



## Projects section

### *Project classifications*

In our 10-Year Assessments and Updates, projects are identified that address reliability issues, economic benefits, loss savings, transmission service issues, generation interconnections or some distribution interconnections, or any combination of the above. In general, these projects address system performance issues identified using the governing system planning criteria or economic benefits for customers. We have numerous other projects under way or under evaluation that address other issues such as obsolete substation equipment, poor line facility condition, line relocations and most distribution interconnections. The projects referenced in the project tables PR-2 through PR-27 generally include only those projects that at least in part address system performance issues.

To facilitate an understanding of the status of the various future projects, we classify projects into one of three possible categories – Planned, Proposed or Provisional. Each classification has specific criteria based on the status of the project as outlined below:

### *Planned projects:*

- ATC planning is complete;
- if required, we have applied for regulatory approvals, which may be pending or have been issued; and
- project may be under construction or in construction planning phase.

### *Proposed projects:*

- ATC planning is not complete;
- ATC has not yet pursued regulatory approvals; and
- project represents ATC's preliminary preferred project alternatives from a system performance perspective.

### *Provisional projects:*

- ATC planning is not complete;
- ATC has not yet sought regulatory approvals; and
- project does not necessarily represent ATC's preliminary preferred project alternative, but does reflect meeting the need identified.

In the 2001-2008 10-Year Assessments and Updates, we identified or assumed responsibility for 648 projects that address system performance issues. Figure PR-6 illustrates the status of all projects ATC has considered from 2001-2008. Regarding Figure PR-6, it is worthwhile to note that:



# 10-Year Assessment

An annual report summarizing proposed additions and expansions to the transmission system to ensure electric system reliability.

2008

September 2008 10-Year Assessment  
www.atc10yearplan.com

- ❑ ATC has completed 266 projects and another 25 are under construction. Notable projects most recently completed are listed in Table PR-1. Projects under construction include capacitor bank installations, Oak Creek generation-related upgrades, and the Gardner Park-Highway 22 and Paddock-Rockdale transmission line projects.
- ❑ 84 projects have been replaced with alternate project solutions. It is not unusual that the status of certain projects will change or evolve since customer needs and uses of the transmission system continually are changing.
- ❑ ATC canceled 137 projects that were identified in previous Assessment reports due to changing needs and up-to-date information. Most of these projects were relatively minor projects, involving only replacement of equipment at existing substations.
- ❑ 159 future projects are in various stages of evaluation or development (Planned (which includes Regulatory and Under Construction), Proposed or Provisional).

## Projects completed since 2007 Assessment

Transmission projects significantly affecting system performance that have been completed since the 2007 Assessment was issued in November 2007 are listed in Table PR-1.

Most notable include:

- ❑ Constructed the Stone Lake-Arrowhead 345-kV line
- ❑ Expansion of the Arrowhead Substation
- ❑ Constructed a new permanent Stone Lake Substation
- ❑ Constructed a Rubicon-Hustisford 138-kV line
- ❑ Rebuilt/converted the Hustisford-Horicon 69-kV line to 138 kV
- ❑ Constructed 138/69-kV substation at Hubbard
- ❑ Constructed a new Cranberry-Conover 115-kV line
- ❑ Reconductored the Saukville-St. Lawrence 138-kV line

## New in 2008

### *Summary of Planned, Proposed and Provisional additions, 2008-2023*

The transmission facilities that we are proposing based on this Assessment are listed in Tables PR-2 through PR-22, and shown graphically by zone in Figures PR-1 through PR-5. Changes that have occurred since the 2007 Assessment are listed in Table PR-23. Finally, Table PR-24 describes operations, maintenance and protection projects greater than \$0.5 million for the years 2009-2013.

In each of these tables, there is a column indicating the planned in-service year for each particular facility and a column indicating the year the facility is needed. Often the year



# 10-Year Assessment

An annual report summarizing proposed additions and expansions to the transmission system to ensure electric system reliability.

# 2008

September 2008 10-Year Assessment  
[www.atc10yearplan.com](http://www.atc10yearplan.com)

facilities are needed precedes the planned in-service year. There are a variety of reasons for this, including:

- The preferred alternative to address a particular need may take several years to implement.
- The need had been addressed with operating procedures that are becoming less effective or ineffective, necessitating a permanent solution.
- The preferred alternative to address a particular need may need to be implemented in phases, thus delaying completion of the entire project.
- New data or information affected the nature of the need or limitation, necessitating a change in the preferred alternative and introducing a delay in implementation.
- The need for a project was based on load or generation development that was uncertain.
- Stakeholder input necessitated a change in the alternative to be implemented, introducing a delay in implementation.

Tables PR-2 through PR-12 show the facilities planned by year for 2008-2023. Table PR-13 shows provisional facilities where the in-service date is yet to be determined.

Tables PR-14 through PR-18 show the facilities planned by zone.

Table PR-19 provides a list of planned transmission lines involving new right-of-way for 2008-2023. Since ATC intends to solicit public input on the identification of ultimate solutions through its public planning process, these particular projects may be modified in the future.

Table PR-20 provides a list of proposed transmission line rebuilds, line reconductoring and uprates on existing right-of-way.

Table PR-21 provides a list of proposed new substations and transformer additions (excluding transmission-to-distribution transformers).

Table PR-22 provides a list of other proposed substation equipment additions or replacements.

### Need categories

Within these tables, the need for each project is identified. Need categories include the following:

**Reliability:** Facility (line, transformer, substation equipment) normal rating is exceeded under normal system conditions or emergency rating is exceeded under single contingency conditions, or bus voltage is not



# 10-Year Assessment

An annual report summarizing proposed additions and expansions to the transmission system to ensure electric system reliability.

2008

September 2008 10-Year Assessment  
www.atc10yearplan.com

within 5 percent of nominal voltage under normal system conditions or is not within 10 percent of nominal voltage under single or multiple contingency conditions, or the contingency creates a cascading outage risk (see Planning criteria). Impending overload or voltage violations are noted as appropriate.

**New generation:** In our generation interconnection studies and related transmission service studies, the facility has been identified as necessary to accommodate new generation.

**T-D interconnection:** Facility is required to interconnect to a new transmission- distribution substation needed by a distribution company served by ATC.

**Condition:** We have identified the facility as needing repair or replacement.

**Stability:** We have identified the facility as needed to ensure that our dynamic stability criteria is met (see Planning criteria), or to improve stability response of generation.

**Economics:** *Preliminary and partial list of facilities emerging from our economic planning studies that may be beneficial in reducing congestion, enhancing system transfer capability and producing economic benefit.*

## Projects in design or under construction

Transmission projects that will significantly affect system performance and are currently in design or under construction are listed in Table PR-25. Most notable include:

- Constructing the Gardner Park-Hwy 22 345-kV line,
- Constructing the new Hwy 22 345-kV Substation,
- Rebuilding/conversion of Conover-Plains 69-kV line to 138 kV,
- Constructing the Morgan-Werner West 345-kV line and stringing new 138-kV line from Clintonville to Werner West,
- Constructing the Paddock-Rockdale 345-kV line and replacement of the 345/138-kV transformer T22 at Rockdale Substation,
- Constructing the Butler Ridge wind farm, and
- Constructing several Oak Creek generation-related system upgrades.

Because of the number of projects in certain areas, finding sufficient outage opportunities has become an issue. We are striving to more accurately predict the potential cost





implications of construction/connection outages and schedule outages to minimize such potential costs.

### **Projects with regulatory approval**

Transmission projects that will significantly affect system performance and which have received regulatory approval but have not commenced construction are listed in Table PR-26.

The most notable projects in this category are:

- Construction of the Jefferson-Lake Mills-Stony Brook 138-kV line
- Construction of the new 138-kV line from North Madison to Huiskamp
- Construction of the new Oak Ridge-Verona 138-kV line and installation of a 138/69-kV transformer at Verona

### **Projects pending regulatory review/approval**

Transmission projects that are pending issuance of a Certificate of Authority (CA) or a Certificate of Public Convenience and Necessity (CPCN) from the Public Service Commission of Wisconsin are listed in Table PR-27.

Notable projects include:

- Construction of the Rockdale-West Middleton 345-kV line

### **Project costs**

The estimated capital costs for all of the projects reflected in Figure PR-6 are shown in Figure PR-7. The figure shows that the combined capital costs for 10-Year Assessment projects that are completed, canceled, replaced, in licensing and under construction account for roughly 86 percent of the estimated total 2001-2008 capital costs, with future projects accounting for the remaining 14 percent of the total. The estimated capital costs depicted in Figure PR-7 are based only on those projects listed in the previous and current Assessment(s) that affect system performance.

The cost estimate for all 2008 10-Year Assessment Update projects to be placed in-service through 2017 is approximately \$1.3 billion, which is \$100 million less than the 2007 Assessment estimate. Figure PR-8 categorizes the current \$1.3 billion 2008 Assessment project dollars by status. Planned projects (including those projects in licensing and under construction) account for 59% of the Assessment dollars, proposed projects account for 13% of the dollars, and provisional projects account for the remaining 28% of the dollars.



Other anticipated projects, including substation equipment replacements, pole and conductor replacements, most T-D interconnections, road relocations and generation interconnections not included in the 2008 10-Year Assessment, make up the remaining \$1.4 billion of the \$2.7 billion in capital expenditures that ATC projects through the year 2017.

## Interconnections

### *Generation Interconnections*

The size and location of new or expanded power plants can have significant impacts on the transmission system. These impacts can range from very positive (adding voltage support in a weak area of the system) to very negative (aggravating loading problems and/or causing generator instability). Information on the status, as of July 1, 2008, of ATC's portion of the Midwest Independent System Operator generation interconnection queue is provided in this section. There continues to be significant activity in ATC's portion of this queue, ranging from newly proposed generation projects to cancellation of previously proposed generation projects.

There are two key aspects in determining the total impacts a proposed new generator may have on the transmission system:

- impacts of interconnecting the new generator to the transmission system and
- impacts of using the transmission system to deliver power from the new generator.

Per the Midwest ISO Attachment X process, interconnection impacts are assessed using up to three interconnection studies. The first study, called a *feasibility study*, includes a determination of thermal overload or voltage level impacts created by the new generator. The second study, called an *impact study*, includes a determination of whether the proposed generator and other nearby generators will remain stable under various disturbance situations, like line trips and equipment failures. It also includes a fault study analysis to determine whether existing system equipment can accommodate the increased short circuit fault duty caused by the new generator. It also identifies solutions for any thermal, stability or fault duty problems. If problems are identified in the impact study, a third study, called a *facility study*, is conducted to settle on solutions and provide cost and time estimates for construction. Delivery impacts are assessed during the interconnection study process using the Midwest ISO deliverability methodology, which determines whether a new generator is deliverable to the Midwest ISO Day 2 market and to what percent if not wholly deliverable. Whatever portion of the new generator that is deliverable may then be used as a Network Resource by Network Customers through the Midwest ISO's Module E Resource Adequacy procedures.

The results of the interconnection studies are needed to develop a comprehensive picture of the transmission facilities that will be required for a proposed generator. This is why we



included in our Assessment models those proposed generators for which interconnection studies have been completed.

The first portion of this section provides the status of the generation queue within our service territory. The second portion of this section describes the transmission system additions associated with various proposed generation projects for which final interconnection studies have been completed. The third portion of this section describes some of the implications associated with interconnecting generation at various locations within our service territory.

### ATC Generation Queue

Since ATC's inception, fourteen new generators have gone into service and two up rates to existing generators have been completed, totaling 4,615 MW. These generators are shown in [Table PR-28](#).

[Table PR-29](#) lists the proposed generators in the generation queue for our service territory as of July 1, 2008. This table lists each proposed generation project and summarizes them by zone and MW amount. These proposed projects also are shown by approximate location in [Figure PR-9](#). As shown, the total capacity of proposed generators in the queue is 7,803.5 MW. Of that proposed capacity, 20 percent reflects new coal units; wind units reflect 79 percent; and the remaining 1 percent is comprised of simple cycle (natural gas) turbines (see [Figure PR-10](#)). Of this generation, 58 percent is proposed in Zone 3, 18 percent in Zone 4, 16 percent in Zone 5, 7 percent in Zone 2, and 1 percent in Zone 1.

The developer's projected in-service date listed in [Table PR-29](#) is the last official commercial operation in-service date provided by the developer for that request. A developer may, per the Midwest ISO's Attachment X procedures, suspend their Interconnection Agreement which may delay the project. A developer is not required to update their official in-service date as part of this suspension.

The following requests have been suspended:

- G282 – 99 MW wind farm, Line X-14 in Lafayette County, Wisconsin
- G366 – 80 MW wind farm, Friesland Substation in Columbia County, Wisconsin
- G376 – 160 MW wind farm, Line X-4 in Green Lake County, Wisconsin
- G384 – 99 MW wind farm, Line Y-51 in Manitowoc County, Wisconsin
- G427 – 98 MW wind farm, Cypress Substation in Fond du Lac County, Wisconsin
- G483 – 50 MW wind farm, Line Y-33 in Green County, Wisconsin
- G546 – 100 MW wind farm, Line 6541 in Walworth County, Wisconsin



# 10-Year Assessment

An annual report summarizing proposed additions and expansions to the transmission system to ensure electric system reliability.

2008

September 2008 10-Year Assessment  
[www.atc10yearplan.com](http://www.atc10yearplan.com)

Generation interconnection requests previously in the generation queue, which have been cancelled or removed from the queue since January 31, 2008 (because the developer withdrew the request or missed contractual milestones), are summarized in Table PR-30.

Link to publicly posted generation queue:

[http://oasis.midwestiso.org/documents/ATC/Cluster\\_8\\_Queue.html](http://oasis.midwestiso.org/documents/ATC/Cluster_8_Queue.html)

Transmission associated with proposed generation interconnections

Prior to the start of the MISO Day 2 Market, transmission service for new generators was handled separately through an OASIS transmission service request(s). For generators listed below that had studies completed prior to Day 2 start-up, system reinforcements were identified through both generator interconnection and transmission service studies.

### *Implications of generation development*

Availability of fuel, water and transmission interconnections are among the key aspects to be considered when siting generation.

From a transmission perspective, the ability of the transmission system to accommodate new generation is a function of stability, power flow and short circuit analyses. For certain generation technologies, harmonics and voltage fluctuations may need to be considered as well. In most instances, new generation will require certain transmission system reinforcements to interconnect and deliver the generation output. In a few specific instances, new generation can be beneficial to the transmission system, perhaps even deferring or eliminating the need for transmission reinforcements that would be necessary absent the new generation. The ability of generation to defer or eliminate the need for transmission reinforcements also can be a function of the generation location, number of generators and/or expected generator capacity factor.

In this section, a very general zone-by-zone evaluation of the likelihood of needing or deferring transmission reinforcements for various generator locations is provided. The purpose of these evaluations is to provide a very cursory indication to the generation market of the likely magnitude of the impact and the transmission reinforcements that would likely be needed by general location.

### *Zone 1*

Within Zone 1, generation has been proposed in various locations, but most of the proposals have involved generation located in the vicinity of the 345-kV infrastructure. Based on studies that we have conducted for proposed generation interconnections and transmission service from this area to date, some transmission reinforcements are likely to



be required for any significant (>100 MW) generation development. The extent and nature of the reinforcements largely would be a function of where the power from the generation is to be delivered.

The northern portion of Zone 1, the Rhinelander Loop, is a potential candidate for moderate-sized (up to 150 MW, depending on location) generation development, provided generator stability can be maintained, and provided it can be located in the northern portion of the Loop. Whether this generation would be cost-effective as a transmission-deferral mechanism would depend on a number of factors. The need for additional reinforcements outside of the Loop would be a function of where the power from the generation is to be delivered.

The transmission infrastructure in the central portion of Zone 1 includes three new 345-kV lines which make up the GCMW corridor (Gardner Park – Highway 22, Morgan – Highway 22, and Highway 22 – Werner West). These additional lines were essential for the new Weston 4 coal plant to interconnect to the ATC transmission system, bringing much needed support to the area for both stability and thermal considerations for the Weston facility. While it has not been evaluated in any G-T requests, it is possible that this new infrastructure has improved the area such that the transmission system has the potential to support additional small to medium size generation development depending on actual physical location of the facility.

The infrastructure in the southern portion of Zone 1 consists of five 138-kV lines and several 69-kV lines. Only smaller generation projects (typically <25 MW) could be accommodated with minimal transmission reinforcements. The existing infrastructure in this portion of Zone 1 is not suitable for significant generation development.

*Zone 1 completed generation studies:*

Request	Size	Type	County, State	Status
G144	550 MW	Coal	Marathon County, WI	In-Service
G522	550 MW	Coal	Portage County, WI	Out of Queue
G523	550 MW	Coal	Marathon County, WI	Out of Queue
G588	55/60 MW	Combustion Turbine	Wood County, WI	In-Queue

**Zone 2**

We have completed studies of three generation interconnection requests and two more are near completion for the Zone 2 area. Even though the first three requests are no longer active in the queue, they have helped us build a base of knowledge similar to what we have in other zones relating to likely generation interconnection impacts.





ATC is beginning to see substantial interest in siting wind turbine generators in the Upper Peninsula of Michigan. Currently, ATC is studying two wind farms located in Marquette and Houghton counties totaling 320 MW and will soon start the study of another 200 MW wind farm in Delta County. One of the major challenges wind farms proposed for the Upper Peninsula will face is the limited transmission infrastructure to interconnect and deliver the energy produced by these power plants. Since the Upper Peninsula transmission grid was primarily designed to serve local load, substantial transmission upgrades area required to accommodate these proposed plants. The completion of the Northern Umbrella Plan, however, will result in a much more robust 138-kV network at Plains Substation that could accommodate a reasonable amount of generation in the future at or near Plains.

It is likely that given the scarcity of 138-kV infrastructure in the Upper Peninsula there are virtually no other locations in Zone 2 that are ideal candidates for significant generation development. The MISO generation interconnection queue contains two proposed wind farms for Zone 2 totaling 320 MW. The studies for these requests are still in progress and required transmission reinforcements have not yet been identified.

There are areas in Zone 2, such as on the western end of the Upper Peninsula, which are or will be in need of transmission reinforcements where smaller generation projects could be beneficial in terms of deferring transmission expenditures. The allowable capacity of such generation would depend on the location. However, other potential impacts (stability, fault duties) would need to be evaluated on a location-by-location basis.

*Zone 2 completed generation studies:*

Request	Size	Type	County, State	Status
G567-568	165 or 300 MW	Coal	Delta County, MI	Out of Queue
G583	19 MW	Biomass	Ontonagon County, MI	Out of Queue
G750	200 MW	Wind	Marquette County, MI	In Queue
G799	120 MW	Wind	Houghton County, MI	In Queue

**Zone 3**

In Zone 3, generation has been proposed in various locations, but over half have been in the southern-most counties in Zone 3. Generation could be beneficial in a few areas depending on the capacity of such generation and the exact location.





# 10-Year Assessment

An annual report summarizing proposed additions and expansions to the transmission system to ensure electric system reliability.

2008

September 2008 10-Year Assessment  
[www.atc10yearplan.com](http://www.atc10yearplan.com)

We are projecting that the Dane County electric system could become subject to thermal overloads, low voltages or voltage collapse, significant load shed risk, and restrictions on power imports into the county as early as 2011. We believe that extending the 345-kV network to the west side of the Madison metropolitan area, coupled with additional 138-kV reinforcements within the city and reactive support will resolve these issues over the long term.

Sauk County, though we are currently reinforcing the system, is projected to need additional transmission reinforcements in the future to ensure reliable operation. Smaller-scale generation (< 100 MW) in certain locations could be beneficial to improving the voltage profile in the area and potentially deferring transmission reinforcements. Stability analysis would need to be conducted to ensure stable operation of such generation.

Similarly, the southeast portion of Zone 3 is heavily loaded and will require transmission reinforcements in the future to ensure reliable operation. Small-scale generation in certain locations could be beneficial to changing power flow patterns and improving the voltage profile in the area.

*Zone 3 completed generation studies:*

Request	Size	Type	County, State	Status
G281	130 MW	Wind	Green County, WI	Out of Queue
G282	99 MW	Wind	Lafayette County, WI	In Queue
G338	54 MW	Wind	Dodge County, WI	In Queue
G366	80 MW	Wind	Columbia County, WI	In Queue
G371	100 MW	Wind	Columbia County, WI	Out of Queue
G483	50 MW	Wind	Green County, WI	In Queue
G506	100 MW	Wind	Monroe County, WI	Out of Queue
G527	280 MW	Coal	Grant County, WI	In Queue
G528	550 MW	Coal	Columbia County, WI	Out of Queue
G546	100 MW	Wind	Walworth County, WI	In Queue
G550	24 MW	Simple cycle	Jefferson County, WI	In Queue
G553	280 MW	Coal	Columbia County, WI	In Queue
G706	99 MW	Wind	Columbia County, WI	In Queue
G724	99 MW	Wind	Dane County, WI	In Queue
G747	99 MW	Wind	Rock County, WI	In Queue
G749	99 MW	Wind	Lafayette County, WI	In Queue
G793	100 MW	Wind	Rock County, WI	In Queue



**Zone 4**

Generation has been proposed in various locations in Zone 4. Generation could be beneficial in a few areas depending on the capacity of such generation and exact location. Given the nature of the issues in Zone 4, however, it is unlikely that new generation in Zone 4 will significantly alter the need for the major transmission reinforcements contemplated in that zone.

One area where generation could defer the need for transmission reinforcements is in Door County, provided such generation is small-scale (< 50 MW) and appropriately located. Currently, the northern portion of the county is served radially, and electric service is subject to interruption for the loss of the single 69-kV line serving the area. The voltage profile in Door County is projected to precipitate the need for reinforcements in the future. Small-scale generation potentially could defer certain of these reinforcements.

One area in Zone 4 that cannot accommodate any additional generation without significant transmission reinforcements is the area around the Point Beach and Kewaunee nuclear plants. In this area, existing transmission lines have little excess capacity. As the system evolves, stability margins at those plants may become a concern. Additional generation may require transmission reinforcements to meet our stability criteria.

*Zone 4 completed generation studies:*

Request	Size	Type	County, State	Status
G240	55 MW	Steam	Manitowoc County, WI	In Service
G353-4	160 MW	Wind	Fond du Lac County, WI	In Service
G368	200 MW	Wind	Fond du Lac County, WI	In Service
G376	160 MW	Wind	Green County, WI	In Queue
G384	99 MW	Wind	Manitowoc County, WI	In Queue
G410	99 MW	Wind	Kewaunee County, WI	Out of Queue
G421	50 MW	Wind	Brown County, WI	Out of Queue
G427	98 MW	Wind	Fond du Lac County, WI	In Queue
G486	10.5 MW	Wind	Manitowoc County, WI	Out of Queue
G507	98 MW	Wind	Fond du Lac County, WI	In Queue
G524	550 MW	Coal	Brown County, WI	Out of Queue
G590	98 MW	Wind	Calumet County, WI	In Queue
G611	99 MW	Wind	Calumet County, WI	In Queue
G773	150 MW	Wind	Brown County, WI	In Queue

**Zone 5**



# 10-Year Assessment

An annual report summarizing proposed additions and expansions to the transmission system to ensure electric system reliability.

2008

September 2008 10-Year Assessment  
[www.atc10yearplan.com](http://www.atc10yearplan.com)

Two major generation additions have been completed for Zone 5. The first addition is at Port Washington Power Plant, which goes into commercial operation on June of 2008. In order to accommodate the two blocks of generation at Port Washington, the two Port Washington–Rangeline 138-kV lines and the three Port Washington–Saukville 138-kV lines were rebuilt in 2005 and the Saukville–Pleasant Valley–Arthur Road–St. Lawrence 138-kV line was rebuilt in 2007 at a cost of approximately \$10 million.

The other site for new generation is the Oak Creek Power Plant. The PSCW has approved two units at the Oak Creek Power Plant, with the first unit going into service in 2009 and the second unit in 2010.

Studies of other proposed generation projects that are no longer in the generation queue indicate that additional generation in certain areas of Zone 5 would pose stability problems. In particular, larger-scale generation interconnecting to the 345-kV network could pose stability issues.

Smaller-scale generation in certain locations in Washington and Waukesha counties potentially could be accommodated without the need for transmission reinforcements if located appropriately.

*Zone 5 completed generation studies:*

Request	Size	Type	County, State	Status
G051	1950 MW	Coal/steam	Milwaukee County, Wisconsin	In Queue
G093	1200 MW	Combined cycle	Ozaukee County, Wisconsin	In Service
G510	70 MW	Combined cycle	Ozaukee County, Wisconsin	In Service

*Transmission to distribution interconnections*

We have received numerous requests from distribution companies for new transmission to distribution interconnections. These interconnection requests generally are categorized into one of three different types of projects:

1. *Constructing new T-D substations.* Typically, these new interconnections involve constructing a new T-D substation adjacent to an existing transmission line and looping the transmission line into the new substation. In some instances, the new substation cannot be sited adjacent to the transmission line and we are required to construct a transmission line to the new substation site. Since this type of interconnection is a way



for a distribution company to redistribute load between the two existing substations, it typically does not materially affect transmission system performance. In some instances, however, the optimum site for the new substation, from a distribution planning perspective, is such that a new transmission line from two substations that were not previously interconnected is warranted, forming a new network line, which can materially affect transmission system performance.

2. *Adding T-D transformers at existing substations.* These new interconnections involve expanding an existing T-D substation to accommodate a new T-D transformer. Typically, this type of interconnection is a way for a distribution company to improve reliability by providing redundancy, lowering the loading on existing T-D transformers and meeting increasing customer demand.
3. *Replacing existing T-D transformers at existing substations.* These are not technically new interconnections since no expansion is required at the existing T-D substation; it's merely a means of increasing transformer capacity. This type of project is a way to reliably serve increasing customer demand.

In some instances, the reason for a new T-D interconnection request is driven by a large new customer load, such as a new industry with a large demand for electricity. In these instances, there may be a need for other transmission system reinforcements to reliably serve the new load.

Several economic development projects in ATC's territory have prompted new D-T interconnections:

- a new manufacturing facility in the Michigan Upper Peninsula Keweenaw area (under construction),
- a new mine development north of Marquette (under construction),
- a gas separation facility in the Janesville area (recently completed),
- a large natural gas pumping facility to support a pipeline extension to the Fox Valley (ATC facilities are complete),
- several ethanol plants in various stages of development, and
- several oil pumping substation expansions for oil pipeline load increases.

T-D interconnection requests that have been jointly evaluated to the point of Best Value Planning agreement between ATC and the LDC are shown in Figures PR-11 through PR-15 for Zones 1-5, respectively. A corresponding list of these interconnection requests is available on ATC's Web site: [www.atcllc.com](http://www.atcllc.com). For the most part, those shown are on the Planning and Project Management worksheets of the D-T queue.

**Table PR-1**  
**Projects Placed In Service Since 2007 10-Year Assessment**  
*As of August 25, 2008*

Project	Zone
Construct Stone Lake-Arrowhead 345-kV line	1
Install 1-75 MVAR capacitor bank and 1-75 MVAR inductor at Stone Lake 345 kV	1
Construct new Arrowhead 345-kV Substation, install 2-75 MVAR capacitor banks, 1-800 MVA PST and 1-800 MVA 345/230-kV transformer	1
Construct the new permanent Stone Lake 345/161-kV Substation	1
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and upgrade the 5.4 MVAR capacitor bank to 10.8 MVAR at Berlin 69-kV Substation	1
Construct Cranberry-Conover 115-kV line	1
Install 2-8.16 MVAR capacitor banks at the 9 Mile 69-kV Substation	2
Install second 138/69-kV transformer at Straits Substation	2
Install second 138/69-kV transformer at Hiawatha Substation	2
Uprate Winona-Atlantic 69-kV line clearance to 185 degrees F	2
Rebuild Atlantic-Osceola 69-kV line (Laurium #1)	2
Uprate Empire-Forsyth 138-kV line to 302 MVA	2
Uprate Mass-Winona 69-kV line clearance to 185 degrees F	2
Construct 138 kV bus and install 138/115-kV 200 MVA and 138/69-kV 60 MVA transformers at Conover Substation	2
Uprate the Atlantic 138/69-kV transformer to 64 MVA summer emergency	2
Uprate the M38 138/69-kV transformer to 70 MVA summer emergency	2
Install 1-4.08 MVAR capacitor bank at Roberts 69-kV Substation	2
Construct a Rubicon-Hustisford 138-kV line	3
Uprate Portage 138/69-kV transformer to achieve a 143 MVA summer emergency rating	3
Uprate Y-51 Brick Church-Cobblestone 69-kV line to achieve a 115 MVA summer emergency rating	3
Uprate X-19 Portage-Trienda 138-kV line to achieve a 321 MVA summer emergency rating	3
Install a temporary 24.5 MVAR 138-kV capacitor bank at Boxelder Substation	3
Install 2-8.16 MVAR 69-kV capacitor banks at South Lake Geneva Substation	3
Rebuild Hustisford-Horicon 69 kV to 138 kV	3
Construct 138/69 kV substation at a site near Horicon and install a 138/69-kV transformer	3
Uprate X-17 Eden-Spring Green 138-kV line to achieve 167 degrees F line ratings	3
Construct new line from Southwest Delavan to Bristol at 138 kV and operate at 69 kV	3
Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress Substation	4
String a new Ellinwood-Sunset Point 138-kV line on existing structures	4
Uprate North Appleton-Lawn Road-White Clay 138-kV line	4
Construct a 138-kV substation at new Cedar Ridge; loop existing Ohmstead-Kettle Moraine 138-kV line into new Cedar Ridge Substation	4
Uprate North Appleton-Fox River 345-kV line	4
Install 2-1.2 MVAR distribution capacitor banks at Sister Bay 69 kV	4
Uprate North Appleton-Mason Street 138-kV line	4
Uprate North Appleton-Lost Dauphin 138-kV line	4
Upgrade St. Martins 138-kV bus to 2000A	5
Upgrade St. Lawrence 138-kV bus	5
Reconductor Saukville-St Lawrence 138-kV line	5

Table PR-2  
Transmission System Additions for 2008

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2008-2017)</i> in <i>Financial Table</i>
Install 2-4.08 MVAR capacitor banks at Munising 69-kV Substation	2008	2008	2	reliability	Planned	F1820
Install a total of 6.3 MVAR distribution capacitor banks at Dickinson Substation	2008	2008	3	reliability	Proposed	F2449
Construct Butler Ridge 138-kV Substation	2008	2008	3	Generation	Planned	F1367
Expand the Menominee 69-kV Substation and install 138 kV terminals. Loop the West Marinette-Bay De Noc 138-kV line into the Substation	2008	2008	4	reliability	Planned	F1621
Install 138/69-kV transformer at the expanded Menominee Substation	2008	2008	4	reliability	Planned	F1621

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment



Table PR-3  
Transmission System Additions for 2009

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2008-2017) in Financial Table
Construct Gardner Park-Hwy 22 345-kV line	2009	2009	1	service limitation, reliability, import capability and Weston stability	Planned	F0301
Construct new Hwy 22 345-kV Substation	2009	2009	1	service limitation, reliability, import capability and Weston stability	Planned	F0301
Relocate Cedar Substation (North Lake)	2005	2009	2	reliability, condition	Planned	F1605
Install 1-4.08 MVAR capacitor bank at L'Anse 69 kV	2008	2009	2	reliability	Proposed	F1819
Construct ring bus at the Pine River 69-kV Substation and replace 1-5.4 MVAR capacitor bank with 2-4.08 MVAR banks	2008	2009	2	reliability, condition	Proposed	F1282
Install 1-8.16 MVAR capacitor banks at the M38 138-kV Substation	2009	2009	2	reliability	Proposed	F2485
Uprate Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	2009	2009	2	reliability	Proposed	F2016
Install 2-16.33 MVAR capacitor bank at Perkins 138-kV Substation	2009	2009	2	reliability	Proposed	F2220
Install 1-16.33 MVAR capacitor bank at Hiawatha 138-kV Substation	2009	2009	2	reliability	Proposed	F2222
Install 1-4.08 MVAR capacitor banks at Osceola 69 kV	2009	2009	2	reliability	Proposed	F2468
Uprate the Delta-North Bluff 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2009	2009	2	reliability	Provisional	F2531
Uprate the North Bluff-Gladstone 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2009	2009	2	reliability	Provisional	F2522
Uprate the Masonville-Gladstone 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2009	2009	2	reliability	Provisional	F2533

Table PR-3 (continued)  
Transmission System Additions for 2009

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2008-2017) in Financial Table
Uprate the Chandler-Masonville 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2009	2009	2	reliability	Provisional	F2532
Install 3-16.33 MVAR 138-kV capacitor banks at North Beaver Dam Substation	2005	2009	3	reliability	Planned	F1847
Construct a Jefferson-Lake Mills-Stony Brook 138-kV line	2006	2009	3	reliability	Planned	F0924
Construct a new 138-kV line from North Madison to Huiskamp	2008	2009	3	reliability	Planned	F1626
Construct a new 138/69-kV substation near Huiskamp and install a 138/69-kV transformer with a 187 MVA summer emergency rating	2008	2009	3	reliability	Planned	F1626
Uprate 6632 Rockdale to Jefferson 138-kV line	2008	2009	3	reliability	Planned	F0924
Uprate X-8 Rockdale to Boxelder 138-kV line	2008	2009	3	reliability	Planned	F0924
Uprate 58751 Boxelder to Stony Brook 138-kV line	2008	2009	3	reliability	Planned	F0924
Convert Rock River to Bristol to Elkhorn 138-kV operation; rebuild Bristol with a new 138 kV bus	2008	2009	3	reliability	Planned	F1690
Install one temporary 12.45 MVAR 69-kV mobile capacitor bank at Brick Church Substation	2008	2009	3	reliability	Proposed	F2279
Uprate Y-61 McCue-Lamar 69-kV line to achieve 300 deg F line ratings and install 2-12.45 Mvar 69 kV capacitor banks at Lamar Substation	2008	2009	3	reliability	Provisional	F2558
Install 5.7 MVAR distribution capacitor bank at Union Townline 69-kV Substation	2009	2009	3	reliability	Proposed	F2332
Install 2-24.5 MVAR 138 kV capacitor banks at Kilbourn Substation and install 2-24.5 MVAR 138-kV capacitor banks at Artesian Substation	2009	2009	3	reliability	Planned	F1712
Expand the existing 69-kV capacitor bank from 5.4 to 8.1 MVAR at Richland Center Olson Substation and install 1-7.8 MVAR 12.4-kV capacitor bank at Brewer Substation	2009	2009	3	reliability	Proposed	F2318
Uprate Y-41 Walworth- North Lake Geneva 69-kV to achieve a 69 MVA summer emergency rating	2009	2009	3	reliability	Proposed	F2154

Table PR-3 (continued)  
Transmission System Additions for 2009

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2008-2017) in Financial Table
Uprate Y-152 North Lake Geneva-Lake Geneva 69-kV line to achieve a 115 MVA summer emergency rating	2009	2009	3	reliability	Proposed	F2155
Rebuild Stoughton Substation bus	2009	2009	3	reliability	Provisional	F2001
String a new 138-kV line from Clintonville-Werner West primarily on Morgan-Werner West 345-kV line structures	2004	2009	4	reliability, service limitation	Under Construction	F0823
Construct Morgan-Werner West 345-kV line	2004	2009	4	reliability, service limitation	Under Construction	F0823
Relocate Mishicot 138-kV Substation	2009	2009	4	new generation	Planned	F2035
Rebuild Crivitz-High Falls 69-kV double circuit line	2009	2009	4	reliability	Under Construction	F1357
Install a second 138-kV reserve auxiliary transformer (RAT) at Kewaunee and remove tertiary auxiliary transformer (TAT)	2009	2009	4	reliability	Proposed	F2371
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2009	2009	4	reliability	Planned	F1361
Replace relaying on 230-kV circuits at Oak Creek	2009	2009	5	new generation	Planned	F0283
Replace two 345-kV circuit breakers at Pleasant Prairie Substation on the Racine and Zion lines with IPO breakers and upgrade relaying	2009	2009	5	new generation	Planned	F0283
Reconductor Oak Creek-Allerton 138-kV line	2009	2009	5	new generation	Planned	F0763
Install second 500 MVA 345/138-kV transformer at Oak Creek Substation	2009	2009	5	new generation	Planned	F0763
Loop Ramsey5-Harbor 138-kV line into Norwich and Kansas to form a new line from Ramsey-Norwich and Harbor-Kansas 138-kV lines	2009	2009	5	new generation	Planned	F2112
Replace CTs at Racine 345-kV Substation	2009	2009	5	new generation	Planned	F1165
Reconductor Oak Creek-Ramsey 138-kV line	2009	2009	5	new generation	Planned	F1729
Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	2009	2009	5	T-D interconnection	Proposed	F2086
Construct a 138-kV bus at Hale Substation to permit third Brookdale distribution transformer interconnection	2009	2009	5	T-D interconnection	Proposed	F2097

Table PR-3 (continued)  
Transmission System Additions for 2009

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	<b>Cost Estimate - Refer to <i>Funding Project and Sum of Total (2008-2017)</i> in Financial Table</b>
Expand Oak Creek 345-kV switchyard to interconnect one new generator	2009	2009	5	new generation	Planned	F2140
Construct 138-kV bus section at Shorewood	2009	2009	5	T-D interconnection	Provisional	F2502

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-4  
Transmission System Additions for 2010

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2008-2017) in Financial Table
Construct 69-kV line from new Warrens Substation to the Council Creek-Tunnel City 69-kV line	2010	2010	1	T-D interconnection	Planned	F2173
Rebuild Arpin-Rocky Run 345-kV line	2010	2010	1	condition	Planned	F2252
Construct Brandon-Fairwater 69-kV line	2010	2010	1	T-D interconnection	Proposed	F1844
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2010	2010	2	reliability, transfer capability	Planned	F1363
Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Iron Grove Substation	2010	2010	2	reliability, transfer capability	Planned	F1363
Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Aspen Substation	2010	2010	2	reliability	Planned	F1363
Relocate Iron River Substation (Iron Grove)	2010	2010	2	reliability	Planned	F1363
Install 1-16.33 MVAR capacitor bank at Indian Lake 138-kV Substation	2010	2010	2	reliability	Proposed	F2223
Install 1-4.08 MVAR capacitor bank at North Bluff 69-kV Substation	2010	2010	2	reliability	Provisional	F2490
Uprate the Chandler-Delta #1 69-kV line summer emergency rating from 120 deg F to 167 deg F	2009	2010	2	reliability	Provisional	F2534
Uprate the Chandler-Delta #2 69-kV line summer emergency rating to from 120 deg F 167 deg F	2009	2010	2	reliability	Provisional	F2535
Construct new Oak Ridge-Verona 138-kV line and install a 138/69-kV transformer at Verona with a 100 MVA summer normal rating	2009	2010	3	reliability	Planned	F1407
Upgrade Sheepskin capacitor bank from 10.8 MVAR to 16.2 MVAR	2009	2010	3	reliability	Proposed	F2248
Construct second Paddock-Rockdale 345-kV line and replace 345/138-kV transformer T22 at Rockdale Substation	2010	2010	3	economics	Planned	F1981
Install 2-16.33 MVAR 69-kV capacitor banks at Spring Green Substation	2010	2010	3	reliability	Proposed	F2327
Uprate the Royster Substation terminals	2010	2010	3	reliability	Provisional	F2317
Install 2-32 MVAR capacitor banks at Summit 138-kV Substation	2009	2010	5	reliability	Proposed	F2256

Table PR-4 (continued)  
Transmission System Additions for 2010

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2008-2017)</i> in <i>Financial Table</i>
Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962	2010	2010	5	reliability	Proposed	F2142
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Planned	F0763
Uprate Oak Creek-Root River 138-kV line	2010	2010	5	new generation	Planned	F0763
Uprate Oak Creek-Nicholson 138-kV line	2010	2010	5	new generation	Planned	F0763
Install 200 MVAR capacitor bank at Bluemound Substation	2010	2010	5	reliability	Proposed	F2435
Upgrade Bain-Albers 138-kV line	2010	2010	5	reliability	Provisional	F2461

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment



Table PR-5  
Transmission System Additions for 2011

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2008-2017) in Financial Table
Rebuild the Y-119 Verona to Oregon 69-kV line	2008	2011	3	reliability, condition	Proposed	F2469
Rebuild Y-33 Brodhead to South Monroe 69-kV line	2011	2011	3	generation interconnection, reliability	Proposed	F2526
Uprate terminal limitations at McCue for the Y-79 McCue-Milton Lawns 69-kV line	2011	2011	3	reliability	Proposed	F2405
Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	2011	2011	3	reliability, economics	Provisional	F2489
Install 2-24.5 Mvar 138-kV capacitor bank and 1-18 Mvar 69-kV capacitor bank at Brick Church substation	2011	2011	3	reliability	Provisional	F2404
Reconfigure Kewaunee 345/138-kV switchyard and install a second 500 MVA 345/138-kV transformer	2011	2011	4	reliability, condition	Proposed	F2437
Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	2010	2011	5	reliability	Provisional	F2539
A second distribution transformer at Somers Substation requires a rebuild of the Racine-Somers-Albers 138-kV line; extend Albers 138-kV bus to permit connecting the Racine-Somers-Albers radial line to the Albers 138-kV bus	2011	2011	5	T-D interconnection	Provisional	F2095

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-6  
Transmission System Additions for 2012

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2008-2017) in Financial Table
Construct 115-kV line from new Arnett Road Substation to the Clear Lake Substation	2012	2012	1	T-D interconnection	Proposed	F1294
Construct Monroe County-Council Creek 161-kV line	2012	2012	1	economics, reliability	Proposed	F1727
Install a 161/138-kV transformer at Council Creek Substation	2012	2012	1	economics, reliability	Proposed	F1727
Uprate Council Creek-Petenwell 138-kV line	2012	2012	1	economics, reliability	Proposed	F1727
Rebuild Y-32 Colley Road-Brick Church 69-kV line	2012	2012	3	reliability, condition	Provisional	F1670
Construct Canal-Dunn Road 138-kV line	2012	2012	4	reliability	Proposed	F1358
Install 60 MVA 138/69-kV transformer at Dunn Road	2012	2012	4	reliability	Proposed	F1358
Construct second Shorewood-Humboldt 138-kV underground cable	2012	2012	5	reliability	Proposed	F2487

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-7  
Transmission System Additions for 2013

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2008-2017) in Financial Table
Replace 138/69-kV transformer at Metomen Substation	2013	2013	1	reliability	Proposed	F1867
Upgrade Mckenna 6.3 MVAR capacitor bank to 12.25 MVAR and install a second new 12.25 MVAR capacitor bank	2013	2013	1	reliability	Provisional	F2519
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F	2009	2013	2	reliability	Provisional	F2492
Loop 6947 Nine Springs-Pflaum 69-kV line into Femrite Substation	2006	2013	3	reliability	Proposed	F2088
Install a 138/69-kV transformer at Bass Creek Substation	2010	2013	3	reliability	Proposed	F1869
Rebuild/reconductor X-12 Town Line Road-Bass Creek 138-kV line	2010	2013	3	reliability	Proposed	F1869
Construct 345-kV line from Rockdale to West Middleton	2013	2013	3	reliability	Planned	F1435
Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at West Middleton Substation	2013	2013	3	reliability	Planned	F1435
Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	2013	2013	3	reliability	Proposed	F2445
Install 1-8.16 MVAR capacitor bank at Boscobel 69-kV Substation and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2013	2013	3	reliability	Provisional	F2518
Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	2013	2013	3	reliability	Proposed	F1868
Upgrade Bain-Kenosha 138-kV line	2013	2013	5	reliability	Provisional	F2462

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-8  
Transmission System Additions for 2014

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2008-2017) in Financial Table
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2014	2014	1	T-D interconnection	Provisional	F2053
Rebuild Blaney Park-Munising 69 kV to 138 kV	2014	2014	2	reliability, condition	Provisional	F0365
Construct a Horicon-East Beaver Dam 138-kV line	2014	2014	3	reliability	Provisional	F1640
Construct new 138-kV line from North Lake Geneva to South Lake Geneva Substation	2014	2014	3	reliability, T-D interconnection	Provisional	F2587
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	2014	2014	3	reliability	Provisional	F2587
Uprate X-23 Colley Road-Marine 138-kV line terminals	2014	2014	3	reliability	Proposed	F1670
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	2014	2014	3	reliability	Provisional	F2515
Install 2-16.33 MVAR 69-kV capacitor banks and 2-24.5 MVAR capacitor banks at Femrite substation	2014	2014	3	reliability	Provisional	F2516
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	2014	2014	3	reliability	Provisional	F2517
Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	2014	2014	3	reliability	Provisional	F2520
Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	2014	2014	3	reliability	Provisional	F2092
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	2014	2014	4	reliability	Provisional	F2079
Construct a 345-kV bus at Bain Substation	2008	2014	5	reliability	Provisional	F0033
Install 2-32 Mvar capacitor banks at Mukwonago 138-kV Substation	2014	2014	5	reliability	Provisional	F2493
Upgrade Oak Creek-Pennsylvania 138-kV line	2014	2014	5	reliability	Provisional	F2473

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-9  
Transmission System Additions for 2015

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2008-2017) in Financial Table
Construct a Lake Delton-Birchwood 138-kV line	2015	2015	3	reliability	Provisional	F1638
Replace the existing 46 MVA Hillman 138/69-kV transformer with a 100 MVA transformer	2015	2015	3	reliability	Provisional	F0339
Rebuild part of the Y-8 Dane-Dam Heights 69-kV line	2015	2015	3	reliability	Provisional	F1602
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	2015	2015	3	reliability	Provisional	F2135
Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	2015	2015	3	reliability	Provisional	F2153
Install 2-16.3 MVAR capacitor bank at Mears Corners 138-kV Substation	2015	2015	4	reliability	Provisional	F1924
Install 2-16.3 MVAR capacitor bank at Rosiere 138-kV Substation	2015	2015	4	reliability	Provisional	F1925

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-10  
Transmission System Additions for 2016

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2008-2017) in Financial Table
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69-kV Substation	2016	2016	1	reliability	Provisional	F2477
Install a second 138/69-kV transformer at McCue Substation	2016	2016	3	reliability	Provisional	F1637
Upgrade the 6986 Royster to Sycamore 69-kV line to 115 MVA	2016	2016	3	reliability	Provisional	F2471
Install 2-16.33 Mvar 69-kV capacitor banks at Sun Prairie	2016	2016	3	reliability	Provisional	F2475
Install 138/69-kV transformer at Custer Substation	2016	2016	4	reliability, economics	Provisional	F2081
Construct Shoto to Custer 138-kV line	2016	2016	4	reliability, economics	Provisional	F2081
Rebuild/Convert Bayport-Suamico-Sobieski-Pioneer 69-kV line to 138 kV	2016	2016	4	reliability, condition	Provisional	F1619
Construct second Dunn Road-Egg Harbor 69-kV line	2016	2016	4	reliability	Proposed	F0181
Upgrade the Melissa-Tayco to 229 MVA (300F)	2016	2016	4	reliability, economics	Provisional	F2434
Install 28.8 MVAR capacitor bank at Butternut 138-kV Substation	2016	2016	4	reliability	Provisional	F1403

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment



Table PR-11  
Transmission System Additions for 2017

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2008-2017) in Financial Table
Install a second 138/69-kV transformer at Wautoma Substation	2017	2017	1	reliability	Provisional	F2480
Uprate the summer emergency rating of the Forsyth 138/69-kV transformer to 57 MVA	2017	2017	2	reliability	Provisional	TBD
Construct double-circuit line between McCue and Lamar substations	2017	2017	3	reliability	Provisional	TBD
Construct West Middleton-Blount 138-kV line	2017	2017	3	reliability	Provisional	F2466
Install 2-16.33 Mvar 69-kV capacitor banks at Dam Heights	2017	2017	3	reliability	Provisional	F2474
Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating	2017	2017	3	reliability	Provisional	TBD

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-12  
Transmission System Additions for 2018-2023

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2008-2017) in Financial Table
Convert Necedah distribution substation from 69 kV to 138 kV	2018	2018	1	reliability	Provisional	F2560
Uprate Castle Rock-Mckenna 69-kV line	2018	2018	1	reliability	Provisional	F2491
Construct Fairwater-Mackford Prairie 69-kV line	2018	2018	1	reliability	Provisional	F2105
Reconfigure the North Randolph-Ripon 69-kV line to form a second Ripon-Metomen 69-kV line and retire the circuit between Metomen and the Mackford Prairie tap	2018	2018	1	reliability	Provisional	F2105
Construct a 345-kV bus, install a 345/138-kV 500 MVA transformer at North Randolph and loop the Columbia to South Fond Du Lac 345-kV line into the substation	2018	2018	3	reliability	Provisional	F2093
Install 2-16.33 Mvar 69-kV capacitor banks at North Monroe	2018	2018	3	reliability	Provisional	F2472
Replace the 1200 A breaker at Edgewater T22 345/138-kV transformer	2018	2018	4	reliability	Proposed	F1714
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	2018	2018	4	reliability	Provisional	F2080
Install 2-16.3 MVAR capacitor bank at Aviation Substation	2018	2018	4	reliability	Provisional	F1923
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2018	2018	3 & 5	T-D interconnection, reliability	Provisional	TBD
Install 2-16.33 Mvar 69-kV capacitor banks at Rio	2019	2019	3	reliability	Provisional	TBD
Install a 12.2 MVAR capacitor bank at Hilltop 69-kV Substation	2023	2023	1	reliability	Provisional	F2476

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-13  
Transmission System Additions with In-service dates Yet To Be Determined

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional	Cost Estimate - Refer to <i>Funding Project</i> and <i>Sum of Total (2008-2017)</i> in <i>Financial Table</i>
Convert Indian Lake-Hiawatha 69-kV line to double-circuit 138-kV operation, construct new Hiawatha 138-kV Substation	TBD	TBD	2	reliability	Provisional	F1354
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	TBD	TBD	2	reliability	Provisional	TBD
Construct Evansville-Brooklyn 69-kV line	TBD	TBD	3	reliability	Provisional	F1848
Replace two overhead Blount-Ruskin 69-kV lines with one underground 69-kV line	TBD	TBD	3	ATC proposal with Madison	Provisional	TBD
Construct Verona-North Monroe 138-kV line	TBD	TBD	3	reliability	Provisional	TBD
Uprate 138-kV line from Kewaunee to East Krok	TBD	TBD	4	reliability	Provisional	TBD
Reconductor Ramsey-Harbor 138-kV line	TBD	TBD	5	reliability	Provisional	TBD

Defined in Previous 10-Year Assessment
Revised in scope from Previous 10-Year Assessment
New to this 10-Year Assessment

Table PR-14  
Zone 1 Transmission System Additions

<b>System Additions</b>	<b>System Need Year</b>	<b>Projected In-Service Year</b>	<b>Planning Zone</b>	<b>Need Category</b>	<b>Planned, Proposed or Provisional</b>
Construct Gardner Park-Hwy 22 345-kV line	2009	2009	1	service limitation, reliability, import capability and Weston stability	Planned
Construct new Hwy 22 345-kV Substation	2009	2009	1	service limitation, reliability, import capability and Weston stability	Planned
Construct 69-kV line from new Warrens Substation to the Council Creek-Tunnel City 69-kV line	2010	2010	1	T-D interconnection	Planned
Rebuild Arpin-Rocky Run 345-kV line	2010	2010	1	condition	Planned
Construct Brandon-Fairwater 69-kV line	2010	2010	1	T-D interconnection	Proposed
Construct 115-kV line from new Arnett Road Substation to the Clear Lake Substation	2012	2012	1	T-D interconnection	Proposed
Construct Monroe County-Council Creek 161-kV line	2012	2012	1	economics, reliability	Proposed
Install a 161/138-kV transformer at Council Creek Substation	2012	2012	1	economics, reliability	Proposed
Uprate Council Creek-Petenwell 138-kV line	2012	2012	1	economics, reliability	Proposed
Replace 138/69-kV transformer at Metomen Substation	2013	2013	1	reliability	Proposed
Upgrade Mckenna 6.3 MVAR capacitor bank to 12.25 MVAR and install a second new 12.25 MVAR capacitor bank	2013	2013	1	reliability	Provisional
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2014	2014	1	T-D interconnection	Provisional
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69-kV Substation	2016	2016	1	reliability	Provisional
Install a second 138/69-kV transformer at Wautoma Substation	2017	2017	1	reliability	Provisional
Convert Necedah distribution substation from 69 kV to 138 kV	2018	2018	1	reliability	Provisional
Uprate Castle Rock-Mckenna 69-kV line	2018	2018	1	reliability	Provisional
Construct Fairwater-Mackford Prairie 69-kV line	2018	2018	1	reliability	Provisional

Table PR-14 (continued)  
Zone 1 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Reconfigure the North Randolph-Ripon 69-kV line to form a second Ripon-Metomen 69-kV line and retire the circuit between Metomen and the Mackford Prairie tap	2018	2018	1	reliability	Provisional
Install a 12.2 MVAR capacitor bank at Hilltop 69-kV Substation	2023	2023	1	reliability	Provisional

Table PR-15  
Zone 2 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Install 2-4.08 MVAR capacitor banks at Munising 69-kV Substation	2008	2008	2	reliability	Planned
Relocate Cedar Substation (North Lake)	2005	2009	2	reliability, condition	Planned
Install 1-4.08 MVAR capacitor bank at L'Anse 69 kV	2008	2009	2	reliability	Proposed
Construct ring bus at the Pine River 69-kV Substation and replace 1-5.4 MVAR capacitor bank with 2-4.08 MVAR banks	2008	2009	2	reliability, condition	Proposed
Install 1-8.16 MVAR capacitor banks at the M38 138-kV Substation	2009	2009	2	reliability	Proposed
Uprate Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	2009	2009	2	reliability	Proposed
Install 2-16.33 MVAR capacitor bank at Perkins 138-kV Substation	2009	2009	2	reliability	Proposed
Install 1-16.33 MVAR capacitor bank at Hiawatha 138-kV Substation	2009	2009	2	reliability	Proposed
Install 1-4.08 MVAR capacitor banks at Osceola 69 kV	2009	2009	2	reliability	Proposed
Uprate the Delta-North Bluff 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2009	2009	2	reliability	Provisional
Uprate the North Bluff-Gladstone 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2009	2009	2	reliability	Provisional
Uprate the Masonville-Gladstone 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2009	2009	2	reliability	Provisional
Uprate the Chandler-Masonville 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2009	2009	2	reliability	Provisional
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2010	2010	2	reliability, transfer capability	Planned
Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Iron Grove Substation	2010	2010	2	reliability, transfer capability	Planned
Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Aspen Substation	2010	2010	2	reliability	Planned

Table PR-15 (continued)  
Zone 2 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Relocate Iron River Substation (Iron Grove)	2010	2010	2	reliability	Planned
Install 1-16.33 MVAR capacitor bank at Indian Lake 138-kV Substation	2010	2010	2	reliability	Proposed
Install 1-4.08 MVAR capacitor bank at North Bluff 69-kV Substation	2010	2010	2	reliability	Provisional
Uprate the Chandler-Delta #1 69-kV line summer emergency rating from 120 deg F to 167 deg F	2009	2010	2	reliability	Provisional
Uprate the Chandler-Delta #2 69-kV line summer emergency rating to from 120 deg F 167 deg F	2009	2010	2	reliability	Provisional
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F	2009	2013	2	reliability	Provisional
Rebuild Blaney Park-Munising 69 kV to 138 kV	2014	2014	2	reliability, condition	Provisional
Uprate the summer emergency rating of the Forsyth 138/69-kV transformer to 57 MVA	2017	2017	2	reliability	Provisional
Convert Indian Lake-Hiawatha 69-kV line to double-circuit 138-kV operation, construct new Hiawatha 138-kV Substation	TBD	TBD	2	reliability	Provisional
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	TBD	TBD	2	reliability	Provisional



Table PR-16  
Zone 3 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Install a total of 6.3 MVAR distribution capacitor banks at Dickinson Substation	2008	2008	3	reliability	Proposed
Construct Butler Ridge 138-kV Substation	2008	2008	3	generation	Planned
Install 3-16.33 MVAR 138-kV capacitor banks at North Beaver Dam Substation	2005	2009	3	reliability	Planned
Construct a Jefferson-Lake Mills-Stony Brook 138-kV line	2006	2009	3	reliability	Planned
Construct a new 138-kV line from North Madison to Huiskamp	2008	2009	3	reliability	Planned
Construct a new 138/69-kV substation near Huiskamp and install a 138/69-kV transformer with a 187 MVA summer emergency rating	2008	2009	3	reliability	Planned
Uprate 6632 Rockdale to Jefferson 138-kV line	2008	2009	3	reliability	Planned
Uprate X-8 Rockdale to Boxelder 138-kV line	2008	2009	3	reliability	Planned
Uprate 58751 Boxelder to Stony Brook 138-kV line	2008	2009	3	reliability	Planned
Convert Rock River to Bristol to Elkhorn 138-kV operation; rebuild Bristol with a new 138 kV bus	2008	2009	3	reliability	Planned
Install one temporary 12.45 MVAR 69-kV mobile capacitor bank at Brick Church Substation	2008	2009	3	reliability	Proposed
Uprate Y-61 McCue-Lamar 69-kV line to achieve 300 deg F line ratings and install 2-12.45 Mvar 69 kV capacitor banks at Lamar Substation	2008	2009	3	reliability	Provisional
Install 5.7 MVAR distribution capacitor bank at Union Townline 69-kV Substation	2009	2009	3	reliability	Proposed
Install 2-24.5 MVAR 138 kV capacitor banks at Kilbourn Substation and install 2-24.5 MVAR 138-kV capacitor banks at Artesian Substation	2009	2009	3	reliability	Planned
Expand the existing 69-kV capacitor bank from 5.4 to 8.1 MVAR at Richland Center Olson Substation and install 1-7.8 MVAR 12.4-kV capacitor bank at Brewer Substation	2009	2009	3	reliability	Proposed
Uprate Y-41 Walworth- North Lake Geneva 69-kV to achieve a 69 MVA summer emergency rating	2009	2009	3	reliability	Proposed

Table PR-16 (continued)  
Zone 3 Transmission System Additions

<b>System Additions</b>	<b>System Need Year</b>	<b>Projected In-Service Year</b>	<b>Planning Zone</b>	<b>Need Category</b>	<b>Planned, Proposed or Provisional</b>
Uprate Y-152 North Lake Geneva-Lake Geneva 69-kV line to achieve a 115 MVA summer emergency rating	2009	2009	3	reliability	Proposed
Rebuild Stoughton Substation bus	2009	2009	3	reliability	Provisional
Construct new Oak Ridge-Verona 138-kV line and install a 138/69-kV transformer at Verona with a 100 MVA summer normal rating	2009	2010	3	reliability	Planned
Upgrade Sheepskin capacitor bank from 10.8 MVAR to 16.2 MVAR	2009	2010	3	reliability	Proposed
Construct second Paddock-Rockdale 345-kV line and replace 345/138-kV transformer T22 at Rockdale Substation	2010	2010	3	economics	Planned
Install 2-16.33 MVAR 69-kV capacitor banks at Spring Green Substation	2010	2010	3	reliability	Proposed
Uprate the Royster Substation terminals	2010	2010	3	reliability	Provisional
Rebuild the Y-119 Verona to Oregon 69-kV line	2008	2011	3	reliability, condition	Proposed
Rebuild Y-33 Brodhead to South Monroe 69-kV line	2011	2011	3	generation interconnection, reliability	Proposed
Uprate terminal limitations at McCue for the Y-79 McCue-Milton Lawns 69-kV line	2011	2011	3	reliability	Proposed
Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	2011	2011	3	reliability, economics	Provisional
Install 2-24.5 Mvar 138-kV capacitor bank and 1-18 Mvar 69-kV capacitor bank at Brick Church substation	2011	2011	3	reliability	Provisional
Rebuild Y-32 Colley Road-Brick Church 69-kV line	2012	2012	3	reliability, condition	Provisional
Loop 6947 Nine Springs-Pflaum 69-kV line into Femrite Substation	2006	2013	3	reliability	Proposed
Install a 138/69-kV transformer at Bass Creek Substation	2010	2013	3	reliability	Proposed
Rebuild/reconductor X-12 Town Line Road-Bass Creek 138-kV line	2010	2013	3	reliability	Proposed
Construct 345-kV line from Rockdale to West Middleton	2013	2013	3	reliability	Planned

Table PR-16 (continued)  
Zone 3 Transmission System Additions

<b>System Additions</b>	<b>System Need Year</b>	<b>Projected In-Service Year</b>	<b>Planning Zone</b>	<b>Need Category</b>	<b>Planned, Proposed or Provisional</b>
Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at West Middleton Substation	2013	2013	3	reliability	Planned
Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	2013	2013	3	reliability	Proposed
Install 1-8.16 MVAR capacitor bank at Boscobel 69-kV Substation and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2013	2013	3	reliability	Provisional
Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	2013	2013	3	reliability	Proposed
Construct a Horicon-East Beaver Dam 138-kV line	2014	2014	3	reliability	Provisional
Construct new 138-kV line from North Lake Geneva to South Lake Geneva Substation	2014	2014	3	reliability, T-D interconnection	Provisional
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	2014	2014	3	reliability	Provisional
Uprate X-23 Colley Road-Marine 138-kV line terminals	2014	2014	3	reliability	Proposed
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	2014	2014	3	reliability	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks and 2-24.5 MVAR capacitor banks at Femrite substation	2014	2014	3	reliability	Provisional
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	2014	2014	3	reliability	Provisional
Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	2014	2014	3	reliability	Provisional
Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	2014	2014	3	reliability	Provisional
Construct a Lake Delton-Birchwood 138-kV line	2015	2015	3	reliability	Provisional
Replace the existing 46 MVA Hillman 138/69-kV transformer with a 100 MVA transformer	2015	2015	3	reliability	Provisional
Rebuild part of the Y-8 Dane-Dam Heights 69-kV line	2015	2015	3	reliability	Provisional
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	2015	2015	3	reliability	Provisional

Table PR-16 (continued)  
Zone 3 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	2015	2015	3	reliability	Provisional
Install a second 138/69-kV transformer at McCue Substation	2016	2016	3	reliability	Provisional
Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	2016	2016	3	reliability	Provisional
Install 2-16.33 Mvar 69-kV capacitor banks at Sun Prairie	2016	2016	3	reliability	Provisional
Construct double-circuit line between McCue and Lamar substations	2017	2017	3	reliability	Provisional
Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating	2017	2017	3	reliability	Provisional
Construct West Middleton-Blount 138-kV line	2017	2017	3	reliability	Provisional
Install 2-16.33 Mvar 69-kV capacitor banks at Dam Heights	2017	2017	3	reliability	Provisional
Construct a 345-kV bus, install a 345/138-kV 500 MVA transformer at North Randolph and loop the Columbia to South Fond Du Lac 345-kV line into the substation	2018	2018	3	reliability	Provisional
Install 2-16.33 Mvar 69-kV capacitor banks at North Monroe	2018	2018	3	reliability	Provisional
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2018	2018	3 & 5	T-D interconnection, reliability	Provisional
Install 2-16.33 Mvar 69-kV capacitor banks at Rio	2019	2019	3	reliability	Provisional
Construct Evansville-Brooklyn 69-kV line	TBD	TBD	3	reliability	Provisional
Replace two overhead Blount-Ruskin 69-kV lines with one underground 69-kV line	TBD	TBD	3	ATC proposal with Madison	Provisional
Construct Verona-North Monroe 138-kV line	TBD	TBD	3	reliability	Provisional

Table PR-17  
Zone 4 Transmission System Additions

<b>System Additions</b>	<b>System Need Year</b>	<b>Projected In-Service Year</b>	<b>Planning Zone</b>	<b>Need Category</b>	<b>Planned, Proposed or Provisional</b>
Expand the Menominee 69-kV Substation and install 138 kV terminals. Loop the West Marinette-Bay De Noc 138-kV line into the Substation	2008	2008	4	reliability	Planned
Install 138/69-kV transformer at the expanded Menominee Substation	2008	2008	4	reliability	Planned
String a new 138-kV line from Clintonville-Werner West primarily on Morgan-Werner West 345-kV line structures	2004	2009	4	reliability, service limitation	Planned
Construct Morgan-Werner West 345-kV line	2004	2009	4	reliability, service limitation	Planned
Relocate Mishicot 138-kV Substation	2009	2009	4	new generation	Planned
Rebuild Crivitz-High Falls 69-kV double circuit line	2009	2009	4	reliability	Planned
Install a second 138-kV reserve auxiliary transformer (RAT) at Kewaunee and remove tertiary auxiliary transformer (TAT)	2009	2009	4	reliability	Proposed
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2009	2009	4	reliability	Planned
Reconfigure Kewaunee 345/138-kV switchyard and install a second 500 MVA 345/138-kV transformer	2011	2011	4	reliability, condition	Proposed
Construct Canal-Dunn Road 138-kV line	2012	2012	4	reliability	Proposed
Install 60 MVA 138/69-kV transformer at Dunn Road	2012	2012	4	reliability	Proposed
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	2014	2014	4	reliability	Provisional
Install 2-16.3 MVAR capacitor bank at Mears Corners 138-kV Substation	2015	2015	4	reliability	Provisional
Install 2-16.3 MVAR capacitor bank at Rosiere 138-kV Substation	2015	2015	4	reliability	Provisional
Install 138/69-kV transformer at Custer Substation	2016	2016	4	reliability, economics	Provisional
Construct Shoto to Custer 138-kV line	2016	2016	4	reliability, economics	Provisional

Table PR-17 (continued)  
Zone 4 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Rebuild/Convert Bayport-Suamico-Sobieski-Pioneer 69-kV line to 138 kV	2016	2016	4	reliability, condition	Provisional
Construct second Dunn Road-Egg Harbor 69-kV line	2016	2016	4	reliability	Proposed
Uprate the Melissa-Tayco to 229 MVA (300F)	2016	2016	4	reliability, economics	Provisional
Install 28.8 MVAR capacitor bank at Butternut 138-kV Substation	2016	2016	4	reliability	Provisional
Replace the 1200 A breaker at Edgewater T22 345/138-kV transformer	2018	2018	4	reliability	Proposed
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	2018	2018	4	reliability	Provisional
Install 2-16.3 MVAR capacitor bank at Aviation Substation	2018	2018	4	reliability	Provisional
Uprate 138-kV line from Kewaunee to East Krok	TBD	TBD	4	reliability	Provisional

Table PR-18  
Zone 5 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Replace relaying on 230-kV circuits at Oak Creek	2009	2009	5	new generation	Planned
Replace two 345-kV circuit breakers at Pleasant Prairie Substation on the Racine and Zion lines with IPO breakers and upgrade relaying	2009	2009	5	new generation	Planned
Reconductor Oak Creek-Allerton 138-kV line	2009	2009	5	new generation	Planned
Install second 500 MVA 345/138-kV transformer at Oak Creek Substation	2009	2009	5	new generation	Planned
Loop Ramsey5-Harbor 138-kV line into Norwich and Kansas to form a new line from Ramsey-Norwich and Harbor-Kansas 138-kV lines	2009	2009	5	new generation	Planned
Replace CTs at Racine 345-kV Substation	2009	2009	5	new generation	Planned
Reconductor Oak Creek-Ramsey 138-kV line	2009	2009	5	new generation	Planned
Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	2009	2009	5	T-D interconnection	Proposed
Construct a 138-kV bus at Hale Substation to permit third Brookdale distribution transformer interconnection	2009	2009	5	T-D interconnection	Proposed
Expand Oak Creek 345-kV switchyard to interconnect one new generator	2009	2009	5	new generation	Planned
Construct 138-kV bus section at Shorewood	2009	2009	5	T-D interconnection	Provisional
Install 2-32 MVAR capacitor banks at Summit 138-kV Substation	2009	2010	5	reliability	Proposed
Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962	2010	2010	5	reliability	Proposed
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Planned
Uprate Oak Creek-Root River 138-kV line	2010	2010	5	new generation	Planned
Uprate Oak Creek-Nicholson 138-kV line	2010	2010	5	new generation	Planned
Install 200 MVAR capacitor bank at Bluemound Substation	2010	2010	5	reliability	Proposed
Upgrade Bain-Albers 138-kV line	2010	2010	5	reliability	Provisional
Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	2010	2011	5	reliability	Provisional



Table PR-18 (continued)  
Zone 5 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
A second distribution transformer at Somers Substation requires a rebuild of the Racine-Somers-Albers 138-kV line; extend Albers 138-kV bus to permit connecting the Racine-Somers-Albers radial line to the Albers 138-kV bus	2011	2011	5	T-D interconnection	Provisional
Construct second Shorewood-Humboldt 138-kV underground cable	2012	2012	5	reliability	Proposed
Upgrade Bain-Kenosha 138-kV line	2013	2013	5	reliability	Provisional
Construct a 345-kV bus at Bain Substation	2008	2014	5	reliability	Provisional
Install 2-32 Mvar capacitor banks at Mukwonago 138-kV Substation	2014	2014	5	reliability	Provisional
Upgrade Oak Creek-Pennsylvania 138-kV line	2014	2014	5	reliability	Provisional
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2018	2018	3 & 5	T-D interconnection, reliability	Provisional
Reconductor Ramsey-Harbor 138-kV line	TBD	TBD	5	reliability	Provisional

**Table PR-19**  
**Identified Needs and Transmission Lines Requiring New Right-of-Way**

Identified need	Potential solutions	Approx. line mileage		System need year	Projected In-service year	Planning zone
		Total	New ROW			
relieve overloads or low voltages under contingency	Construct a Jefferson-Lake Mills-Stony Brook 138-kV line	12	12	2006	2009	3
relieve overloads or low voltages under contingency	Construct a new 138-kV line from North Madison to Huiskamp	5	5	2008	2009	3
relieve overloads or low voltages under contingency, reduce service limitations	String a new 138-kV line from Clintonville-Werner West primarily on Morgan-Werner West 345-kV line structures	16	2	2004	2009	4
relieve overloads or low voltages under contingency, reduce service limitations	Construct Morgan-Werner West 345-kV line	47	47	2004	2009	4
T-D interconnection request	Construct 69-kV line from new Warrens Substation to the Council Creek-Tunnel City 69-kV line	4.5	4.5	2010	2010	1
T-D interconnection request	Construct Brandon-Fairwater 69-kV line	4	4	2010	2010	1
relieve overloads or low voltages under contingency	Construct new Oak Ridge-Verona 138-kV line and install a 138/69-kV transformer at Verona with a 100 MVA summer normal rating	9	3	2009	2010	3
T-D interconnection request	Construct 115-kV line from new Arnett Road Substation to the Clear Lake Substation	7	7	2012	2012	1
relieve overloads or low voltages under contingency	Construct 345-kV line from Rockdale to West Middleton	35	35	2013	2013	3
T-D interconnection request	Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	1.5	1.5	2014	2014	1
relieve overloads or low voltages under contingency	Construct a Horicon-East Beaver Dam 138-kV line	9	9	2014	2014	3
relieve overloads or low voltages under contingency, T-D interconnection request	Construct new 138-kV line from North Lake Geneva to South Lake Geneva Substation	3	3	2014	2014	3
relieve overloads or low voltages under contingency	Construct a Lake Delton-Birchwood 138-kV line	5	5	2015	2015	3
relieve overloads or low voltages under contingency	Construct Shoto to Custer 138-kV line	9.94	9.94	2016	2016	4
relieve overloads or low voltages under contingency	Construct second Dunn Road-Egg Harbor 69-kV line	12.66	12.66	2016	2016	4
relieve overloads or low voltages under contingency	Construct Fairwater-Mackford Prairie 69-kV line	5	5	2018	2018	1

**Table PR-19  
Identified Needs and Transmission Lines Requiring New Right-of-Way**

Identified need	Potential solutions	Approx. line mileage		System need year	Projected In-service year	Planning zone
		Total	New ROW			
request,relieve overloads or low voltages	Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	26.5	15	2018	2018	3 & 5
relieve overloads or low voltages under contingency	Construct Evansville-Brooklyn 69-kV line	8	8	TBD	TBD	3
relieve overloads or low voltages under contingency	Construct Verona-North Monroe 138-kV line	20	20	TBD	TBD	3

**Table PR-20  
Transmission Line Rebuilds/Reconductors, New Circuits and Voltage Conversions on  
Existing Right-of-Way**

Identified need	Lines to be rebuilt/reconducted on existing ROW	Approx. mileage of rebuilt, reconducted or uprated lines	System need year	Projected In-service year	Planning zone
reduce service limitations, relieve overloads or low voltages under contingency, improve transfer capability and Weston stability	Construct Gardner Park-Hwy 22 345-kV line	47	2009	2009	1
relieve overloads or low voltages under contingency	Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F	22	2009	2013	2
relieve overloads or low voltages under contingency	Convert Rock River to Bristol to Elkhorn 138-kV operation; rebuild Bristol with a new 138 kV bus	27.74	2008	2009	3
relieve overloads or low voltages under contingency	Rebuild Crivitz-High Falls 69-kV double circuit line	14.5	2009	2009	4
relieve overloads or low voltages under contingency	Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2.37	2009	2009	4
accommodate new generation	Reconductor Oak Creek-Allerton 138-kV line	5.41	2009	2009	5
accommodate new generation	Loop Ramsey5-Harbor 138-kV line into Norwich and Kansas to form a new line from Ramsey-Norwich and Harbor-Kansas 138-kV lines	5.72	2009	2009	5
accommodate new generation	Reconductor Oak Creek-Ramsey 138-kV line	8.5	2009	2009	5
replace aging facilities	Rebuild Arpin-Rocky Run 345-kV line	20	2010	2010	1
relieve overloads or low voltages under contingency, transfer capability	Rebuild/convert Conover-Plains 69-kV line to 138 kV	73	2010	2010	2
economics	Construct second Paddock-Rockdale 345-kV line and replace 345/138-kV transformer T22 at Rockdale Substation	35	2010	2010	3
accommodate new generation	Uprate Oak Creek-Nicholson 138-kV line	6.8	2010	2010	5
relieve overloads or low voltages under contingency, replace aging facilities	Rebuild the Y-119 Verona to Oregon 69-kV line	11	2008	2011	3
generation interconnection, relieve overloads or low voltages under contingency	Rebuild Y-33 Brodhead to South Monroe 69-kV line	18	2011	2011	3

**Table PR-20  
Transmission Line Rebuilds/Reconductors, New Circuits and Voltage Conversions on  
Existing Right-of-Way**

Identified need	Lines to be rebuilt/reconducted on existing ROW	Approx. mileage of rebuilt, reconducted or updated lines	System need year	Projected In-service year	Planning zone
T-D interconnection request	A second distribution transformer at Somers Substation requires a rebuild of the Racine-Somers-Albers 138-kV line; extend Albers 138-kV bus to permit connecting the Racine-Somers-Albers radial line to the Albers 138-kV bus	8	2011	2011	5
economics, relieve overloads or low voltages under contingency	Construct Monroe County-Council Creek 161-kV line	20	2012	2012	1
economics, relieve overloads or low voltages under contingency	Uprate Council Creek-Petenwell 138-kV line	32	2012	2012	1
relieve overloads or low voltages under contingency, replace aging facilities	Rebuild Y-32 Colley Road-Brick Church 69-kV line	19.7	2012	2012	3
relieve overloads or low voltages under contingency	Construct Canal-Dunn Road 138-kV line	7.64	2012	2012	4
relieve overloads or low voltages under contingency	Construct second Shorewood-Humboldt 138-kV underground cable	2.8	2012	2012	5
relieve overloads or low voltages under contingency	Rebuild/reconductor X-12 Town Line Road-Bass Creek 138-kV line	9	2010	2013	3
relieve overloads or low voltages under contingency, replace aging facilities	Rebuild Blaney Park-Munising 69 kV to 138 kV	50	2014	2014	2
relieve overloads or low voltages under contingency	Rebuild part of the Y-8 Dane-Dam Heights 69-kV line	5	2015	2015	3
relieve overloads or low voltages under contingency	Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	3.35	2016	2016	3
relieve overloads or low voltages under contingency, replace aging facilities	Rebuild/Convert Bayport-Suamico-Sobieski-Pioneer 69-kV line to 138 kV	21.5	2016	2016	4
relieve overloads or low voltages under contingency	Construct double-circuit line between McCue and Lamar substations	4.0	2017	2017	3
relieve overloads or low voltages under contingency	Construct West Middleton-Blount 138-kV line	5	2017	2017	3
relieve overloads or low voltages under contingency	Reconfigure the North Randolph-Ripon 69-kV line to form a second Ripon-Metomen 69-kV line and retire the circuit between Metomen and the Mackford Prairie tap	5	2018	2018	1

**Table PR-20  
Transmission Line Rebuilds/Reconductors, New Circuits and Voltage Conversions on  
Existing Right-of-Way**

Identified need	Lines to be rebuilt/reconstructed on existing ROW	Approx. mileage of rebuilt, reconstructed or uprated lines	System need year	Projected In-service year	Planning zone
relieve overloads or low voltages under contingency	Convert Indian Lake-Hiawatha 69-kV line to double-circuit 138-kV operation, construct new Hiawatha 138-kV Substation	40	TBD	TBD	2
ATC proposal with Madison	Replace two overhead Blount-Ruskin 69-kV lines with one underground 69-kV line	2	TBD	TBD	3
relieve overloads or low voltages under contingency	Uprate 138-kV line from Kewaunee to East Krok	8.4	TBD	TBD	4
relieve overloads or low voltages under contingency	Reconductor Ramsey-Harbor 138-kV line	8.4	TBD	TBD	5

**Table PR-21  
New Substations, Transformer Additions and Replacements**

Identified need	Potential additions or replacements	Transformer Capacity (MVA)		System need year	Projected In-service year	Planning zone
		Install	Replace			
accommodate new generation	Construct Butler Ridge 138-kV Substation	N/A	N/A	2008	2008	3
relieve overloads under contingency	Install 138/69-kV transformer at the expanded Menominee Substation	100	N/A	2008	2008	4
reduce service limitations, relieve overloads under contingency, improve transfer capability and Weston stability	Construct new Hwy 22 345-kV Substation	N/A	N/A	2009	2009	1
relieve overloads under contingency, replace aging facilities	Relocate Cedar Substation (North Lake)	N/A	N/A	2005	2009	2
relieve overloads under contingency	Construct a new 138/69-kV substation near Huiskamp and install a 138/69-kV transformer with a 187 MVA summer emergency rating	187	N/A	2008	2009	3
accommodate new generation	Relocate Mishicot 138-kV Substation	N/A	N/A	2009	2009	4
accommodate new generation	Install second 500 MVA 345/138-kV transformer at Oak Creek Substation	500	N/A	2009	2009	5
T-D interconnection request	Construct a 138-kV bus at Hale Substation to permit third Brookdale distribution transformer interconnection	N/A	N/A	2009	2009	5
relieve overloads under contingency, transfer capability	Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Iron Grove Substation	60	N/A	2010	2010	2
relieve overloads under contingency	Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Aspen Substation	60	N/A	2010	2010	2
relieve overloads under contingency	Relocate Iron River Substation (Iron Grove)	N/A	N/A	2010	2010	2
relieve overloads or low voltages under contingency, replace aging facilities	Reconfigure Kewaunee 345/138-kV switchyard and install a second 500 MVA 345/138-kV transformer	500	0	2011	2011	4
relieve overloads under contingency	Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	500	672	2010	2011	5
economics, relieve overloads under contingency	Install a 161/138-kV transformer at Council Creek Substation	100	N/A	2012	2012	1
relieve overloads under contingency	Install 60 MVA 138/69-kV transformer at Dunn Road	60	N/A	2012	2012	4
relieve overloads under contingency	Replace 138/69-kV transformer at Metomen Substation	100	47	2013	2013	1
relieve overloads under contingency	Install a 138/69-kV transformer at Bass Creek Substation	100	N/A	2010	2013	3



**Table PR-21  
New Substations, Transformer Additions and Replacements**

Identified need	Potential additions or replacements	Transformer Capacity (MVA)		System need year	Projected In-service year	Planning zone
		Install	Replace			
relieve overloads under contingency	Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at West Middleton Substation	500	0	2013	2013	3
relieve overloads under contingency	Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	100	0	2013	2013	3
relieve overloads under contingency	Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	100	0	2014	2014	3
relieve overloads under contingency	Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	200	116	2014	2014	4
relieve overloads under contingency	Construct a 345-kV bus at Bain Substation	N/A	N/A	2008	2014	5
relieve overloads under contingency	Replace the existing 46 MVA Hillman 138/69-kV transformer with a 100 MVA transformer	47	0	2015	2015	3
relieve overloads under contingency	Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	527	400	2015	2015	3
relieve overloads under contingency	Install a second 138/69-kV transformer at McCue Substation	100	0	2016	2016	3
relieve overloads under contingency, economics	Install 138/69-kV transformer at Custer Substation	100	N/A	2016	2016	4
relieve overloads under contingency	Install a second 138/69-kV transformer at Wautoma Substation	100	N/A	2017	2017	1
relieve overloads or low voltages under contingency	Uprate the summer emergency rating of the Forsyth 138/69-kV transformer to 57 MVA	57	48	2017	2017	2
relieve overloads under contingency	Convert Necedah distribution substation from 69 kV to 138 kV	N/A	N/A	2018	2018	1
relieve overloads under contingency	Construct a 345-kV bus, install a 345/138-kV 500 MVA transformer at North Randolph and loop the Columbia to South Fond Du Lac 345-kV line into the substation	500	N/A	2018	2018	3
relieve overloads under contingency	Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	200	142	2018	2018	4

**Table PR-22  
Substation Equipment Additions and Replacements**

Identified need	Potential additions or replacements	Capacitor bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
relieve overloads or low voltages under contingency	Install 2-4.08 MVAR capacitor banks at Munising 69-kV Substation	8.16	2008	2008	2
relieve overloads or low voltages under contingency	Install a total of 6.3 MVAR distribution capacitor banks at Dickinson Substation	6.3	2008	2008	3
relieve overloads or low voltages under contingency	Expand the Menominee 69-kV Substation and install 138 kV terminals. Loop the West Marinette-Bay De Noc 138-kV line into the Substation	N/A	2008	2008	4
relieve overloads or low voltages under contingency	Install 1-4.08 MVAR capacitor bank at L'Anse 69 kV	4.08	2008	2009	2
relieve overloads or low voltages under contingency, replace aging facilities	Construct ring bus at the Pine River 69-kV Substation and replace 1-5.4 MVAR capacitor bank with 2-4.08 MVAR banks	2.76	2008	2009	2
relieve overloads or low voltages under contingency	Install 1-8.16 MVAR capacitor banks at the M38 138-kV Substation	8.16	2009	2009	2
relieve overloads or low voltages under contingency	Uprate the Delta-North Bluff 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	N/A	2009	2009	2
relieve overloads or low voltages under contingency	Uprate the North Bluff-Gladstone 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	N/A	2009	2009	2
relieve overloads or low voltages under contingency	Uprate the Masonville-Gladstone 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	N/A	2009	2009	2
relieve overloads or low voltages under contingency	Uprate the Chandler-Masonville 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	N/A	2009	2009	2
relieve overloads or low voltages under contingency	Uprate Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	N/A	2009	2009	2
relieve overloads or low voltages under contingency	Install 2-16.33 MVAR capacitor bank at Perkins 138-kV Substation	32.66	2009	2009	2
relieve overloads or low voltages under contingency	Install 1-16.33 MVAR capacitor bank at Hiawatha 138-kV Substation	16.33	2009	2009	2
relieve overloads or low voltages under contingency	Install 1-4.08 MVAR capacitor banks at Osceola 69 kV	4.08	2009	2009	2
relieve overloads or low voltages under contingency	Install 3-16.33 MVAR 138-kV capacitor banks at North Beaver Dam Substation	49	2005	2009	3
relieve overloads or low voltages under contingency	Uprate 6632 Rockdale to Jefferson 138-kV line	N/A	2008	2009	3

**Table PR-22  
Substation Equipment Additions and Replacements**

Identified need	Potential additions or replacements	Capacitor bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
relieve overloads or low voltages under contingency	Uprate X-8 Rockdale to Boxelder 138-kV line	N/A	2008	2009	3
relieve overloads or low voltages under contingency	Uprate 58751 Boxelder to Stony Brook 138-kV line	N/A	2008	2009	3
relieve overloads or low voltages under contingency	Install one temporary 12.45 MVAR 69-kV mobile capacitor bank at Brick Church Substation	12.45	2008	2009	3
relieve overloads or low voltages under contingency	Uprate Y-61 McCue-Lamar 69-kV line to achieve 300 deg F line ratings and install 2-12.45 Mvar 69 kV capacitor banks at Lamar Substation	24.9	2008	2009	3
relieve overloads or low voltages under contingency	Install 5.7 MVAR distribution capacitor bank at Union Townline 69-kV Substation	5.7	2009	2009	3
relieve overloads or low voltages under contingency	Install 2-24.5 MVAR 138 kV capacitor banks at Kilbourn Substation and install 2-24.5 MVAR 138-kV capacitor banks at Artesian Substation	98	2009	2009	3
relieve overloads or low voltages under contingency	Expand the existing 69-kV capacitor bank from 5.4 to 8.1 MVAR at Richland Center Olson Substation and install 1-7.8 MVAR 12.4-kV capacitor bank at Brewer Substation	10.86	2009	2009	3
relieve overloads or low voltages under contingency	Uprate Y-41 Walworth- North Lake Geneva 69-kV to achieve a 69 MVA summer emergency rating	N/A	2009	2009	3
relieve overloads or low voltages under contingency	Uprate Y-152 North Lake Geneva-Lake Geneva 69-kV line to achieve a 115 MVA summer emergency rating	N/A	2009	2009	3
relieve overloads or low voltages under contingency	Rebuild Stoughton Substation bus	N/A	2009	2009	3
relieve overloads or low voltages under contingency	Install a second 138-kV reserve auxiliary transformer (RAT) at Kewaunee and remove tertiary auxiliary transformer (TAT)	N/A	2009	2009	4
accommodate new generation	Replace relaying on 230-kV circuits at Oak Creek	N/A	2009	2009	5
accommodate new generation	Replace two 345-kV circuit breakers at Pleasant Prairie Substation on the Racine and Zion lines with IPO breakers and upgrade relaying	N/A	2009	2009	5
accommodate new generation	Replace CTs at Racine 345-kV Substation	N/A	2009	2009	5
T-D interconnection request	Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	N/A	2009	2009	5
accommodate new generation	Expand Oak Creek 345-kV switchyard to interconnect one new generator	N/A	2009	2009	5
T-D interconnection request	Construct 138-kV bus section at Shorewood	N/A	2009	2009	5

**Table PR-22  
Substation Equipment Additions and Replacements**

Identified need	Potential additions or replacements	Capacitor bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
relieve overloads or low voltages under contingency	Uprate the Chandler-Delta #1 69-kV line summer emergency rating from 120 deg F to 167 deg F	N/A	2009	2010	2
relieve overloads or low voltages under contingency	Uprate the Chandler-Delta #2 69-kV line summer emergency rating to from 120 deg F 167 deg F	N/A	2009	2010	2
relieve overloads or low voltages under contingency	Install 1-16.33 MVAR capacitor bank at Indian Lake 138-kV Substation	16.33	2010	2010	2
relieve overloads or low voltages under contingency	Install 1-4.08 MVAR capacitor bank at North Bluff 69-kV Substation	4.08	2010	2010	2
relieve overloads or low voltages under contingency	Upgrade Sheepskin capacitor bank from 10.8 MVAR to 16.2 MVAR	5.4	2009	2010	3
relieve overloads or low voltages under contingency	Install 2-16.33 MVAR 69-kV capacitor banks at Spring Green Substation	32	2010	2010	3
relieve overloads or low voltages under contingency	Uprate the Royster Substation terminals	N/A	2010	2010	3
relieve overloads or low voltages under contingency	Install 2-32 MVAR capacitor banks at Summit 138-kV Substation	64	2009	2010	5
relieve overloads or low voltages under contingency	Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962	N/A	2010	2010	5
accommodate new generation	Expand 345-kV switchyard at Oak Creek to interconnect one new generator	N/A	2010	2010	5
accommodate new generation	Uprate Oak Creek-Root River 138-kV line	N/A	2010	2010	5
relieve overloads or low voltages under contingency	Install 200 MVAR capacitor bank at Bluemound Substation	200	2010	2010	5
relieve overloads or low voltages under contingency	Upgrade Bain-Albers 138-kV line	N/A	2010	2010	5
relieve overloads or low voltages under contingency	Uprate terminal limitations at McCue for the Y-79 McCue-Milton Lawns 69-kV line	N/A	2011	2011	3
relieve overloads or low voltages under contingency, economics	Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	196	2011	2011	3
relieve overloads or low voltages under contingency	Install 2-24.5 Mvar 138-kV capacitor bank and 1-18 Mvar 69-kV capacitor bank at Brick Church substation	67	2011	2011	3
relieve overloads or low voltages under contingency	Upgrade Mckenna 6.3 MVAR capacitor bank to 12.25 MVAR and install a second new 12.25 MVAR capacitor bank	15.3	2013	2013	1
relieve overloads or low voltages under contingency	Loop 6947 Nine Springs-Pflaum 69-kV line into Femrite Substation	N/A	2006	2013	3

**Table PR-22  
Substation Equipment Additions and Replacements**

Identified need	Potential additions or replacements	Capacitor bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
relieve overloads or low voltages under contingency	Install 1-8.16 MVAR capacitor bank at Boscobel 69-kV Substation and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	10.8	2013	2013	3
relieve overloads or low voltages under contingency	Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	N/A	2013	2013	3
relieve overloads or low voltages under contingency	Upgrade Bain-Kenosha 138-kV line	N/A	2013	2013	5
relieve overloads or low voltages under contingency	Uprate X-23 Colley Road-Marine 138-kV line terminals	N/A	2014	2014	3
relieve overloads or low voltages under contingency	Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	32.66	2014	2014	3
relieve overloads or low voltages under contingency	Install 2-16.33 MVAR 69-kV capacitor banks and 2-24.5 MVAR capacitor banks at Femrite substation	81.66	2014	2014	3
relieve overloads or low voltages under contingency	Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	24.5	2014	2014	3
relieve overloads or low voltages under contingency	Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	32.66	2014	2014	3
relieve overloads or low voltages under contingency	Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	N/A	2014	2014	3
relieve overloads or low voltages under contingency	Install 2-32 Mvar capacitor banks at Mukwonago 138-kV Substation	64	2014	2014	5
relieve overloads or low voltages under contingency	Upgrade Oak Creek-Pennsylvania 138-kV line	N/A	2014	2014	5
relieve overloads or low voltages under contingency	Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	N/A	2015	2015	3
relieve overloads or low voltages under contingency	Install 2-16.3 MVAR capacitor bank at Mears Corners 138-kV Substation	32.6	2015	2015	4
relieve overloads or low voltages under contingency	Install 2-16.3 MVAR capacitor bank at Rosiere 138-kV Substation	32.6	2015	2015	4
relieve overloads or low voltages under contingency	Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69-kV Substation	12.3	2016	2016	1
relieve overloads or low voltages under contingency	Install 2-16.33 Mvar 69-kV capacitor banks at Sun Prairie	32.66	2016	2016	3
relieve overloads or low voltages under contingency, economics	Uprate the Melissa-Tayco to 229 MVA (300F)	N/A	2016	2016	4
relieve overloads or low voltages under contingency	Install 28.8 MVAR capacitor bank at Butternut 138-kV Substation	28.8	2016	2016	4

**Table PR-22  
Substation Equipment Additions and Replacements**

Identified need	Potential additions or replacements	Capacitor bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
relieve overloads or low voltages under contingency	Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating	N/A	2017	2017	3
relieve overloads or low voltages under contingency	Install 2-16.33 Mvar 69-kV capacitor banks at Dam Heights	32.66	2017	2017	3
relieve overloads or low voltages under contingency	Uprate Castle Rock-Mckenna 69-kV line	N/A	2018	2018	1
relieve overloads or low voltages under contingency	Install 2-16.33 Mvar 69-kV capacitor banks at North Monroe	32.66	2018	2018	3
relieve overloads or low voltages under contingency	Replace the 1200 A breaker at Edgewater T22 345/138-kV transformer	N/A	2018	2018	4
relieve overloads or low voltages under contingency	Install 2-16.3 MVAR capacitor bank at Aviation Substation	32.6	2018	2018	4
relieve overloads or low voltages under contingency	Install 2-16.33 Mvar 69-kV capacitor banks at Rio	32.66	2019	2019	3
relieve overloads or low voltages under contingency	Install a 12.2 MVAR capacitor bank at Hilltop 69-kV Substation	12.2	2023	2023	1
relieve overloads or low voltages under contingency	Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	N/A	TBD	TBD	2

**Table PR-23****Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2008 10-Year Assessment**

<b>PROJECTS CANCELED</b>	<b>Former In-Service Date</b>	<b>Planning Zone</b>	<b>Reason for Removal</b>
Install two 69-kV breakers at Beardsley Street Substation	2010	4	Updated study results
Reconductor Pulliam-Danz 69-kV line	2015	4	Updated study results
Reconductor Danz-Henry Street 69-kV line	2015	4	Updated study results
Reconductor Pulliam-Van Buren 69-kV line	2015	4	Updated study results
Construct a Northside-City Limits 138-kV line	2016	4	Updated study results
Install second 345/138-kV transformer at Plains Substation	2009	2	Updated model information
Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69-kV Substation	TBD	2	Updated study results
Upgrade the existing 2-8.16 MVAR to 2-16.33 MVAR capacitor banks at South Lake Geneva Substation	2010	3	Updated load/model information
Loop the Deforest to Token Creek 69-kV line into the Yahara River Substation and install a 138/69-kV transformer at Yahara River	2014	3	Updated load/model information
Uprate Yahara River-Token Creek 69-kV line	2014	3	Updated load/model information
Uprate Gardner Park-Black Brook 115-kV line - scope TBD	2012	1	Equipment replaced during construction of another project
Rebuild/convert Holmes-Chandler 69 kV to 138-kV operation	2013	2 & 4	Updated load/model information
Replace the existing 138/69-kV transformer at South Sheboygan Falls Substation with 100 MVA transformer	2018	4	Updated load/model information
Rebuild Hiawatha-Pine River 69-kV line ESE_6908	TBD	2	Upper Peninsula collaborative currently underway to identify best area solution.
Construct new Mackinac 138/69-kV Substation	TBD	2	Upper Peninsula collaborative currently underway to identify best area solution.
Replace the 400 amp metering CT at North Mullet River 69-kV Substation	2011	4	Updated model information

**Table PR-23****Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2008 10-Year Assessment**

<b>PROJECTS DEFERRED</b>	<b>New date</b>	<b>Planning Zone</b>	<b>Reason for Deferral</b>
Construct ring bus at the Pine River 69-kV Substation and replace 1-5.4 MVAR capacitor bank with 2-4.08 MVAR banks	2009	2	was 2008; revised resource scheduling
Relocate Mishicot 138-kV Substation	2009	4	was 2007; deferred due to the delay of G384.
Replace 138/69-kV transformer at Metomen Substation	2013	1	was 2010; deferred because of updated load forecasts.
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F	2013	2	was 2009; review of physical condition required (may require a rebuild)
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2014	1	was 2013; customer deferred distribution project by one year.
Rebuild Blaney Park-Munising 69 kV to 138 kV	2014	2	was 2013; continuation of review of performance, condition and need
Install 2-32 Mvar capacitor banks at Mukwonago 138-kV Substation	2014	5	was 2011; need for area voltage support decreased as a result of capacitors added at Bluemound and Summit.
Construct a Lake Delton-Birchwood 138-kV line	2015	3	was 2013; load forecast change in the Reedsburg loop area
Replace the existing 46 MVA Hillman 138/69-kV transformer with a 100 MVA transformer	2015	3	was 2013; load forecast change in the Hillman area
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	2015	3	was 2013; load forecast change in Sauk and Columbia counties and reactive reinforcement projects developed in the area
Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	2015	3	was 2011; load forecast change in the Lake Geneva area
Install 2-16.3 MVAR capacitor bank at Mears Corners 138-kV Substation	2015	4	was 2011; deferred due to updated load model
Install 2-16.3 MVAR capacitor bank at Rosiere 138-kV Substation	2015	4	was 2011; deferred due to updated load model.
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69-kV Substation	2016	1	was 2011; deferred because of updated load forecasts.



**Table PR-23****Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2008 10-Year Assessment**

<b>PROJECTS DEFERRED (continued)</b>	<b>New date</b>	<b>Planning Zone</b>	<b>Reason for Deferral</b>
Install a second 138/69-kV transformer at McCue Substation	2016	3	was 2014; deferred due to load forecast change in the McCue area and other new project developments in this area
Install 138/69-kV transformer at Custer Substation	2016	4	was 2014; deferred due to updated generation dispatch information
Construct Shoto to Custer 138-kV line	2016	4	was 2014; deferred due to updated generation dispatch information
Uprate the Melissa-Tayco to 229 MVA (300F)	2016	4	was 2014; deferred due to updated load model
Install 28.8 MVAR capacitor bank at Butternut 138-kV Substation	2016	4	was 2015; deferred due to updated load model
Install a second 138/69-kV transformer at Wautoma Substation	2017	1	was 2015; deferred because of updated load forecasts.
Construct Fairwater-Mackford Prairie 69-kV line	2018	1	was 2014; deferred because of updated load forecasts.
Reconfigure the North Randolph-Ripon 69-kV line to form a second Ripon-Metomen 69-kV line and retire the circuit between Metomen and the Mackford Prairie tap	2018	1	was 2014; deferred because of updated load forecasts.
Construct a 345-kV bus, install a 345/138-kV 500 MVA transformer at North Randolph and loop the Columbia to South Fond du Lac 345-kV line into the substation	2018	3	was 2014; deferred due to load forecast changes in Sauk and Columbia counties and reactive reinforcement projects developed in the area
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	2018	4	was 2015; deferred due to updated load model
Install 2-16.3 MVAR capacitor bank at Aviation Substation	2018	4	was 2015; deferred due to updated load model
Replace the 1200 A breaker at Edgewater T22 345/138-kV transformer	2018	4	was 2014; deferred due to updated load model
Install a 12.2 MVAR capacitor bank at Hilltop 69-kV Substation	2023	1	was 2016; deferred because of updated load model
Construct Evansville-Brooklyn 69-kV line	TBD	3	was 2016; no firm planning need driver identified in this Assessment

**Table PR-23**

**Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2008 10-Year Assessment**

OTHER PROJECT CHANGES AND POSSIBLE CHANGES	Date	Planning Zone	Nature of Change or Update
Install 1-8.16 MVAR capacitor banks at the M38 138-kV Substation	2009	2	was TBD in-service date 2-8.16 banks; on the 69 kV due to updated load forecast in western U.P.
Install 1-4.08 MVAR capacitor banks at Osceola 69 kV	2009	2	was TBD in-service date 2-5.4 MVAR banks; due to updated load forecast in western U.P.
Install a 138/69-kV transformer at Bass Creek Substation	2013	3	Status was changed from provisional to proposed
Rebuild/reconductor X-12 Town Line Road-Bass Creek 138-kV line	2013	3	Status was changed from provisional to proposed
Construct new 138-kV line from North Lake Geneva to South Lake Geneva	2014	3	was 2016; date accelerated due to updated study results
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	2014	3	was 2016; date accelerated due to updated study results
Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	2014	3	capacitor banks were previously at Montrose, moved to Verona due to updated study results
Construct West Middleton-Blount 138-kV line	2017	3	In-service date was previously to be determined, 2017 in-service date due to updated study results
NEW PROJECTS	In-Service Date	Planning Zone	Reason for Project
Install a total of 6.3 MVAR distribution capacitor banks at Dickinson Substation	2008	3	reliability
Uprate the Delta-North Bluff 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2009	2	reliability
Uprate the North Bluff-Gladstone 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2009	2	reliability

**Table PR-23****Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2008 10-Year Assessment**

<b>NEW PROJECTS (continued)</b>	<b>In-Service Date</b>	<b>Planning Zone</b>	<b>Reason for Project</b>
Uprate the Masonville-Gladstone 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2009	2	reliability
Uprate the Chandler-Masonville 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2009	2	reliability
Uprate Y-61 McCue-Lamar 69-kV line to achieve 300 deg F line ratings and install 2-12.45 Mvar 69 kV capacitor banks at Lamar Substation	2009	3	reliability
Rebuild Stoughton Substation bus	2009	3	reliability
Install 5.7 MVAR distribution capacitor bank at Union Townline 69-kV Substation	2009	3	reliability
Install a second 138-kV reserve auxiliary transformer (RAT) at Kewaunee and remove tertiary auxiliary transformer (TAT)	2009	4	reliability
Construct 138-kV bus section at Shorewood	2009	5	T-D interconnection
Construct 69-kV line from new Warrens Substation to the Council Creek-Tunnel City 69-kV line	2010	1	T-D interconnection
Rebuild Arpin-Rocky Run 345-kV line	2010	1	maintenance
Install 1-4.08 MVAR capacitor bank at North Bluff 69-kV Substation	2010	2	reliability
Uprate the Chandler-Delta #1 69-kV line summer emergency rating from 120 deg F to 167 deg F	2010	2	reliability
Uprate the Chandler-Delta #2 69-kV line summer emergency rating to from 120 deg F 167 deg F	2010	2	reliability
Uprate the Royster Substation terminals	2010	3	reliability
Upgrade Sheepskin capacitor bank from 10.8 MVAR to 16.2 MVAR	2010	3	reliability
Upgrade Bain-Albers 138-kV line	2010	5	reliability
Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	2011	3	reliability, economics
Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	2011	5	reliability

**Table PR-23****Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2008 10-Year Assessment**

<b>NEW PROJECTS (continued)</b>	<b>In-Service Date</b>	<b>Planning Zone</b>	<b>Reason for Project</b>
Install 2-24.5 Mvar 138-kV capacitor banks and 1-18 Mvar 69-kV capacitor bank at Brick Church Substation	2011	3	reliability
Reconfigure Kewaunee 345/138-kV switchyard and install a second 500 MVA 345/138-kV transformer	2011	4	reliability, condition
Construct 115-kV line from new Arnett Road Substation to the Clear Lake Substation	2012	1	T-D interconnection
Rebuild Y-32 Colley Road-Brick Church 69-kV line	2012	3	reliability, condition
Construct second Shorewood-Humboldt 138-kV underground cable	2012	5	reliability
Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	2013	3	reliability
Upgrade Bain-Kenosha 138-kV line	2013	5	reliability
Uprate X-23 Colley Road-Marine 138-kV line terminals	2014	3	reliability
Upgrade Oak Creek-Pennsylvania 138-kV line	2014	5	reliability
Rebuild part of the Y-8 Dane-Dam Heights 69-kV line	2015	3	reliability
Install 2-16.33 Mvar 69-kV capacitor banks at Sun Prairie	2016	3	reliability
Uprate the summer emergency rating of the Forsyth 138/69-kV transformer to 57 MVA	2017	2	reliability
Construct double-circuit line between McCue and Lamar substations	2017	3	reliability
Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating	2017	3	reliability
Install 2-16.33 Mvar 69-kV capacitor banks at Dam Heights	2017	3	reliability
Convert Necedah distribution substation from 69 kV to 138 kV	2018	1	reliability
Uprate Castle Rock-Mckenna 69-kV line	2018	1	reliability

**Table PR-23**

**Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2008 10-Year Assessment**

<b>NEW PROJECTS (continued)</b>	<b>In-Service Date</b>	<b>Planning Zone</b>	<b>Reason for Project</b>
Install 2-16.33 Mvar 69-kV cap banks at North Monroe	2018	3	reliability
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2018	3 & 5	T-D interconnection, reliability
Install 2-16.33 Mvar 69-kV cap banks at Rio	2019	3	reliability
Construct Verona-North Monroe 138-kV line	TBD	3	reliability
Uprate 138-kV line from Kewaunee to East Krok	TBD	4	reliability
Reconductor Ramsey-Harbor 138-kV line	TBD	5	reliability

**Table PR-24**  
**Maintenance, Operations or Protection Projects over \$0.5 Million (2009-2013)**

<b>Project Description</b>	<b>System Need Year</b>	<b>In-Service Year</b>	<b>Initiated</b>	<b>Planning Zone</b>	<b>Need Category</b>	<b>Planned, Proposed or Provisional</b>	<b>Capital Cost Estimate (in Millions)</b>
Chaffee Creek-Kilbourn (Y100) line	2006	2009	Maintenance	1	Poor condition	Planned	3.9
Chaffee Creek-Hancock (Y90) line rebl'd	2009	2009	Maintenance	1	Poor condition	Planned	1.0
Iola breaker replacement	2008	2009	Maintenance	1	Poor condition	Planned	0.6
Pine River substation upgrades	2008	2009	Maintenance	2	Poor condition	Planned	7.5
Plains substation upgrades	2008	2009	Protection	2	Improve protection	Planned	3.5
Atlantic breaker & relay replacements	2009	2009	Protection	2	Improve protection	Proposed	0.7
M38 breaker & switch replacements	2009	2009	Maintenance	2	Poor condition	Provisional	0.6
Hillman-Nelson Dewey (X15) line rebl'd	2008	2009	Maintenance	3	Poor condition	Planned	4.4
Mt Horeb-Rock Branch (Y135) line rebl'd	2007	2009	Maintenance	3	Poor condition	Planned	4.0
North Monroe substation upgrades	2008	2009	Protection	3	Improve protection	Planned	1.7
Deforest substation upgrades	2008	2009	Protection	3	Improve protection	Planned	1.7
Brodhead relay replacements	2009	2009	Protection	3	Improve protection	Proposed	0.7
City Limits relay replacements	2009	2009	Protection	4	Improve protection	Proposed	0.9
Highway V breaker replacement	2009	2009	Protection	4	Improve protection	Proposed	0.7
Butte Des Mort relay upgrades	2009	2009	Maintenance	4	Poor condition	Planned	0.6
Maes relay replacements	2009	2009	Protection	4	Improve protection	Proposed	0.6
Kenosha-Lakeview line rebuild	2009	2009	Maintenance	5	Poor condition	Provisional	1.2
Spare 138/69 kV transformer	2009	2009	Maintenance	-	Improve protection	Proposed	2.1
Berlin-Wautoma (Y95) line rebuild	2010	2010	Maintenance	1	Poor condition	Provisional	2.0
Council Creek transformer	2010	2010	Maintenance	1	Poor condition	Provisional	1.8
Whitman-Deer Trail (Y86) line rebuild	2010	2010	Maintenance	1	Poor condition	Provisional	1.7
Arpin breaker replace	2010	2010	Maintenance	1	Poor condition	Provisional	1.0
Rozelleville-Sigel (Y107) line rebuild	2009	2010	Maintenance	1	Poor condition	Planned	0.7
Portage-Wautoma (Y17) lightning protect	2010	2010	Maintenance	1	Improve protection	Provisional	0.6
Black Brook breaker addition	2010	2010	Protection	1	Improve protection	Proposed	0.5
L6952 lightning protection	2010	2010	Maintenance	2	Improve protection	Provisional	1.0
Munising lightning protection	2010	2010	Maintenance	2	Improve protection	Planned	0.5
60853-60842 lightning protection	2010	2010	Maintenance	2	Improve protection	Planned	0.5
Spring Green-Stagecoach (Y62) line rebl'd	2008	2010	Maintenance	3	Poor condition	Planned	4.8
Sun Prairie breaker & relay replacements	2010	2010	Protection	3	Improve protection	Provisional	2.2
Boscobel-Hillside (Y40) line rebuild	2010	2010	Maintenance	3	Poor condition	Planned	2.1
Sheepskin SS relay upgrades	2008	2010	Protection	3	Improve protection	Planned	2.1
Spring Green-Kirkwood (X18) line rebl'd	2010	2010	Maintenance	3	Poor condition	Planned	1.9

*Table PR-24 (continued)  
Maintenance, Operations or Protection Projects over \$0.5 Million (2009-2013)*

<b>Project Description</b>	<b>System Need Year</b>	<b>In-Service Year</b>	<b>Initiated</b>	<b>Planning Zone</b>	<b>Need Category</b>	<b>Planned, Proposed or Provisional</b>	<b>Capital Cost Estimate (in Millions)</b>
Rio- North Randolph (Y64) line rebuild	2010	2010	Maintenance	3	Poor condition	Provisional	1.9
Colley Road Substation upgrades	2006	2010	Maintenance	3	Poor condition	Proposed	1.2
Dam Heights breaker & relay replacement	2010	2010	Protection	3	Improve protection	Planned	1.1
Dam Heights-Dane (Y8) line rebuild	2008	2010	Maintenance	3	Poor condition	Planned	1.0
Hillman-Miner (Y130) line rebuild	2010	2010	Maintenance	3	Poor condition	Provisional	0.9
McCue relay replacements	2010	2010	Protection	3	Improve protection	Proposed	0.7
Ellinwood relay & switch replacements	2010	2010	Maintenance	4	Poor condition	Provisional	4.0
KK64441-KK64451 lightning protection	2010	2010	Maintenance	4	Improve protection	Provisional	2.2
N. Fond du Lac transformer & breakers	2010	2010	Maintenance	4	Poor condition	Provisional	2.1
Shoto breaker replacement	2010	2010	Maintenance	4	Poor condition	Provisional	0.7
New Holstein relay & switch replacements	2010	2010	Maintenance	4	Poor condition	Provisional	0.6
Elkhart Lake substation upgrades	2010	2010	Maintenance	4	Poor condition	Proposed	0.6
Sawyer breaker & relay replacements	2010	2010	Maintenance	4	Poor condition	Provisional	0.5
Bluemound breaker & switch replacement	2010	2010	Maintenance	5	Poor condition	Planned	4.3
Oak Creek Substation upgrades	2010	2010	Maintenance	5	Poor condition	Proposed	1.0
Kenosha substation upgrades	2010	2010	Maintenance	5	Poor condition	Proposed	0.9
Spare 345/138-kV transformer	2010	2010	Maintenance	-	Improve protection	Proposed	4.2
Spare 138/69-kV transformer	2010	2010	Maintenance	-	Improve protection	Proposed	4.2
Inland 69-kV line rebuild	2013	2013	Maintenance	2	Poor condition	Provisional	4.4

*Table PR-25  
Projects In Design or Construction*

Project	Zone
Construct Gardner Park-Highway 22 345-kV line	1
Construct new Highway 22 345-kV Substation	1
Rebuild/convert Conover-Plains 69-kV line to 138 kV	1
Construct 138-kV bus and install a 138/69 kV, 60 MVA transformer at Iron Grove Substation	1
Relocate Iron River Substation (Iron Grove)	1
Construct 138-kV bus and install a 138/69 kV, 60 MVA transformer at Aspen Substation	1
Install 2-4.08 MVAR capacitor banks at Munising 69-kV Substation	2
Construct Butler Ridge 138-kV Substation	3
Construct second Paddock-Rockdale 345-kV line and replace 345/138-kV transformer T22 at Rockdale Substation	3
Expand the Menominee 69-kV Substation and install 138 kV terminals. Loop the West Marinette-Bay De Noc 138-kV line into the Substation	4
Install 138/69-kV transformer at the expanded Menominee Substation	4
Construct Morgan-Werner West 345-kV line	4
String a new 138-kV line from Clintonville-Werner West primarily on Morgan-Werner West 345-kV line structures	4
Rebuild Crivitz-High Falls 69-kV double circuit line	4
Replace relaying on 230-kV circuits at Oak Creek	5
Replace two 345-kV circuit breakers at Pleasant Prairie Substation on the Racine and Zion lines with IPO breakers and upgrade relaying	5
Reconductor Oak Creek-Allerton 138-kV line	5
Install second 500 MVA 345/138-kV transformer at Oak Creek Substation	5
Loop Ramsey5-Harbor 138-kV line into Norwich and Kansas to form a new line from Ramsey-Norwich and Harbor-Kansas 138-kV lines	5
Replace CTs at Racine 345-kV Substation	5



*Table PR-25*  
*Projects In Design or Construction (continued)*

<b>Project</b>	<b>Zone</b>
Reconductor Oak Creek-Ramsey 138-kV line	5
Expand Oak Creek 345-kV switchyard to interconnect one new generator (2009)	5
Expand 345-kV switchyard at Oak Creek to interconnect one new generator (2010)	5
Uprate Oak Creek-Root River 138-kV line	5
Uprate Oak Creek-Nicholson 138-kV line	5

*Table PR-26  
Projects That Have Obtained Regulatory Approval, but Construction has not  
Commenced*

<b>Project</b>	<b>Zone</b>
Construct Jefferson-Lake Mills-Stony Brook 138-kV line	3
Construct a new 138-kV line from North Madison to Huiskamp	3
Construct new Oak Ridge-Verona 138-kV line and install a 138/69-kV transformer at Verona	3

*Table PR-27*  
*Projects Awaiting Regulatory Review/Approval*

<b>Project</b>	<b>Zone</b>
Construct Rockdale-West Middleton 345-kV line	3

*Table PR-28  
Former Generator Requests Now In-Service*

<u>Date</u>	<u>Requests on-line</u>	<u>Megawatts</u>
2000	IC006 (Eden/Little Badger)	31
2001	G074 (Combined Locks)	53
6/1/2003	G111 (Pulliam CT), G148 (Pettenwell/Big Pond)	105
3/19/2004	G165 & G383 (Kewaunee uprate)	43
6/1/2004	G225 (Kaukauna CT)	60
6/15/2004	G035 & G072 (Riverside)	655
5/1/2005	G096 & G160 (West Campus)	150
6/1/2005	G044 (Fox Energy)	602
6/2/2005	G103 (Sheboygan)	370
7/16/2005/ 6/1/2008	G014 & G093 (Port Washington)	1200
9/1/2006/ 6/1/2008	G510 (Port Washington increase)	70
4/1/2007	G240 (Manitowoc)	54
5/2007	G550 (Concord uprate)	12
4/30/2008	G353 & G354 (Cypress)	160
3/31/2008	G368 (Forward)	200
6/26/2008	G144 (Weston)	550

**Table PR-29**  
**Proposed Projects Active in the Generation Queue as of July 1, 2008**

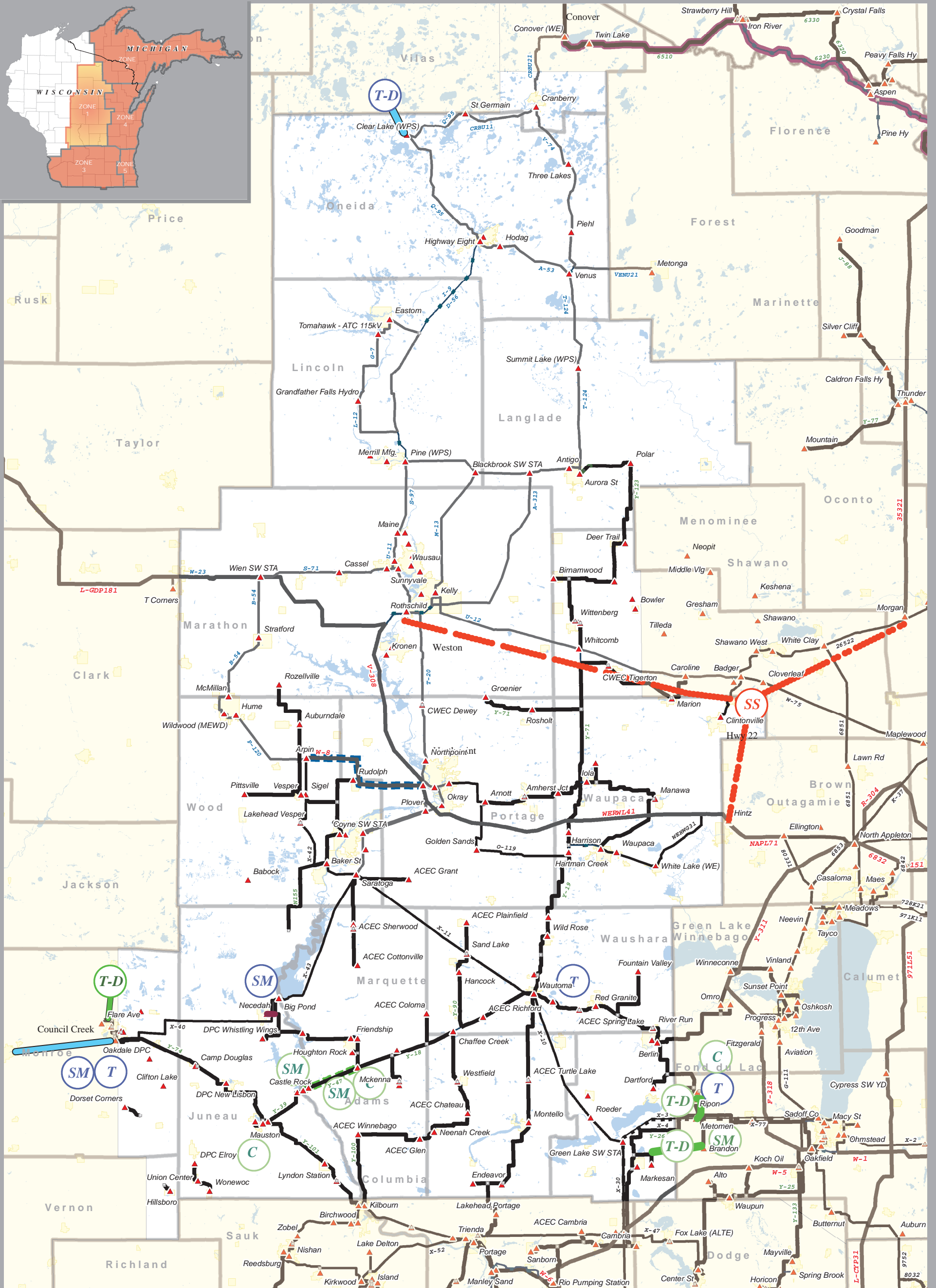
<b>Zone</b>	<b>Queue #</b>	<b>County</b>	<b>Project capacity</b>	<b>Interconnection voltage</b>	<b>Generator technology and fuel</b>	<b>Developer projected in-service date</b>
1	G588	Wood	55 MW	115 kV	simple cycle/gas	3/08
1	Total		55 MW			
2	G750	Marquette	200 MW	138 kV	wind turbine	9/09
2	G799	Houghton	120.5 MW	69 kV	wind turbine	11/09
2	G937	Delta	200 MW	138 kV	wind turbine	12/10
2	Total		520.5 MW			
3	G282	Lafayette	99 MW	138 kV	wind turbine	12/06 susp.
3	G338	Dodge	54 MW	138 kV	wind turbine	TBD
3	G366	Columbia	80 MW	138 kV	wind turbine	6/06 susp.
3	G483	Green	50 MW	69 kV	wind turbine	12/06 susp.
3	G527	Grant	280 MW	161 kV	steam/coal	3/12
3	G546	Walworth	100 MW	138 kV	wind turbine	12/08 susp.
3	G550	Jefferson	12 MW	138 kV	simple cycle/gas	6/09
3	G553 (alternate to G527)	Columbia	280 MW (not in total below)	345 kV	steam/coal	3/12
3	G706	Columbia	99 MW	138 kV	wind turbine	12/08
3	G724	Dane	99 MW	138 kV	wind turbine	5/09
3	G747	Rock	99 MW	138 kV	wind turbine	8/09
3	G749	Lafayette	99 MW	69 or 138 kV	wind turbine	8/09
3	G793	Rock	100 MW	138 kV	wind turbine	8/09
3	G953	Grant	49.5 MW	69 kV	wind turbine	12/09
3	G954	Grant	49.5 MW	69 kV	wind turbine	12/10
3	G955	Rock	99 MW	138 kV	wind turbine	12/10
3	G956	Walworth	49.5 MW	69 kV	wind turbine	12/10
3	G995	Lafayette	99 MW	138 kV	wind turbine	12/10
3	G901	Winnebago	1500	345 kV	wind turbine	12/10
3	G902	Winnebago	1500	345 kV	wind turbine	12/10
3	Total		4518 MW			
4	G376	Green Lake/Fond du Lac	160 MW	138 kV	wind turbine	12/06 susp.
4	G384	Manitowoc/Kewaunee	99 MW	138 kV	wind turbine	10/07 susp.
4	G427	Fond du Lac	98 MW	345 kV	wind turbine	6/06 susp.
4	G507	Fond du Lac	98 MW	138 kV	wind turbine	10/08
4	G590	Calumet	98 MW	138 kV	wind turbine	12/07
4	G611	Calumet	99 MW	138 kV	wind turbine	5/09
4	G773	Brown	150 MW	138 kV	wind turbine	12/09
4	G833	Manitowoc	53 MW	345 kV	wind turbine	5/11
4	G834	Manitowoc	53 MW	345 kV	wind turbine	5/10
4	G927	Calumet	1.5 MW	138 kV	wind turbine	9/09
4	G977	Calumet	100.5 MW	138 kV	wind turbine	6/10
4	G987	Brown	400 MW	345 kV	wind turbine	12/10
4	Total		1410 MW			
5	G051	Milwaukee	1300 MW	345 kV	steam/coal	6/09, 6/10
5	Total		1300 MW			

Notes:

1. susp = Interconnection Agreement has been suspended by the customer.
2. TBD = Customer has lifted suspension and the new in-service date is to be determined.

*Table PR-30  
 Requests Previously in the Generation Queue  
 Which Have been Withdrawn/Removed between July 1, 2007  
 and July 1, 2008*

Zone	Queue no.	County	Size	Voltage	Type	In-Service Date
1	none					
2	none					
3	none					
4	none					
5	none					



Transmission System Additions (May be Planned, Proposed or Provisional)  
**PLANNING ZONE 1**

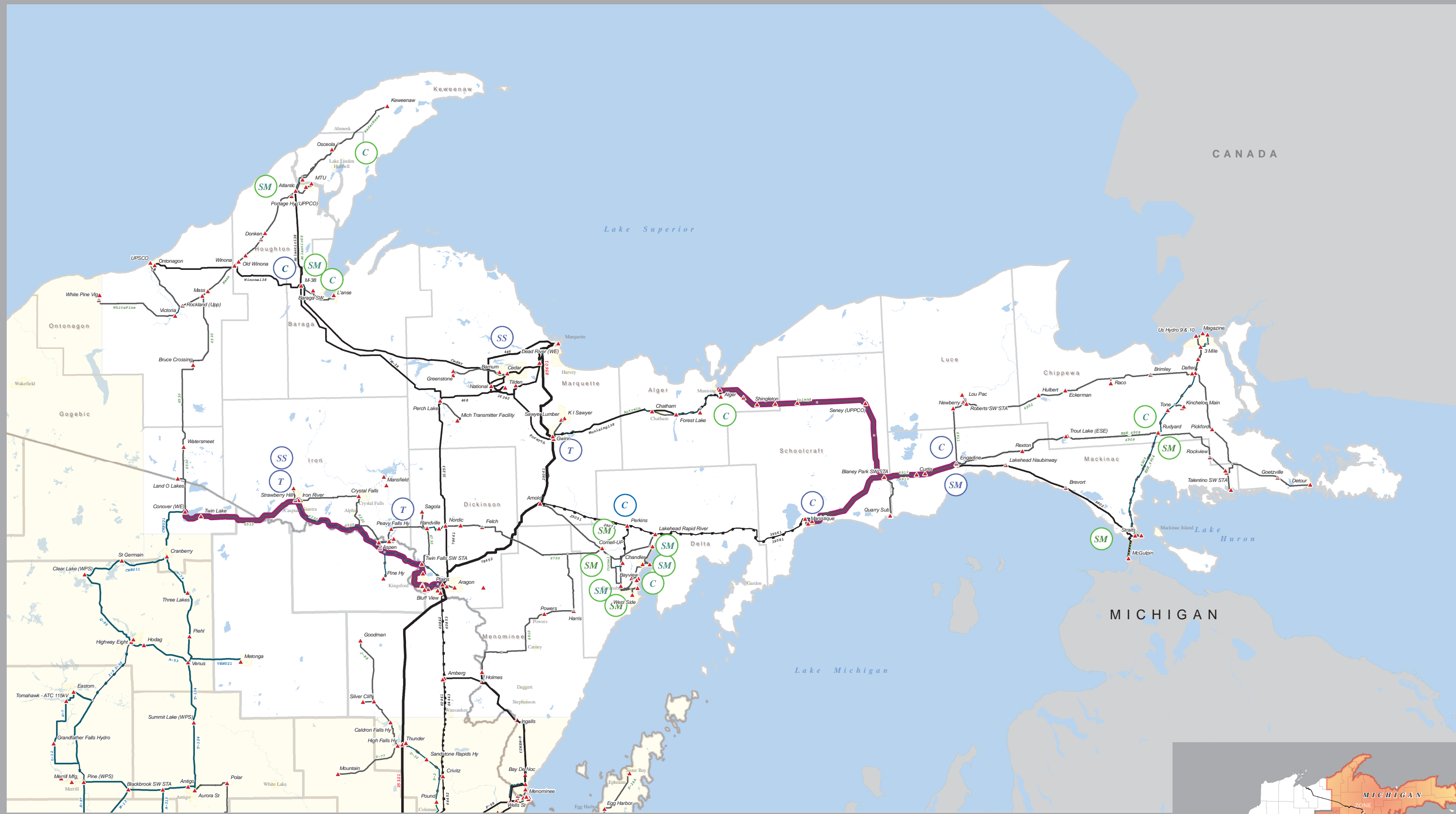


- (SS)** New Substation
- (SM)** Substation Modifications
- (T)** Transformer
- (C)** Capacitor Bank
- (T-D)** New T-D Interconnection

- 345 kV Transmission Line
- ▬▬▬ 115, 138 or 161 kV Transmission Line
- ▬▬▬ Rebuilt 115, 138 or 161 kV Transmission Line
- ▬▬▬ Transmission Line Voltage Conversion
- ▬▬▬ 69 kV Transmission Line

- Transmission Related Facilities**
- ▲ Substation, Switchyard or Terminal
  - Proposed/Design/Construction
  - ATC Office Location
  - Generation
  - Other Facility

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.



**Transmission System Additions (May be Planned, Proposed or Provisional)**

## PLANNING ZONE 2

<ul style="list-style-type: none"> <li><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">SM</span> Substation Modifications or other Line Uprate</li> <li><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">T</span> Transformer</li> <li><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">SS</span> New Substation</li> </ul>	<ul style="list-style-type: none"> <li><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">C</span> Capacitor Bank</li> <li><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">T-D</span> New T-D Interconnection</li> <li><span style="color: green;">●●●●</span> Rebuilt 69 kV Transmission</li> </ul>	<ul style="list-style-type: none"> <li><span style="border-bottom: 2px solid blue; width: 20px; display: inline-block;"></span> 115 or 138 kV Transmission Line</li> <li><span style="border-bottom: 2px dashed blue; width: 20px; display: inline-block;"></span> Rebuilt 115 or 138 kV Transmission</li> <li><span style="border-bottom: 2px solid purple; width: 20px; display: inline-block;"></span> Transmission Line Voltage Conversion</li> <li><span style="border-bottom: 2px solid green; width: 20px; display: inline-block;"></span> 69 kV Transmission Line</li> </ul>
--	---	--

### Transmission Related Facilities

<ul style="list-style-type: none"> <li><span style="color: red;">▲</span> Substation, Switchyard or Terminal</li> <li><span style="background-color: yellow; width: 10px; height: 10px; display: inline-block;"></span> Proposed/Design/Construction</li> </ul>	<ul style="list-style-type: none"> <li><span style="color: orange;">●</span> ATC Office Location</li> <li><span style="background-color: orange; width: 10px; height: 10px; display: inline-block;"></span> Generation</li> <li><span style="border: 1px solid black; width: 10px; height: 10px; display: inline-block;"></span> Other Facility</li> </ul>
---	--

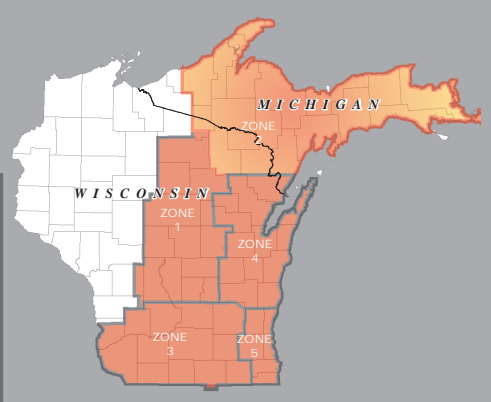
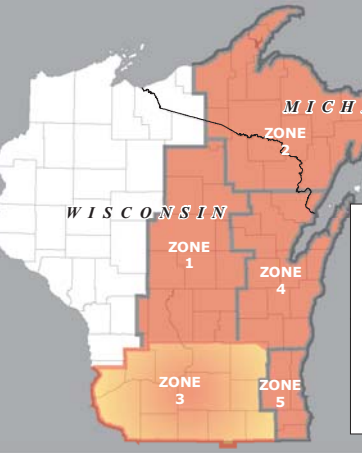
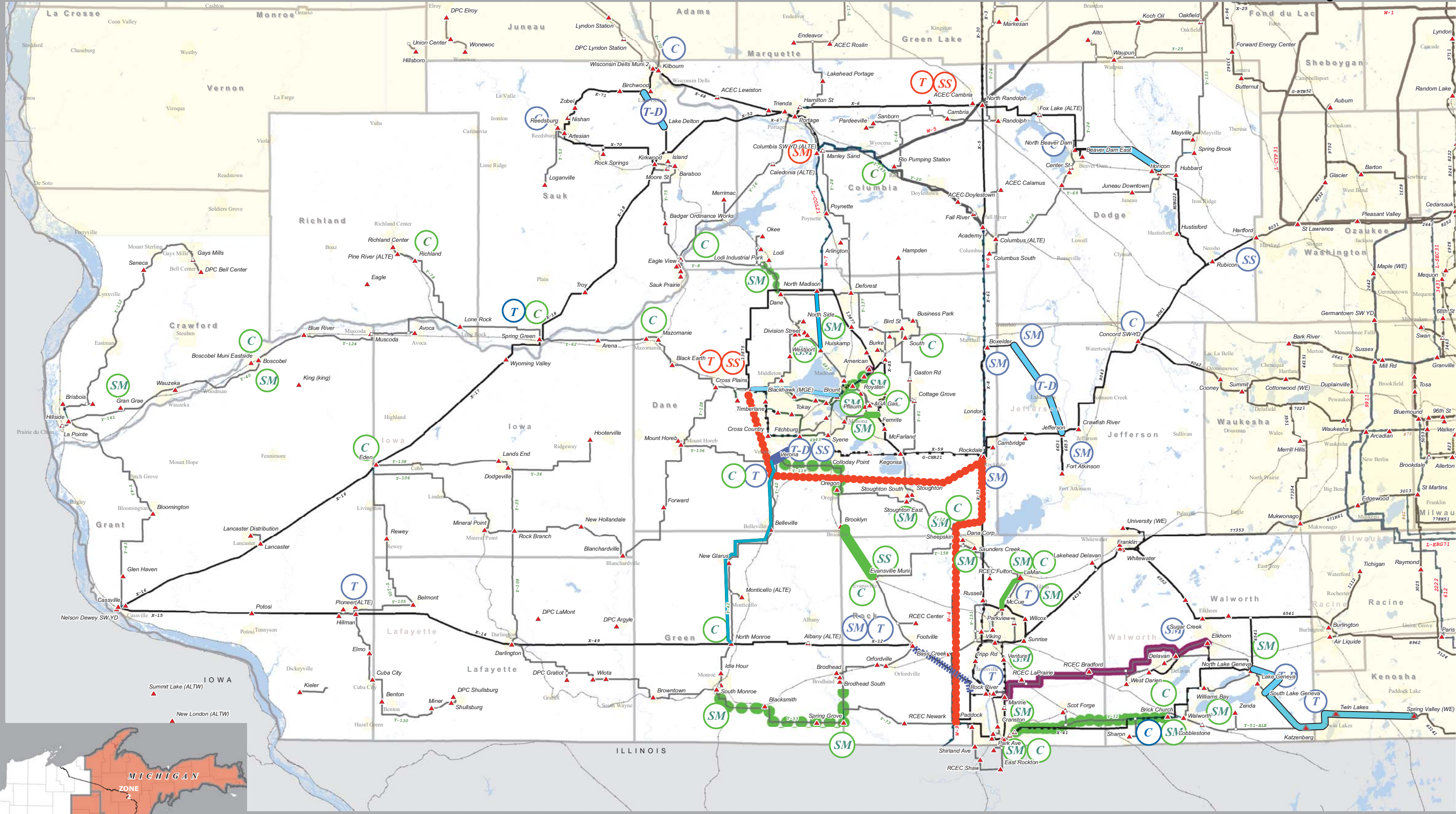




Figure PR-3



Transmission Planning Additions (May be Planned, Proposed or Provisional)

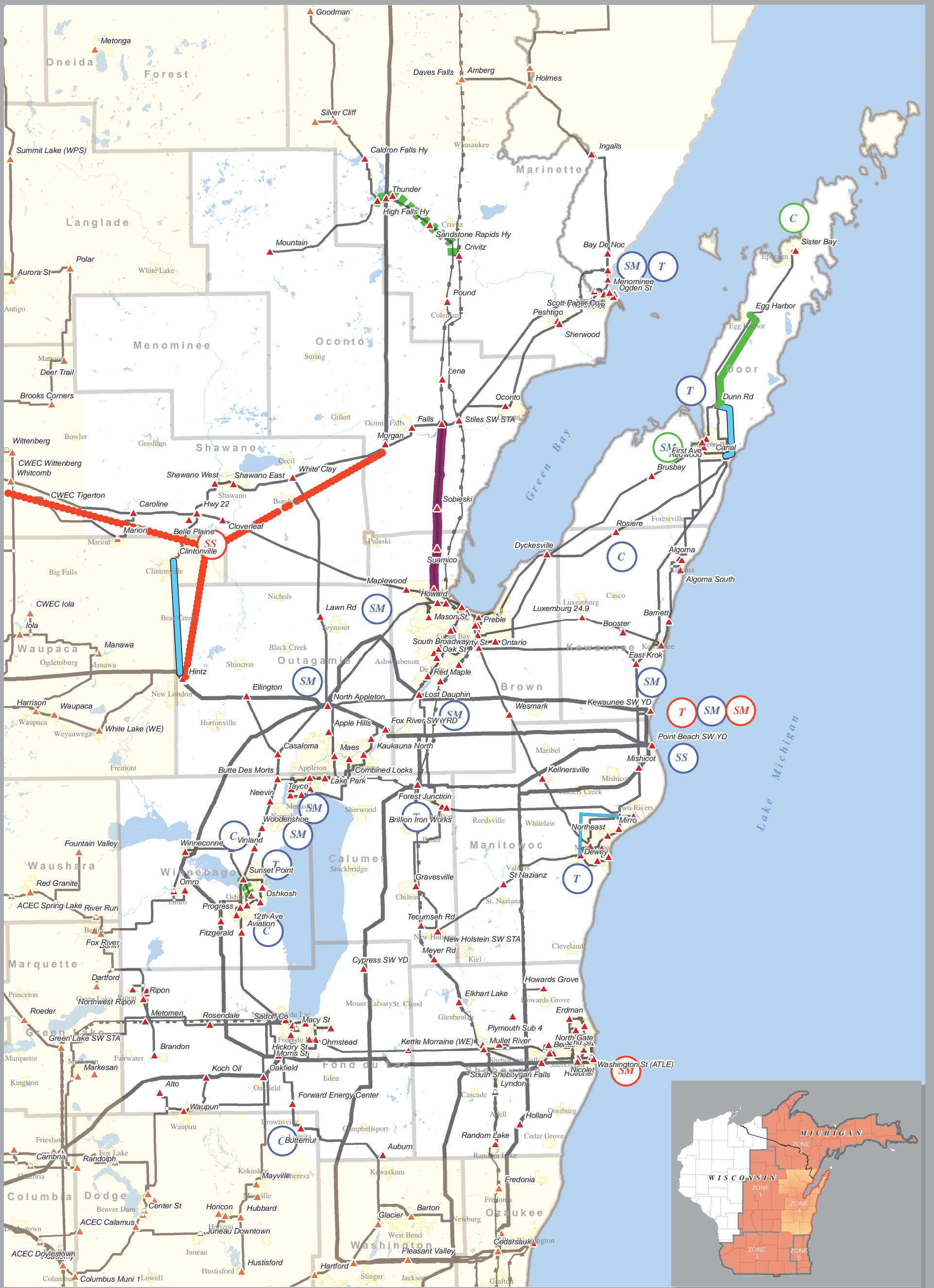
## PLANNING ZONE 3

<ul style="list-style-type: none"> <li><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">SS</span> New Substation</li> <li><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">SM</span> Substation Modifications</li> <li><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">T</span> Transformer</li> </ul>	<ul style="list-style-type: none"> <li><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">C</span> Capacitor Bank</li> <li><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">T-D</span> New T-D Interconnection</li> <li><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">PS</span> Phase Shifter</li> </ul>	<ul style="list-style-type: none"> <li><span style="color: red;">●●●●</span> 345 kV Transmission Line</li> <li><span style="color: blue;">▬▬▬▬</span> 115 or 138 kV Transmission Line</li> <li><span style="color: blue;">▬▬▬▬▬▬▬▬</span> 115 or 138 kV Transmission Line Rebuild</li> <li><span style="color: purple;">▬▬▬▬▬▬▬▬</span> Transmission Line Voltage Conversion</li> </ul>	<ul style="list-style-type: none"> <li><span style="color: green;">▬▬▬▬</span> 69 kV Transmission Line</li> <li><span style="color: green;">●●●●</span> 69 kV Transmission Line Rebuild</li> </ul>
---	---	---	--

### Transmission Related Facilities

<ul style="list-style-type: none"> <li><span style="color: red;">▲</span> Substation, Switchyard or Terminal</li> <li><span style="color: orange;">■</span> Proposed/Design/Construction</li> </ul>	<ul style="list-style-type: none"> <li><span style="color: orange;">●</span> ATC Office Location</li> <li><span style="color: black;">■</span> Generation</li> <li><span style="color: black;">■</span> Other Facility</li> </ul>
---	---





Transmission System Additions (May be Planned, Proposed or Provisional)

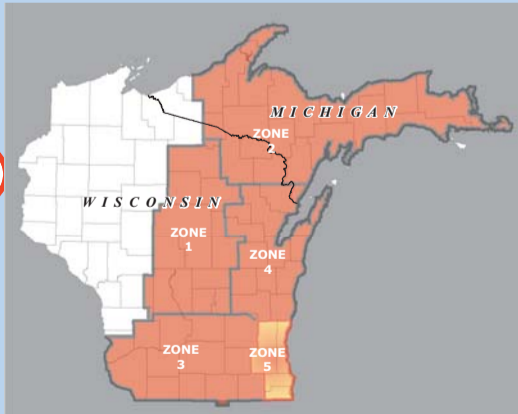
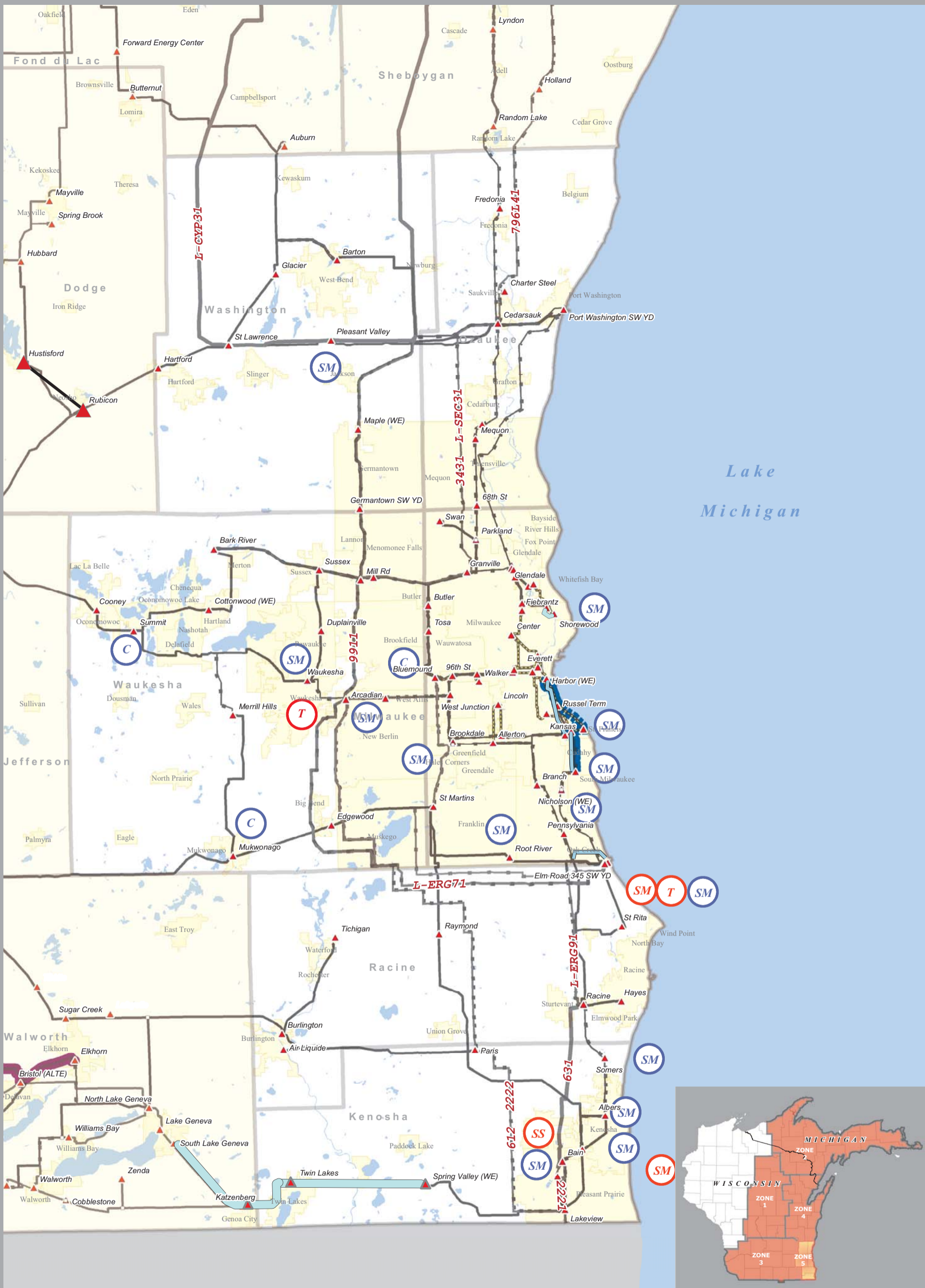
**PLANNING ZONE 4**

- SS** New Substation
- SM** Substation Modifications
- T** Transformer
- C** Capacitor Bank
- T-D** New T-D Interconnection
- R** Reactor

- 345 kV Transmission Line
- ▬▬▬▬▬ 115 or 138 kV Transmission Line
- ▬▬▬▬▬ Rebuilt 115 or 138 kV Transmission Line
- ▬▬▬▬▬ Transmission Line Voltage Conversion
- ▬▬▬▬▬ 69 kV Transmission Line
- ▬▬▬▬▬ Rebuilt 69 kV Transmission Line

- Transmission Related Facilities**
- ▲ Substation, Switchyard or Terminal
  - ▲ Proposed/Design/Construction
  - ATC Office Location
  - Generation
  - Other Facility

Figure PR-5



Transmission System Additions (May be Planned, Proposed or Provisional)  
**PLANNING ZONE 5**

- |                               |                               |   |                                      |                       |
|-------------------------------|-------------------------------|---|--------------------------------------|-----------------------|
| (SS) New Substation           | (C) Capacitor Bank            | ●●●●● 345 kV Transmission Line            | ▲ Substation, Switchyard or Terminal | ● ATC Office Location |
| (SM) Substation Modifications | (T-D) New T-D Interconnection | ▬ 115 or 138 kV Transmission Line         | ■ Proposed/Design/Construction       | ☀ Generation          |
| (T) Transformer               | (R) Series Reactor            | ▬ Rebuilt 115 or 138 kV Transmission Line |                                      | ■ Other Facility      |
|                               |                               | ▬ Transmission Line Voltage Conversion    |                                      |                       |



Figure PR-6

*American Transmission Company - Number of Projects by Status  
10-Year Assessments 2001-2008*

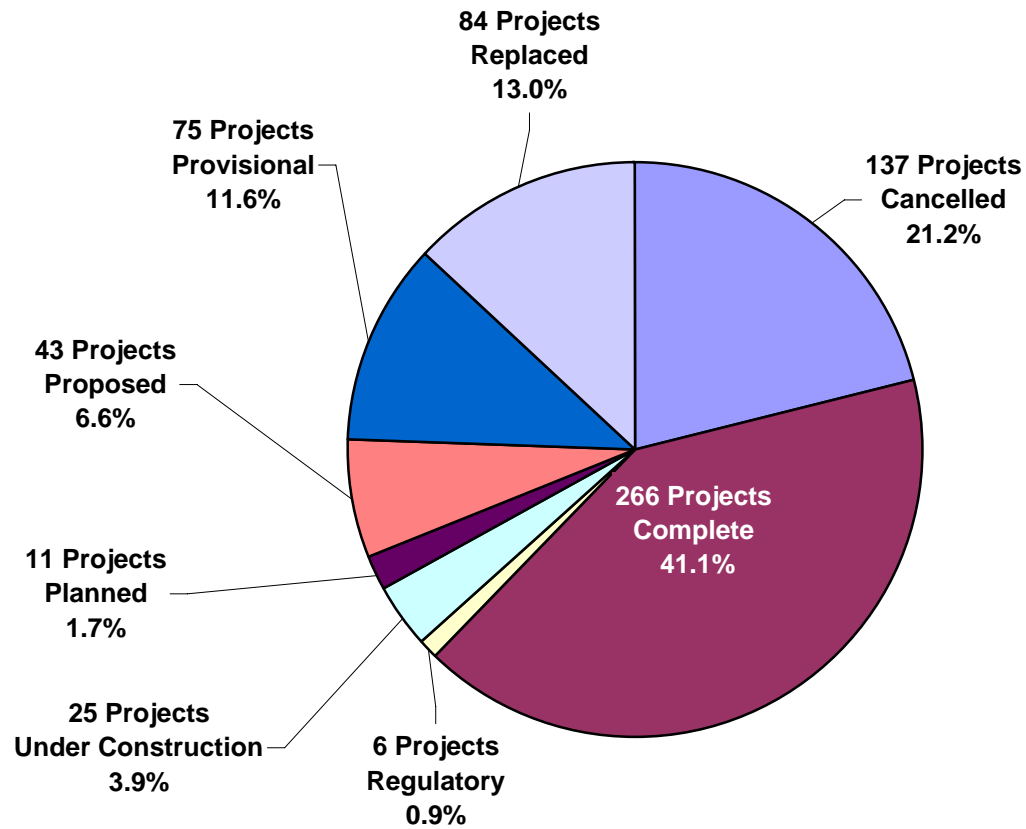


Figure PR-7

*American Transmission Company - Cost of Projects by Status  
10-Year Assessments 2001-2008*

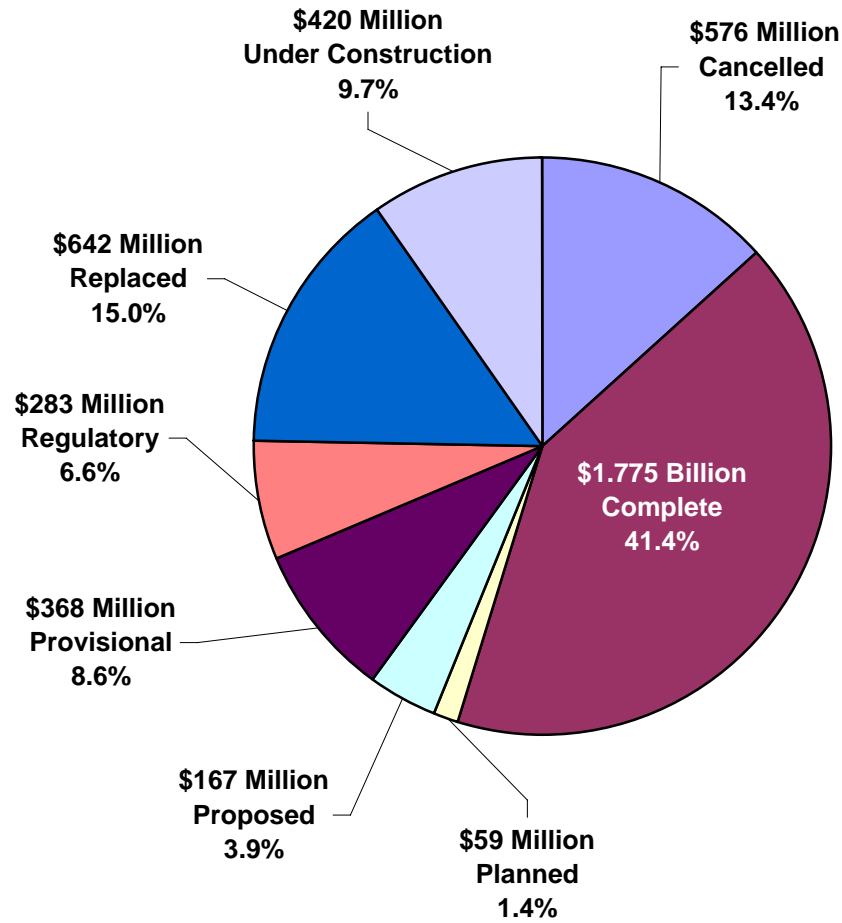


Figure PR-8

*American Transmission Company - Cost of Projects by Status  
2008 10-Year Assessment  
Planned, Proposed and Provisional Projects*

Total 2008 Assessment (2008-2017) Expenditures = \$1.297 billion

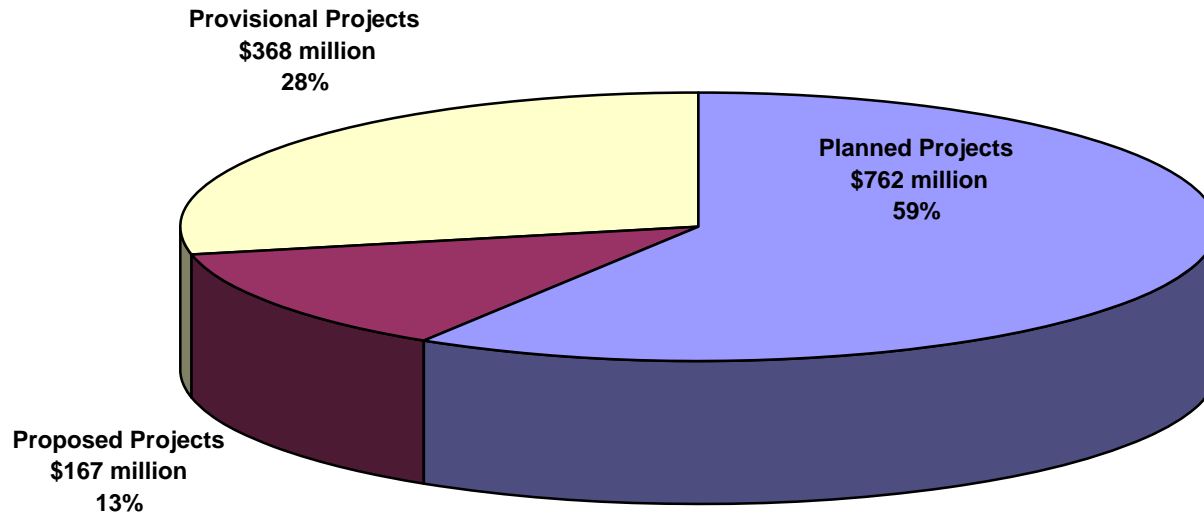
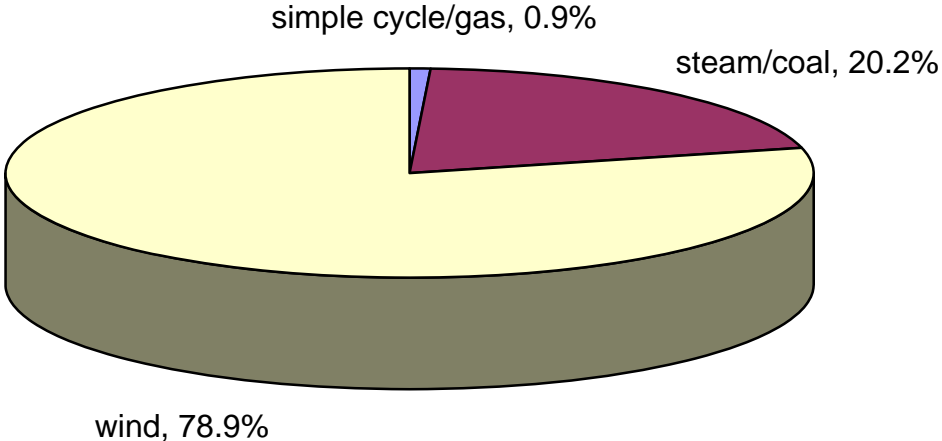


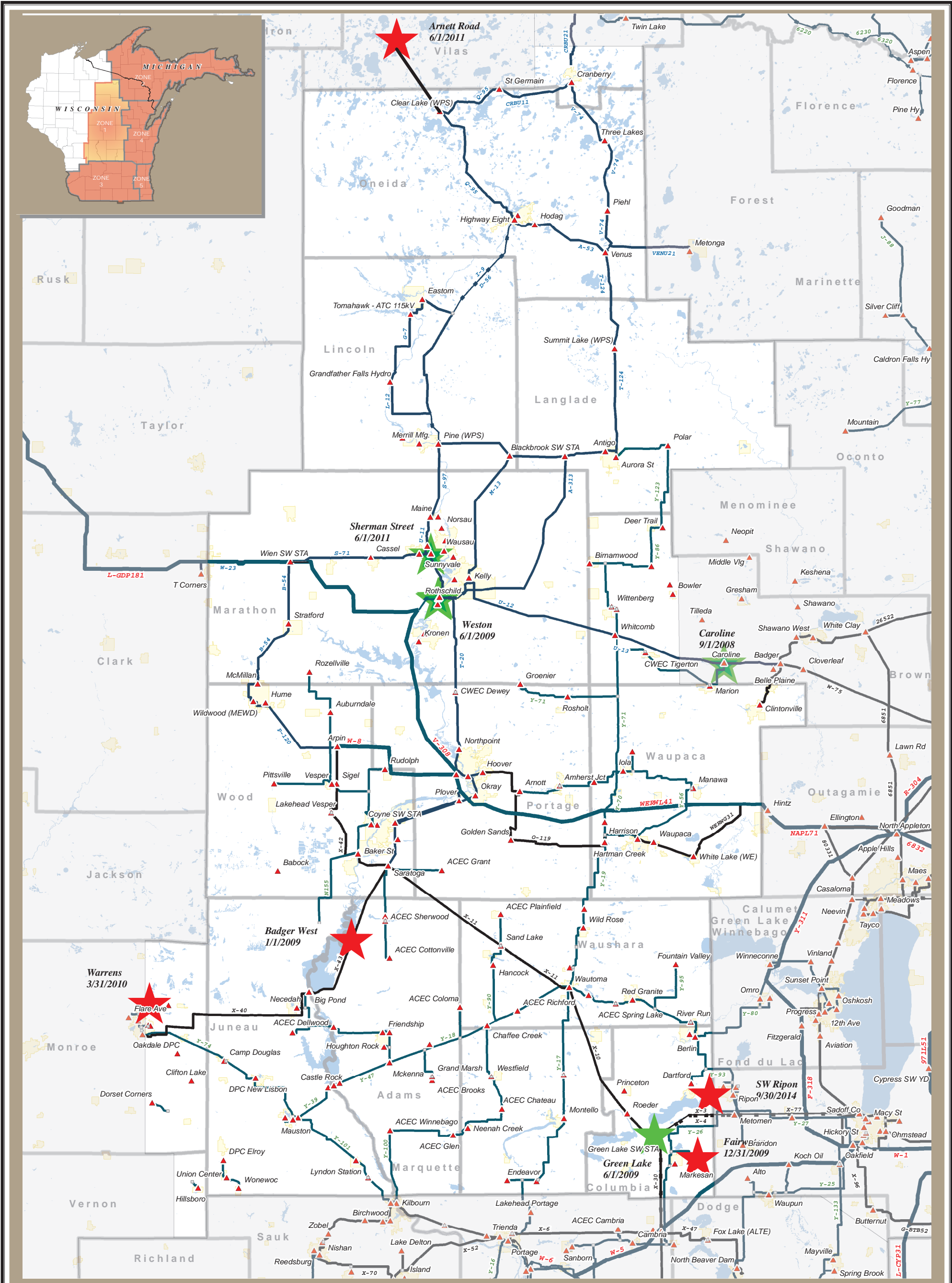


Figure PR-10

**ATC Generation Queue**  
Percent of Capacity as of 2008 Assessment Update





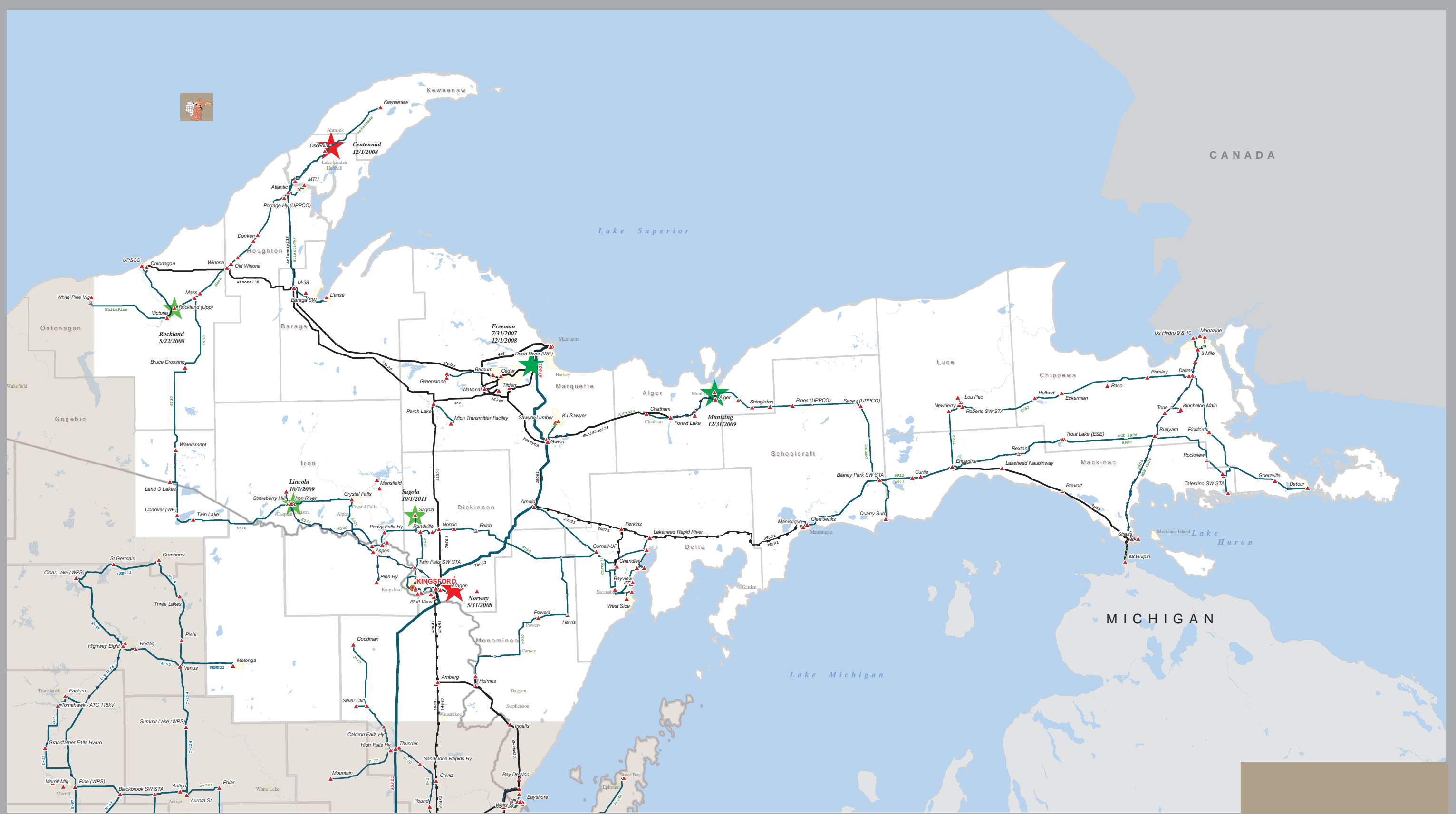


## Transmission-Distribution Interconnection Requests PLANNING ZONE 1

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:  
 \* Approximately 8900 miles of transmission lines  
 \* 98 wholly owned substations  
 \* 358 jointly owned substations  
 \* Offices in Madison (2), Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, MI

- |  |   |   |
|--|---|---|
| <ul style="list-style-type: none"> <li><span style="color: red; font-size: 2em;">★</span> New Substation Interconnection Request</li> <li><span style="color: green; font-size: 2em;">★</span> Transformer Addition/Replacement</li> </ul> | <ul style="list-style-type: none"> <li><span style="color: red; font-size: 1.5em;">▲</span> Substation, Switchyard or Terminal</li> <li><span style="color: yellow; font-size: 1.5em;">■</span> Proposed/Design/Construction</li> </ul> | <ul style="list-style-type: none"> <li><span style="color: orange; font-size: 1.5em;">●</span> ATC Office Location</li> <li><span style="color: brown; font-size: 1.5em;">■</span> Generation</li> <li><span style="color: black; font-size: 1.5em;">■</span> Other Facility</li> </ul> |
|--|---|---|

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.



## Transmission-Distribution Interconnection Requests PLANNING ZONE 2

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:

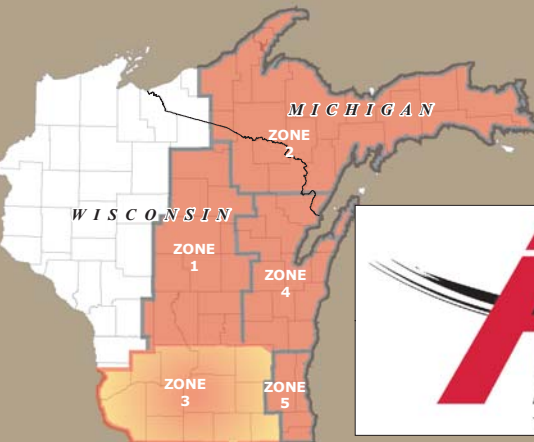
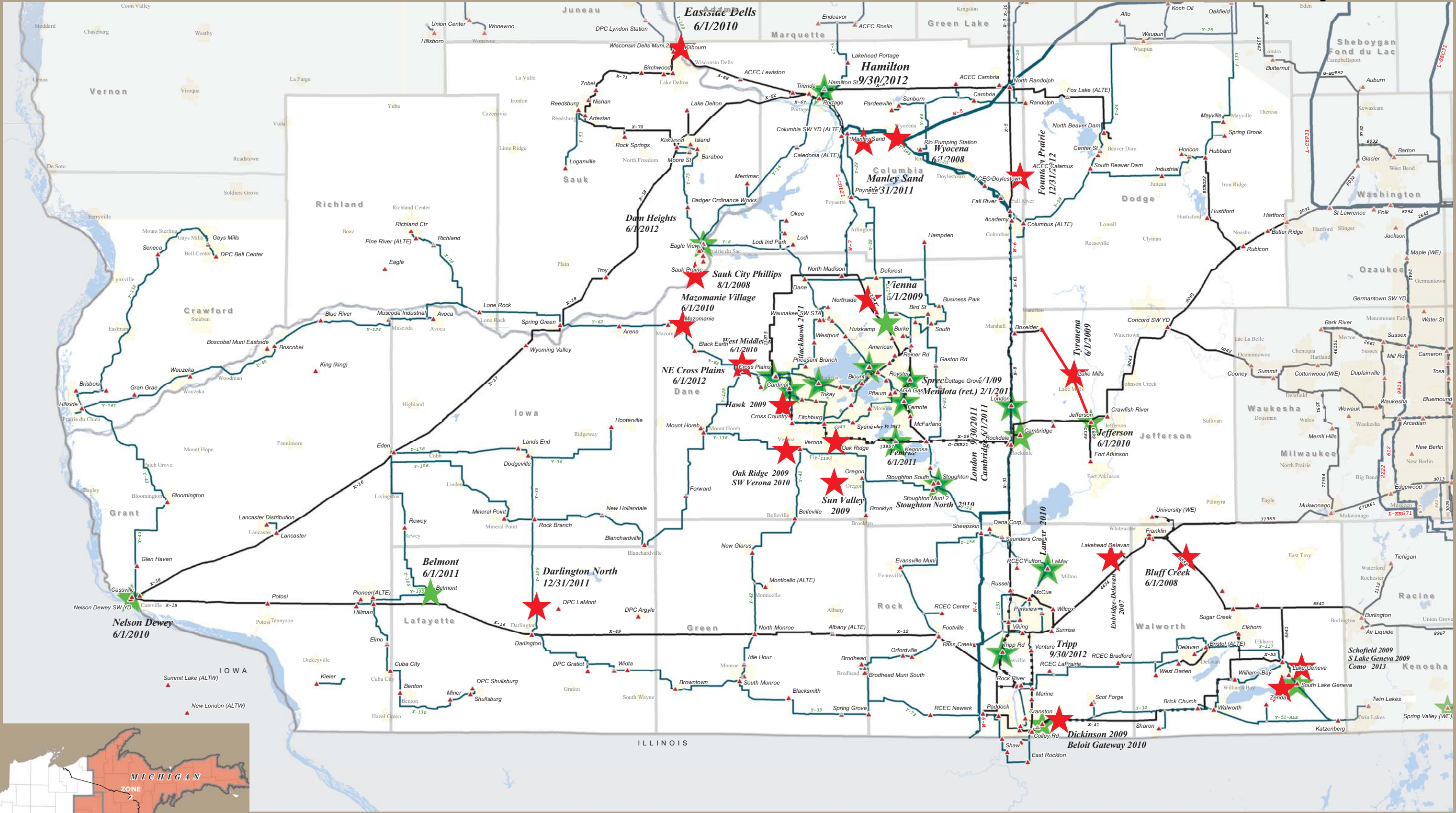
- \* Approximately 8900 miles of transmission lines
- \* 98 wholly owned substations
- \* 358 jointly owned substations
- \* ATC offices in Madison (2), Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, MI

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li><span style="color: red;">★</span> New Substation Interconnection Request</li> <li><span style="color: green;">★</span> Transformer Addition/Replacement</li> </ul> | <ul style="list-style-type: none"> <li><span style="color: red;">▲</span> Substation, Switchyard or Terminal</li> <li><span style="color: orange;">■</span> Proposed/Design/Construction</li> <li><span style="color: blue;">●</span> ATC Office Location</li> <li><span style="color: brown;">■</span> Generation</li> <li><span style="color: black;">■</span> Other Facility</li> </ul> |
|--|--|

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.



Figure PR-13



Transmission-Distribution Interconnection Requests  
**PLANNING ZONE 3**

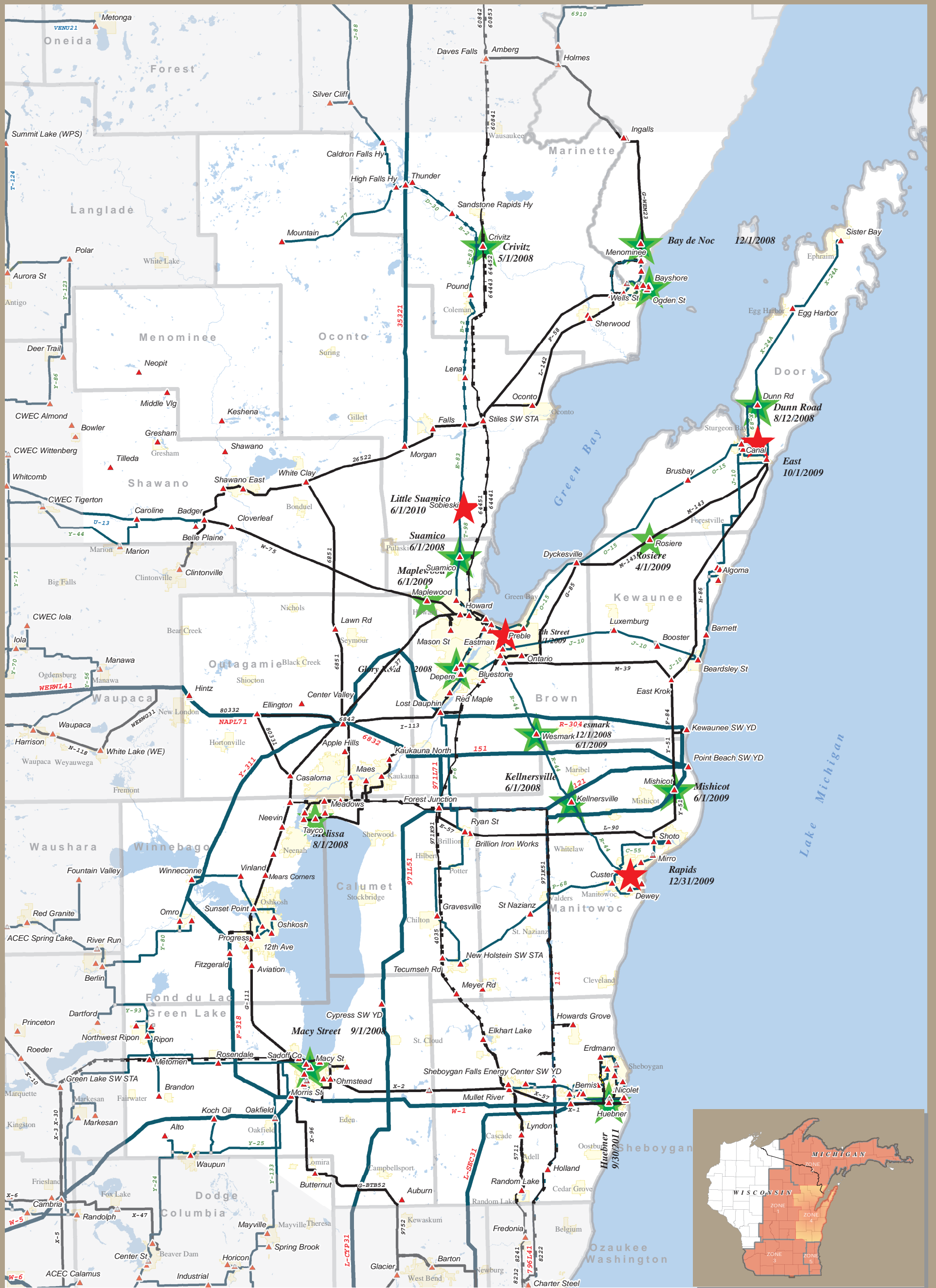
Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:

- \* Approximately 8900 miles of transmission lines
- \* 98 wholly owned substations
- \* 358 jointly owned substations
- \* ATC offices in Madison (2), Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, MI

- ★ New Substation Interconnection Request
- ★ Transformer Addition/Replacement

- Transmission Related Facilities**
- ▲ Substation, Switchyard or Terminal
  - ATC Office Location
  - Proposed/Design/Construction
  - ☐ Generation
  - Other Facility



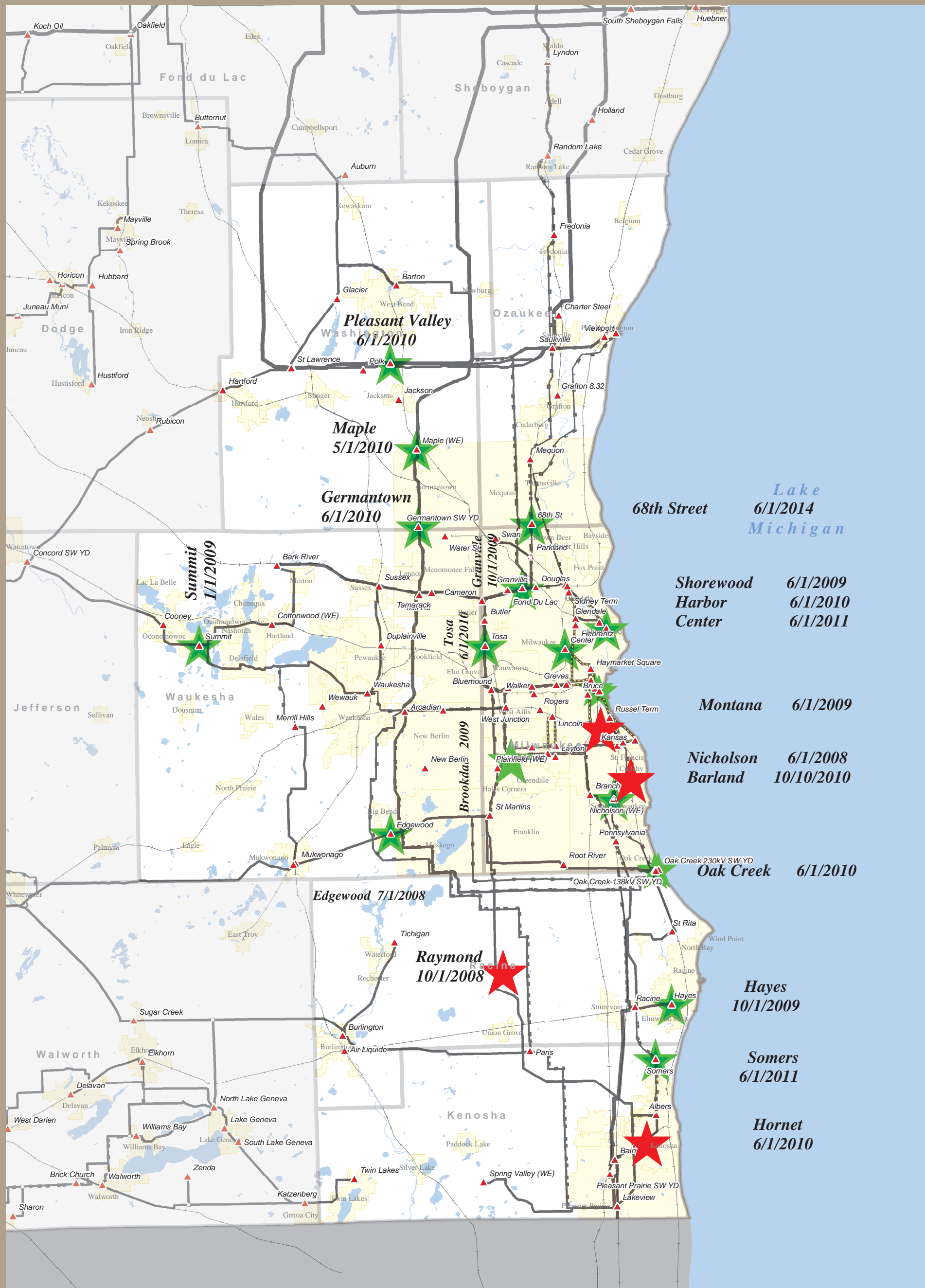


Transmission-Distribution Interconnection Requests  
**PLANNING ZONE 4**

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:  
 \* Approximately 8900 miles of transmission lines  
 \* 98 wholly owned substations  
 \* 358 jointly owned substations  
 \* Offices in Madison (2), Cottage Grove, Pewaukee, De Pere Wausau and Kingsford, MI

- ★ New Substation Interconnection Request
- ★ Transformer Addition/Replacement
- ▲ Substation, Switchyard or Terminal
- Proposed/Design/Construction
- ATC Office Location
- Generation
- Other Facility

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.



- Shorewood 6/1/2009
- Harbor 6/1/2010
- Center 6/1/2011
  
- Montana 6/1/2009
- Nicholson 6/1/2008
- Barland 10/10/2010
  
- Oak Creek 6/1/2010
  
- Hayes 10/1/2009
  
- Somers 6/1/2011
  
- Hornet 6/1/2010



Transmission-Distribution Interconnection Requests  
**PLANNING ZONE 5**

Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:  
 \* Approximately 8900 miles of transmission lines  
 \* 98 wholly owned substations  
 \* 358 jointly owned substations  
 \* Offices in Madison (2), Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, MI

- |  |                                    |                     |
|--|------------------------------------|---------------------|
| New Substation Interconnection Request | Substation, Switchyard or Terminal | ATC Office Location |
| Transformer Addition/Replacement       | Proposed/Design/Construction       | Generation          |
|  |                                    | Other Facility      |

The information presented in this map document is advisory and is intended for reference purposes only. American Transmission Company owned and operated facility locations are approximate.