone 3 are current or emerging concerns. Electric load growth in Rock and Walworth counties is precipitating the need for reinforcements in those areas in the 2006-2010 timeframe. Load growth in southwestern Wisconsin will necessitate reinforcements to the transmission system in the 2009-2015 timeframe.

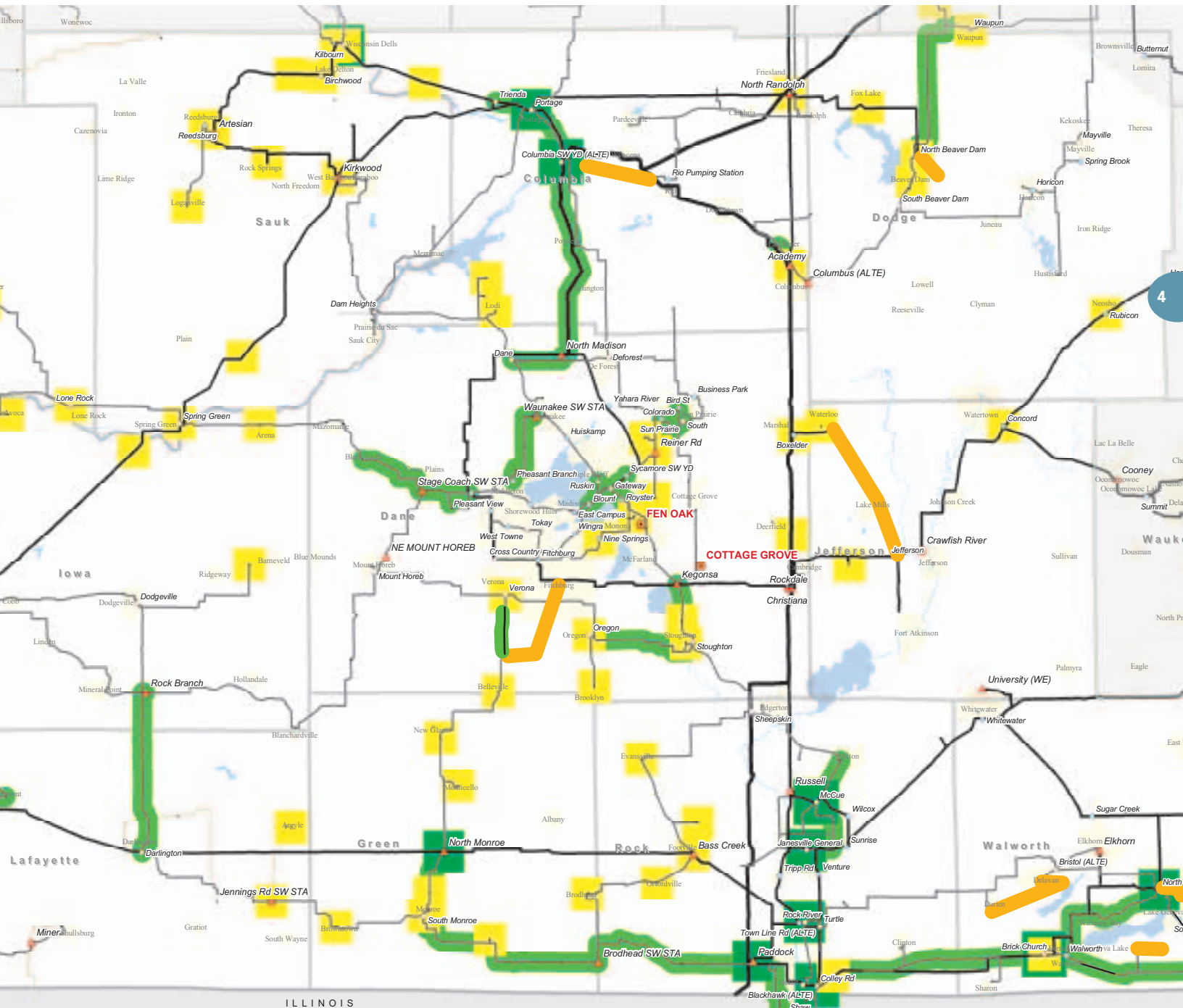


Changes in prevailing power flows in the region are congesting the transmission system in northeastern Iowa and the southwestern, southeastern and south-central portions of Wisconsin. This has resulted in chronic interruptions of approved transmission service and denial of numerous transmission service requests. We are pursuing a new 345-kV circuit to address this congestion.

In the 2004 Assessment, we identified generator instability at Columbia Power Plant. This has been addressed, in part, with changes at Columbia Substation. Further additions at Columbia Substation to accommodate the planned Columbia-North Madison 138-kV line conversion to 345 kV will fully address this limitation.

### System Limitations

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





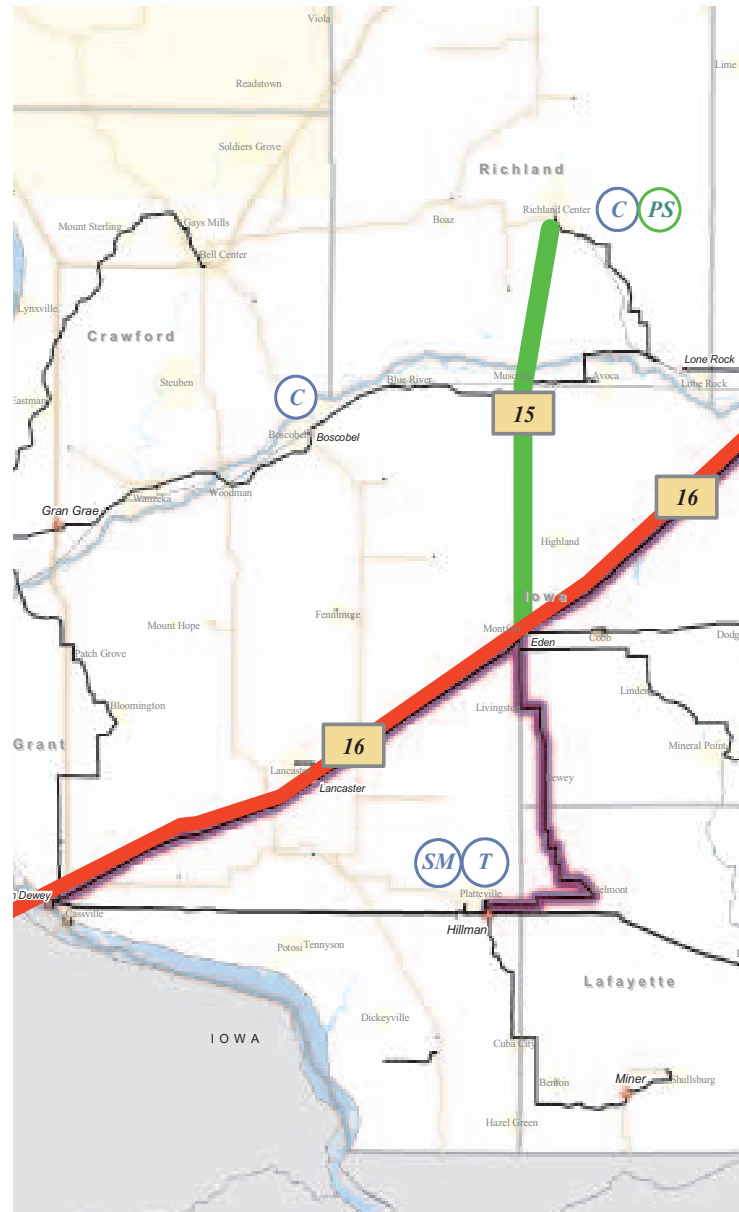
# zone 3

## South Central/Southwest Wisconsin and North Central Illinois

### Transmission projects in Zone 3

ATC has completed six network projects in Zone 3 since the 2004 Assessment Update, most notably adding a second 345-kV circuit to the Wempletown-Paddock 345-kV line along with the reconfiguration of existing Wempletown-Paddock and Paddock-Rockdale 345-kV circuits into a Wempletown-Rockdale 345-kV circuit.

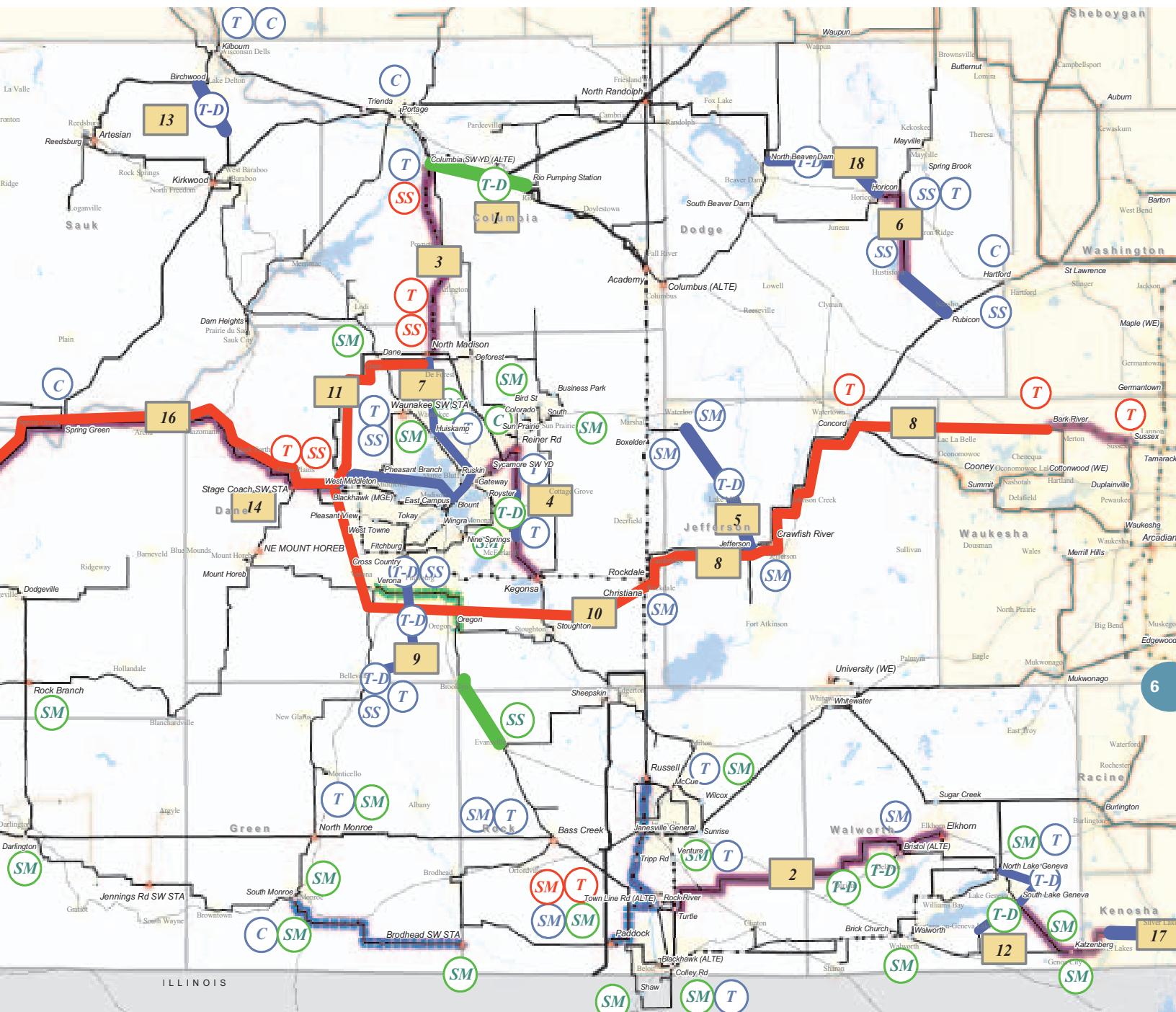
ATC's current plans in Zone 3 include more than 90 projects between 2005 and 2015. These projects are in various stages of development. The most notable planned, proposed and provisional projects in Zone 3, along with their projected year of completion and the factors driving the need for the projects, are listed below.



### System Solutions

- New substation
- Substation modifications
- Phase shifter
- Transformer
- Capacitor bank
- Reactor
- T-D interconnection
- 345-kV transmission line
- 115-, 138- or 161-kV transmission line
- Rebuilt 115- or 138-kV transmission line
- Transmission line voltage conversion
- 69-kV transmission line
- Rebuilt 69-kV transmission line

	Project description	In-service year	Need driver
<b>Planned projects</b>			
1	Columbia-Wyocena-Rio 69-kV line	2006	Addresses low voltages, accommodates T-D interconnection
2	Turtle-West Darien-Southwest Delavan-Delavan/Bristol 138 kV	2006/2007	Addresses low voltages, accommodates T-D interconnection
3	Convert Columbia-North Madison 138-kV line to 345 kV	2006	Addresses low voltages, accommodates transmission service request
4	Sprecher-Femrite 138-kV line	2007	Addresses low voltages, accommodates transmission service request
<b>Proposed Projects</b>			
5	Jefferson-Lake Mills-Stony Brook 138-kV line	2007	Addresses low voltages and overloaded facilities, accommodates T-D interconnection
6	Rubicon-Hustisford-Horicon 138-kV line	2008	Addresses low voltages
7	North Madison-Waunakee 138-kV line	2008	Addresses low voltages, averts voltage collapse
8	Rockdale-Concord-Bark River 345-kV line	2011	Addresses low voltages, averts voltage collapse, improves west-east transfer capability, lowers system losses
9	Montrose-Sun Valley-Oak Ridge 138-kV line	2009	Improves area voltages, addresses overloads and accommodates T-D interconnection

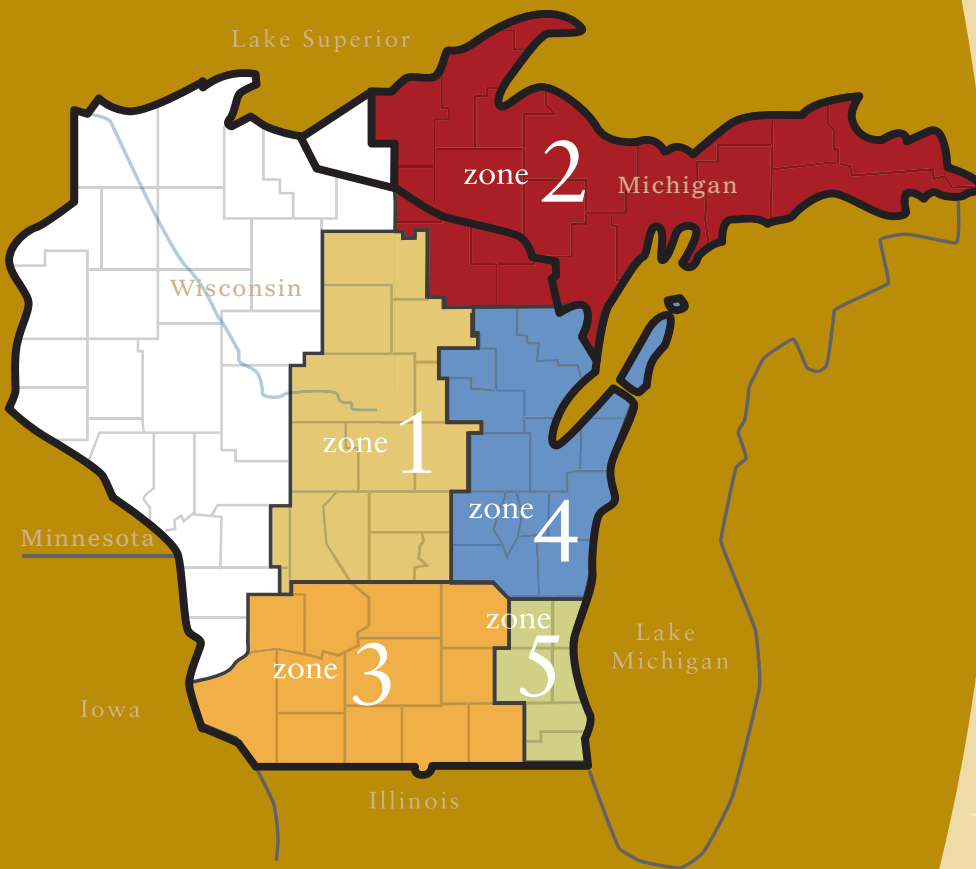


	Project description	In-service year	Need driver
10	Rockdale-West Middleton 345-kV line	2011	Averts voltage collapse, addresses low voltages, improves transfer capability to Madison area, lowers system losses
11	North Madison-West Middleton 345-kV line	2014	Averts voltage collapse, addresses low voltages, in the Madison area, lowers system losses, improves stability at Columbia Power Plant, improves transfer capability to Madison area
<b>Provisional Projects</b>			
12	South Lake Geneva-White River 138-kV line	2009	Addresses low voltages, accommodates T-D interconnection
13	Lake Delton-Birchwood 138-kV line	2011	Improves area voltages, improves reliability for Lake Delton load
14	West Middleton-Stagecoach double-circuit 138/69-kV line	2012	Addresses low voltages and overloads
15	Eden-Muscoda-Richland Center 69-kV line	2012	Addresses low voltages
16	Salem-Spring Green-West Middleton 345-kV line	2013	Representative Access project, improves transfer capability, improves line system voltages in southwest Wisconsin, lowest system losses
17	Twin Lakes-Spring Valley 138-kV line	2013	Addresses low voltages, improves reliability for area loads
18	Horicon-East Beaver Dam 138-kV line	2013	Addresses low voltages



## Contact

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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.

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