



10-Year Assessment

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

2010

September 2010 10-Year Assessment
www.atc10yearplan.com

Project classifications

In our 10-Year Assessments and Updates, projects are identified that address system reliability issues, economic benefits, regional issues, loss savings, transmission service issues, generation or 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 asset renewal including reliability improvement and end-of-life equipment issues. The projects referenced in the project tables PR-2 through PR-25a generally include only those projects that at least in part address system reliability issues. Projects referenced in tables AR-1 through AR-4 detail our asset renewal efforts.

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. Please note that the classifications of asset renewal projects are underway and thus are not depicted in Tables AR-1 through AR-4.

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 reflects meeting the need identified, but does not necessarily represent ATC's preliminary preferred project alternative.

In the 2001-2010 10-Year Assessments and Updates, we identified 680 projects that address system reliability issues. Projects that address equipment reliability issues are not included in these statistics. Figure PR-6 illustrates the status of system reliability and economic projects ATC has considered from 2001-2010. Regarding Figure PR-6, it is worthwhile to note that:



- ❑ ATC has completed 331 projects and another 8 are in design or under construction. Notable projects most recently completed are listed in Table PR-1. Projects under construction include capacitor bank installations, the Warrens transmission-to-distribution interconnection, and the Oak Creek generation projects.
- ❑ 85 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 157 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.
- ❑ 101 future projects are in various stages of evaluation or development (Planned which includes projects In Design/Under Construction, Proposed or Provisional).

Projects completed since 2009 Assessment

Transmission projects significantly affecting system performance that have been completed since the 2009 Assessment was issued in October 2009 are listed in Table PR-1.

Most notable include:

- ❑ Construct a Jefferson-Tyrannena-Stony Brook 138-kV line,
- ❑ Rebuild/convert Conover-Plains 69-kV line to 138 kV,
- ❑ Construct second Paddock-Rockdale 345-kV line and replace 345/138-kV transformer T22 at Rockdale Substation, and
- ❑ Construct Oak Ridge-Verona 138-kV line.

Summary of 2010-2025 Projects

The transmission facilities that we are proposing based on this Assessment are listed in Tables PR-2 through PR-22, and shown graphically by planning zone in Figures PR-1 through PR-5. Changes that have occurred since the 2009 Assessment are listed in Table PR-23. Please also refer to our Asset Renewal section for a list of our larger asset renewal projects.

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. Sometimes the year that 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.



10-Year Assessment

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

2010

September 2010 10-Year Assessment
www.atc10yearplan.com

- 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 2010-2020. Table PR-13 shows provisional facilities where the in-service date is yet to be determined or beyond the 2020 timeframe.

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

Table PR-19 provides a list of planned transmission lines involving new right-of-way for 2010-2025. 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 or multiple contingency conditions, or bus voltage is not 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. NERC reliability categories



10-Year Assessment

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

2010

September 2010 10-Year Assessment
www.atc10yearplan.com

depicted in the Project Tables are from Table 1 of the TPL 001-004. If the reliability need is not on the Bulk Electric System, we have utilized the terminology of the voltage level preceding the equivalent NERC reliability category.

Operating flexibility: Provides enhanced ability to perform maintenance or react to system changes.

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 requested by a distribution company.

Asset renewal: 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 are met (see Planning criteria), or to improve stability response of generation.

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

Policy benefits: Provides enhanced ability to access renewable resources and to meet the public policy objectives of state and federal governments.

Projects in design or under construction

Transmission projects that will significantly affect system performance, have regulatory approval if required and are currently in design or under construction are listed in Table PR-24. Most notable include:

- Construct 69-kV line from new Warrens Substation to the Council Creek-Tunnel City 69-kV line,
- Construct the Rockdale-West Middleton 345-kV line, and
- Rebuilding the Brodhead to South Monroe 69-kV line.

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 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-25](#).

Notable projects include:

- Construct 115-kV line from new Woodmin Substation to the Clear Lake Substation, and
- Construct Monroe County-Council Creek 161-kV line and Timberwolf 69-kV switching station.

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 88 percent of the estimated total 2001-2010 capital costs, with future projects accounting for the remaining 12 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 total 10-year capital expenditure described in this Assessment is \$3.4 billion. The cost estimate for all 2010 10-Year Assessment system reliability and economics projects (not including regional multi-value projects) to be placed in-service is approximately \$1.0 billion, which is the same as the 2009 Assessment estimate. [Figure PR-8](#) categorizes the current \$1.0 billion 2010 Assessment system reliability and economics project dollars by status. Planned projects (including those projects in design and under construction) account for 32% of the Assessment dollars, proposed projects account for 13% of the dollars, and provisional projects account for the remaining 55% of the dollars.

Asset renewal project costs as outlined in our [Asset Renewal](#) section account for approximately \$700 million of the total \$3.4 billion. Other anticipated projects, including regional multi-value projects, road relocations, generation and distribution interconnections, and unspecified network projects make up the remaining \$1.7 billion of the total \$3.4 billion.



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, 2010, 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 Revised Attachment X process, a generator interconnection study is usually performed in three stages: Interconnection Feasibility Study (Application Review Phase), Interconnection System Impact Study (System Planning and Analysis and/or Definitive Planning Phase), and an Interconnection Facilities Study (Definitive Planning Phase)

The *Interconnection Feasibility Study* includes a determination of thermal overload or voltage level impacts created by the new generator. This study process is now performed by MISO approximately five to six times per calendar year and provides a qualitative screen of the affected facilities, indicating if there is ample capacity on the system to support the new interconnection. Depending on the results of the study, the request may either enter into the Definitive Planning Phase (DPP), System Planning and Analysis Phase (SPA) or Customer Not Ready Phase of the Interconnection System Impact study.

The *Interconnection System Impact Study* includes a determination of whether the proposed generator and other nearby generators will remain connected to the system under various disturbance situations, such as line trips and equipment failures and includes a fault duty analysis to determine whether existing system equipment can accommodate the increased short circuit fault duty caused by the new generator. Finally, the Interconnection System Impact Study will identify solutions for any thermal, stability or fault duty deficiencies.

Delivery impacts are assessed during the DPP portion of 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



10-Year Assessment

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

2010

September 2010 10-Year Assessment
www.atc10yearplan.com

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 facility study is conducted in the DPP process phase to specify and estimate the time and cost of the equipment, engineering, procurement and construction of the system upgrades identified in the earlier interconnection studies.

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, seventeen new generators have gone into service and two up rates to existing generators have been completed, totaling 4,943 MW. These generators are shown in [Table PR-26](#).

[Table PR-27](#) lists the proposed generators in the generation queue for our service territory as of July 1, 2010. This table lists each proposed generation project and summarizes them by planning 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 3533.1 MW. Of that proposed capacity, 18 percent reflects new coal units; wind units reflect 75 percent; biomass reflect 2 percent; nuclear up-rates reflect 3 percent and the remaining 2 percent is comprised of simple cycle (natural gas) turbines (see [Figure PR-10](#)). Of this generation, 18 percent in Zone 5, 26 percent in Zone 4, 44 percent is proposed in Zone 3, 9 percent in Zone 2, and 3 percent in Zone 1. [Table PR-29](#) lists the required network upgrades associated with the generators shown in [Table PR-27](#) with a signed Interconnection Agreement.

The developer's projected in-service date listed in [Table PR-27](#) is the last official commercial operation in-service date provided by the developer for that request. Under the Midwest ISO's former Attachment X procedures, a developer may suspend their



Interconnection Agreement which may delay the project and is not required to update their official in-service date as part of this suspension.

The following requests have been suspended:

- G546 – 100 MW wind farm, Line 6541 in Walworth County, Wisconsin
- G590 – 98 MW wind farm, Line 971K91 in Calumet County, Wisconsin

Generation interconnection requests previously in the generation queue, which have been cancelled or removed from the queue since July 1, 2009 (because the developer withdrew the request or missed contractual milestones), are summarized in Table PR-28.

Link to publicly posted generation queue:

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 sighting 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 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 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 reliability of the northern portion of Zone 1, the Rhinelander Loop, has been significantly improved with the completion of the new Cranberry to Conover 115-kV line and the Conover to Plains 138-kV conversion. While no new generator requests have been studied for this area, the addition of the Rhinelander Loop improvement projects may be able to support small-sized (up to 50 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 stability and thermal reinforcements in and outside of the Loop would be a function of where the new generation is sited and where the power is to be delivered. These improvements will be required to ensure that NERC reliability standards are continuously being met and that the security of the Rhinelander loop is not compromised.

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 significantly strengthen the Weston area, bringing much needed support to the area for both stability and thermal considerations for the new Weston 4 generation facility. A new generating facility was studied interconnecting 50 MW of biomass generation to the 115-kV transmission system located near the Weston substation. This study proved that properly sighted generation of 50 MW or less can be accommodated to the transmission system in the area with minimal network upgrades. While the evaluation of new generation in this area is limited to this one study, it is possible that the GCMW corridor 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
J040	50 MW	Biomass	Marathon County, WI	In-Queue

Zone 2

We have completed studies of seven generation interconnection requests for the Zone 2 area. Even though the first six 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. ATC has completed studying four wind farms located in Marquette, Houghton and Delta counties totaling 379 MW. 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. Generation studies have indicated substantial re-enforcements are required to site large amounts of generation throughout the Upper Peninsula.

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-	165 or	Coal	Delta County, MI	Out of Queue



10-Year Assessment

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

2010

September 2010 10-Year Assessment
www.atc10yearplan.com

568	300 MW			
G583	19 MW	Biomass	Ontonagon County, MI	Out of Queue
G750	201 MW	Wind	Marquette County, MI	Out of Queue
G799	120 MW	Wind	Houghton County, MI	Out of Queue
G937	29 MW	Wind	Delta County	Out of Queue
J039	50 MW	Biomass	Delta County	Out of Queue
J060	29 MW	Wind	Delta County	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.

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. ATC will be extending the 345-kV network to the west side of the Madison metropolitan area and introducing additional 138-kV reinforcements and reactive support within the city to resolve these issues over the long term.

Even with the on-going reinforcement plans, Sauk County 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. Generation studies completed in the southwest corner of the state have demonstrated that sighting large amounts of generation in rural areas may require substantial upgrades to the transmission system to ensure reliable operation.



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 Service
G366	80 MW	Wind	Columbia County, WI	Out of Queue
G371	100 MW	Wind	Columbia County, WI	Out of Queue
G483	50 MW	Wind	Green County, WI	Out of Queue
G506	100 MW	Wind	Monroe County, WI	Out of Queue
G527	280 MW	Coal	Grant County, WI	Out of 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 Service
G553	280 MW	Coal	Columbia County, WI	Out of Queue
G706	99 MW	Wind	Columbia County, WI	In Queue
G724	99 MW	Wind	Dane County, WI	Out of Queue
G747	99 MW	Wind	Rock County, WI	Out of Queue
G749	50 MW	Wind	Lafayette County, WI	In Queue
G793	100 MW	Wind	Rock County, WI	Out of Queue
G901	600 MW	Wind	Winnebago County, IL	Out of Queue
G902	600 MW	Wind	Winnebago County, IL	Out of Queue
G953	49.5 MW	Wind	Grant County, WI	Out of Queue
G954	49.5 MW	Wind	Grant County, WI	Out of Queue
H012	150 MW	Wind	Columbia County, WI	In Queue
H024	48 MW	Wind	Columbia County, WI	Out of Queue
J084	50 MW	Wind	Grant 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. 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 easily accommodate 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 and the



existing generation request have demonstrated that large scale transmission projects are a must for even modest increases in existing capacity. As the system evolves, stability margins at those plants may become a concern even with the transmission improvements. Additional generation wishing to site in the area will require extensive studies to ensure that system reliability will continue to be met for the existing generators in the area.

Zone 4 completed generation studies:

Request	Size	Type	County, State	Status
G240	54 MW	Steam	Manitowoc County, WI	In Service
G353-4	145 MW	Wind	Fond du Lac County, WI	In Service
G368	129 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	Out of 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	68 MW	Wind	Fond du Lac County, WI	In Service
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
G833	53 MW	Nuclear	Manitowoc County, WI	In Queue
G834	53 MW	Nuclear	Manitowoc County, WI	In Queue
G927	1.5 MW	Wind	Calumet County, WI	In Queue
G987	400 MW	Wind	Brown County, WI	Out of Queue

Zone 5

Two major generation additions have been completed for Zone 5. The first addition is at Port Washington Power Plant, which was declared for 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 having gone into service December 2009 and the second unit due to go in-service early Fall 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	1300 MW	Coal/steam	Milwaukee County, Wisconsin	First block In Service
G093/G510	1200 MW	Combined cycle	Ozaukee County, Wisconsin	In Service

Transmission to distribution interconnections

We continue to receive numerous requests from LDC's for new transmission to distribution interconnections. These interconnection requests generally are categorized into one of four different types of projects:

1. *Constructing new T-D substations.* This type of interconnection typically involves constructing a new T-D substation to serve normal load growth. They are usually located adjacent to an existing transmission line which is tapped or looped into the new substation. However sometimes, from a Best Value Planning perspective, the optimum site for the new substation cannot be located adjacent to the transmission line and we are required to construct a transmission line to the new substation site. In these instances it may require a single circuit transmission tap to the new substation or it may require a new transmission line from two existing substations forming a new network line. Depending on the redistribution of the load and type of new interconnection, the transmission system performance may not be materially impacted. However, a new network line can have a greater impact on the transmission system performance.
2. *Adding T-D transformers at existing substations.* This type of interconnection involves 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 increase capacity by lowering the loading on existing T-D transformers to meet increasing customer demand and/or to improve reliability by providing redundancy. The addition of the new T-D transformer typically does not materially affect system performance.



10-Year Assessment

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

2010

September 2010 10-Year Assessment
www.atc10yearplan.com

3. *Replacing existing T-D transformers at existing substations or substation rebuilds.* This type of project is not technically a new interconnection since it is typically just an increase in the transformer capacity to reliably serve increasing customer demand. This type of project may also include increasing reliability by replacing old infrastructure and/or equipment at an existing substation. This type of project typically does not materially affect system performance.
4. *Economic development projects:* This type of project is designed to accommodate a large new unforeseen load. These loads may include a new industry or an existing industry that is expanding their operation. Distributed generation is also included in some of these requests. Depending on the amount of generation and the load pocket it is connecting to the transmission system may absorb some of the generation during part or all of the year. However, there may be a need for other transmission system reinforcements, besides a new substation, to reliably serve the new load.

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. Those shown are on the Project Management worksheet of the D-T queue.

Table PR-1
Projects Placed In Service Since 2009 10-Year Assessment
As of August 25, 2010

Project	Zone
Rebuild Arpin-Rocky Run 345-kV line	1
Replace Metomen 69-kV breaker	1
Construct Brandon-Fairwater 69-kV line	1
Uprate the Chandler-Delta #1 69-kV line summer emergency rating from 120 deg F to 167 deg F	2
Uprate the Chandler-Delta #2 69-kV line summer emergency rating to from 120 deg F 167 deg F	2
Install 1-8.16 MVAR capacitor bank at M38	2
Install 1-4.08 MVAR capacitor bank at L'Anse 69 kV	2
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
Install 1-4.08 MVAR capacitor banks at Osceola 69 kV	2
Install 1-8.2 MVAR capacitor bank at Hiawatha 138-kV Substation	2
Uprate the Chandler-Masonville 69-kV line summer normal and emergency ratings from 120 deg F to 167 deg F	2
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2
Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Aspen Substation	2
Uprate Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	2
Construct second Paddock-Rockdale 345-kV line and replace 345/138-kV transformer T22 at Rockdale Substation	3
Construct a Jefferson-Tyrannena-Stony Brook 138-kV line	3
Uprate X-8 Rockdale to Boxelder 138-kV line	3
Uprate Y-41 Walworth- North Lake Geneva 69-kV to achieve a 69 MVA summer emergency rating	3
Upgrade Sheepskin capacitor bank from 10.8 MVAR to 16.2 MVAR	3
Construct new Oak Ridge-Verona 138-kV line and install a 138/69-kV transformer at Verona with a 100 MVA summer normal rating	3
Uprate X-23 Colley Road-Marine 138-kV line terminals	3
Uprate Point Beach-Sheboygan Energy Center 345-kV circuit L111 to 167 degrees F	4
Install a second 138-kV reserve auxiliary transformer (RAT) at Kewaunee and remove tertiary auxiliary transformer (TAT)	4
Uprate Oak Creek-Root River 138-kV line	5
Upgrade Bain-Albers 138-kV line	5
Install 2-24.5 MVAR capacitor banks at Summit 138-kV Substation	5
Uprate Oak Creek-Nicholson 138-kV line	5

Table PR-2
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 (2010-2019)</i> in <i>Financial Table</i>
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
Install 2-8.0 MVAR capacitor bank at Indian Lake 69-kV Substation	2010	2010	2	reliability (B1)	Proposed	F2223
Install reactor at Straits Substation	2010	2010	2	reliability (B1)	Proposed	F2966
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	2010	3	reliability (69B2)	Planned	F2324
Uprate the Royster Substation terminals	2010	2010	3	reliability (B2)	Planned	F2317
Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	2017	2010	3	reliability (69B2)	Planned	F1868
Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating*	2017	2010	3	reliability (B2, 69B2)	Planned	F1444
Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	2010	2010	5	T-D interconnection	Planned	F2086

Table PR-2
Transmission System Additions for 2010 (continued)

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 (2010-2019)</i> in <i>Financial Table</i>
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Planned	F1729
Construct second Shorewood-Humboldt 138-kV underground cable*	2012	2010	5	reliability (B2)	Proposed	F2487

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 2011

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 (2010-2019)</i> in <i>Financial Table</i>
Upgrade McKenna 69-kV 6.3 MVAR capacitor bank to 15.3 MVAR and upgrade Chaffee Creek 69-kV 8.1 MVAR bank to 14.4 MVAR	2011	2011	1	reliability (69B2, 69B3)	Proposed	F2519
Replace two overhead Blount-Ruskin 69-kV lines with one underground 69-kV line	2010	2011	3	Completion of earlier project per agreement with the City of Madison	Planned	F2628
Install 2-16.33 MVAR 69-kV capacitor banks at Spring Green Substation	2011	2011	3	reliability (A, 69B3)	Planned	F2327
Install 1-32.66 MVAR 138-kV capacitor bank at Femrite Substation	2011	2011	3	reliability (A, C5)	Planned	F2516
Install 1-32.66 MVAR 138-kV capacitor bank at Kegonsa Substation	2011	2011	3	reliability (A, C5)	Planned	F3008
Rebuild Y-33 Brodhead to South Monroe 69-kV line	2011	2011	3	reliability (B2, 69B2, 69B3)	Planned	F2526
Uprate terminal limitations at McCue for the Y-79 McCue-Milton Lawns 69-kV line	2011	2011	3	reliability (69B2)	Proposed	F2405
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2011	2011	4	reliability (69B2, 69B3)	Planned	F1361

Table PR-3
Transmission System Additions for 2011 (continued)

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 (2010-2019)</i> in <i>Financial Table</i>
Reconfigure Kewaunee 345/138-kV switchyard and install a second 500 MVA 345/138-kV transformer	2011	2011	4	reliability (C3), condition	Proposed	F2437

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 2012

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 (2010-2019)</i> in <i>Financial Table</i>
Construct 115-kV line from new Woodmin Substation to the Clear Lake Substation	2012	2012	1	T-D interconnection	Proposed	F2495
Install second 138/69-kV transformer and a 138-kV ring bus at Chandler Substation	2012	2012	2	reliability (69B3)	Proposed	F3040
Relocate Engadine 69-kV load	2012	2012	2	reliability (69B2)	Provisional	F3073
Upgrade 69-kV equipment at Delta Substation	2012	2012	2	reliability (C1), operating flexibility	Proposed	F3066
Rebuild part of the Y-8 Dane-Dam Heights 69-kV line*	2015	2012	3	reliability, asset renewal, potential T-D interconnection	Planned	F1602
Construct Canal-Dunn Road 138-kV line	2012	2012	4	reliability (69A, 69B2, 69B3, 69C3)	Planned	F1358
Install 100 MVA 138/69-kV transformer at Dunn Road	2012	2012	4	reliability (69A, 69B2, 69B3, 69C3)	Planned	F1358

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 2013

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 (2010-2019)</i> in <i>Financial Table</i>
Reconfigure Petenwell 138-kV bus	2013	2013	1	reliability (C1), operating flexibility	Provisional	F3046
Construct Monroe County-Council Creek 161-kV line and Timberwolf 69-kV switching station	2013	2013	1	economics, reliability (A, B2, C3)	Proposed	F2454
Install a 161/138-kV transformer at Council Creek Substation	2013	2013	1	economics, reliability (A, B2, C3)	Proposed	F2454
Uprate Council Creek-Petenwell 138-kV line	2013	2013	1	economics, reliability (B2)	Proposed	F2454
Install 2-16.33 MVAR 69-kV capacitor banks at Nine Springs Substation	2006	2013	3	reliability (69B2)	Proposed	F2088
Uprate Fitchburg-Nine Springs 69-kV and Royster-Pflaum 69-kV lines and move AGA load to the Royster-Femrite 69-kV line	2006	2013	3	reliability (69B2)	Proposed	F2088
Install a 138/69-kV transformer at Bass Creek Substation	2010	2013	3	reliability (69B2)	Planned	F1869
Uprate X-12 Town Line Road-Bass Creek 138-kV line to 300 deg F	2010	2013	3	reliability (69B2)	Planned	F1869

Table PR-5
Transmission System Additions for 2013 (continued)

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 (2010-2019)</i> in <i>Financial Table</i>
Construct 345-kV line from Rockdale to West Middleton	2013	2013	3	reliability (B2, C5)	Planned	F1435
Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at West Middleton Substation	2013	2013	3	reliability (B2, C5)	Planned	F1435

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 2014

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 (2010-2019)</i> in <i>Financial Table</i>
Energize Hiawatha-Indian Lake at 138 kV	2014	2014	2	reliability (B2)	Provisional	F3068
Install power flow control at Straits 138-kV Substation	2010	2014	2	reliability (B1)	Provisional	F2894
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	2012	2014	2	reliability (B2)	Proposed	F2874
Rebuild Straits-Pine River lines 6904/5 for 138 kV and operate at 69 kV	2014	2014	2	reliability (B2)	Proposed	F2833
Uprate Munising-Seney-Blaney Park 69-kV line to 167 degrees F	2014	2014	2	reliability (69B2)	Provisional	F3071
Construct 18th Road-Chandler double circuit 138-kV lines and operate at 138/69	2014	2014	2	reliability (69B3)	Provisional	F3077
Construct 18th Road 138/69-kV Substation and install two 138/69-kV transformers	2014	2014	2	reliability (69B3)	Provisional	F3077
Install 1-8.16 MVAR 138-kV capacitor bank at 18th Road	2014	2014	2	reliability (69B3)	Provisional	F3077

Table PR-6
Transmission System Additions for 2014 (continued)

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 (2010-2019)</i> in <i>Financial Table</i>
Rebuild the Y-119 Verona to Oregon 69-kV line	2008	2014	3	reliability, condition (69B3, 69C3)	Proposed	F2469
Install 3-75 MVAR capacitor banks at Bluemound Substation	2012	2014	5	reliability (B1)	Provisional	F2650

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 2015

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 (2010-2019)</i> in <i>Financial Table</i>
Replace Petenwell 138/69-kV transformer	2015	2015	1	reliability (A, 69B2)	Provisional	F3036
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69-kV Substation	2015	2015	1	reliability (69B2)	Provisional	F2477
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2015	2015	1	T-D interconnection	Provisional	TBD
Construct a new Arnold 345-kV Substation and install a 345/138-kV transformer	2015	2015	2	reliability (B1)	Provisional	F3080
Uprate 6927 West Middleton-Stage Coach 69-kV line to 106 MVA SE	2015	2015	3	reliability (69B2, 69B3)	Provisional	F3103
Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	2010	2015	5	reliability (B3)	Provisional	F2539
Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962	2010	2015	5	reliability (B2)	Provisional	F2142

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 2016

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 (2010-2019)</i> in <i>Financial Table</i>
Replace existing 56 MVA Harrison 138/69-kV transformer with a 100 MVA transformer	2016	2016	1	reliability (A)	Provisional	F3063
Uprate Pine River-Nine Mile 69-kV line 6923 to 167 degrees F and Asset Renewal for 6921/3	2016	2016	2	reliability (69B2)	Proposed	F2836
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	2016	2016	3	reliability (69B2)	Proposed	F2587
Construct new 138-kV line from North Lake Geneva to South Lake Geneva Substation	2016	2016	3	reliability (69B2), T-D interconnection	Proposed	F2587

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 2017

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 (2010-2019)</i> in <i>Financial Table</i>
Replace 138/69-kV transformer at Metomen Substation	2017	2017	1	reliability (A, 69B3)	Proposed	F1867
Uprate Castle Rock-McKenna 69-kV line	2016	2017	1	reliability (69B2, 69B3)	Provisional	F2491
Install a second 138/69-kV transformer at Wautoma Substation	2018	2017	1	reliability (A, 69B2)	Provisional	F2480
Construct 69-kV double-circuit line between McCue and Lamar substations	2017	2017	3	reliability (A, 69B2), economics	Provisional	F2558
Install 2-24.5 MVAR 138-kV capacitor bank and 1-18 MVAR 69-kV capacitor bank at Brick Church substation	2017	2017	3	reliability (69B2)	Provisional	F2404

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 2018

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 (2010-2019)</i> in <i>Financial Table</i>
Replace existing Caroline 115/69-kV transformer	2018	2018	1	reliability (69B3)	Provisional	TBD
Construct Fairwater-Mackford Prairie 69-kV line	2019	2018	1	reliability (69B2)	Provisional	F2105
Convert Necedah distribution substation from 69 kV to 138 kV	2018	2018	1	reliability (69B2, 69B3)	Provisional	F2560
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	2019	2018	1	reliability (69B2)	Provisional	F2105
Rebuild Y-32 Colley Road-Brick Church 69-kV line	2013	2018	3	reliability (B2, 69B3, 69C5, C3), condition	Provisional	F1670
Install a second 100 MVA 138/69 kV transformer at Hillman Substation	2018	2018	3	reliability (69B2, 69B3)	Provisional	F0339
Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	2018	2018	3	reliability (69B3)	Provisional	F2445
Uprate Y87 North Monroe-South Monroe 69-kV line to 115 MVA SE	2018	2018	3	reliability (69B2)	Provisional	TBD

Table PR-10
Transmission System Additions for 2018 (continued)

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 (2010-2019)</i> in <i>Financial Table</i>
Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	2018	2018	3	reliability (A, B2, B3)	Provisional	F2520
Install 2-16.33 MVAR 69-kV capacitor banks at North Monroe	2018	2018	3	reliability (B2)	Provisional	F2472
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2018	2018	3 & 5	T-D interconnection, reliability (69B2)	Provisional	F2570
Construct second Dunn Road-Egg Harbor 69-kV line	2018	2018	4	reliability (69B2)	Provisional	F0181

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 2019

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 (2010-2019)</i> in <i>Financial Table</i>
Uprate Ripon-Northwest Ripon 69-kV line Y-93	2019	2019	1	reliability (69B2)	Provisional	TBD
Uprate Winneconne-Sunset Point 69-kV line Y-103	2019	2019	1	reliability (69B2)	Provisional	F3062
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	2019	2019	3	reliability (69B2)	Provisional	F2518
Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	2019	2019	3	reliability (69B3)	Provisional	F2471
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	2019	2019	3	reliability (A, B2)	Provisional	F2515
Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	2021	2019	3	reliability (B2)	Provisional	F2489
Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	2021	2019	3	reliability (69B2)	Provisional	F2153
Install 2-16.33 MVAR 69-kV capacitor banks at Dam Heights	2021	2019	3	reliability (69B2), asset renewal, potential T-D interconnection	Provisional	F2474

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 2020

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 (2010-2019)</i> in <i>Financial Table</i>
Construct Cardinal-Blount 138-kV line	2020	2020	3	reliability (C5)	Provisional	F2466
Install 2-16.33 MVAR 69-kV capacitor banks at Sun Prairie	2020	2020	3	reliability (69B2, 69B3)	Provisional	F2475
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	2020	2020	3	reliability (69B2)	Provisional	F2517
Construct a Lake Delton-Birchwood 138-kV line	2022	2020	3	reliability (B2)	Provisional	F1638
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	2020	2020	4	reliability (69B3)	Provisional	F2079
Upgrade Oak Creek-Pennsylvania 138-kV line	2021	2020	5	reliability (B2)	Provisional	F2473
Install 2-32 Mvar capacitor banks at Mukwonago 138-kV Substation	2021	2020	5	reliability (B2)	Provisional	F2493

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 beyond 2020

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 (2010-2019)</i> in <i>Financial Table</i>
Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	2022	2022	3	reliability (69B2)	Provisional	F2092
Construct a Hubbard-East Beaver Dam 138-kV line	2022	2022	3	reliability (B2)	Provisional	F1640
Construct Shoto to Custer 138-kV line	2022	2022	4	reliability (69B2, 69B3)	Provisional	F2081
Install 138/69-kV transformer at Custer Substation	2022	2022	4	reliability (69B2, 69B3)	Provisional	F2081
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	2024	2024	4	reliability (69B3)	Provisional	F2080
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	2025	2025	3	reliability (B2)	Provisional	F2093
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F and asset renewal	2009	TBD	2	reliability (69B2)	Provisional	TBD
Construct Gwinn-Forsyth second 69-kV line	2016	TBD	2	reliability (69B2)	Provisional	TBD
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	TBD	TBD	3	reliability (B3)	Provisional	F2135

Table PR-13
Transmission System Additions beyond 2020 (continued)

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 (2010-2019)</i> in <i>Financial Table</i>
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

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Upgrade McKenna 6.3 MVAR capacitor bank to 15.3 MVAR and upgrade Chaffee Creek 8.1 MVAR bank to 14.4 MVAR	2011	2011	1	reliability (69B2, 69B3)	Proposed
Construct 115-kV line from new Woodmin Substation to the Clear Lake Substation	2012	2012	1	T-D interconnection	Proposed
Reconfigure Petenwell 138-kV bus	2013	2013	1	reliability (C1), operating flexibility	Provisional
Construct Monroe County-Council Creek 161-kV line and Timberwolf 69-kV switching station	2013	2013	1	economics, reliability (A, B2, C3)	Proposed
Install a 161/138-kV transformer at Council Creek Substation	2013	2013	1	economics, reliability (A, B2, C3)	Proposed
Upgrade Council Creek-Petenwell 138-kV line	2013	2013	1	economics, reliability (B2)	Proposed
Replace Petenwell 138/69-kV transformer	2015	2015	1	reliability (A, 69B2)	Provisional
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2015	2015	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	2015	2015	1	reliability (69B2)	Provisional
Replace existing 56 MVA Harrison 138/69-kV transformer with a 100 MVA transformer	2016	2016	1	reliability (A)	Provisional
Replace 138/69-kV transformer at Metomen Substation	2017	2017	1	reliability (A, 69B3)	Proposed

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
Uprate Castle Rock-McKenna 69-kV line	2016	2017	1	reliability (69B2, 69B3)	Provisional
Install a second 138/69-kV transformer at Wautoma Substation	2018	2017	1	reliability (A, 69B2)	Provisional
Replace existing Caroline 115/69-kV transformer	2018	2018	1	reliability (69B3)	Provisional
Construct Fairwater-Mackford Prairie 69-kV line	2019	2018	1	reliability (69B2)	Provisional
Convert Necedah distribution substation from 69 kV to 138 kV	2018	2018	1	reliability (69B2, 69B3)	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	2019	2018	1	reliability (69B2)	Provisional
Uprate Ripon-Northwest Ripon 69-kV line Y-93	2019	2019	1	reliability (69B2)	Provisional
Uprate Winneconne-Sunset Point 69-kV line Y-103	2019	2019	1	reliability (69B2)	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 2-8.0 MVAR capacitor bank at Indian Lake 69-kV Substation	2010	2010	2	reliability (B1)	Proposed
Install reactor at Straits Substation	2010	2010	2	reliability (B1)	Proposed
Install second 138/69-kV transformer and a 138-kV ring bus at Chandler Substation	2012	2012	2	reliability (69B3)	Proposed
Relocate Engadine 69-kV load	2012	2012	2	reliability (69B2)	Provisional
Upgrade 69-kV equipment at Delta Substation	2012	2012	2	reliability (C1), operating flexibility	Proposed
Energize Hiawatha-Indian Lake at 138 kV	2014	2014	2	reliability (B2)	Provisional
Install power flow control at Straits 138-kV Substation	2010	2014	2	reliability (B1)	Provisional

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
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	2012	2014	2	reliability (B2)	Proposed
Rebuild Straits-Pine River lines 6904/5 for 138 kV and operate at 69 kV	2014	2014	2	reliability (B2)	Proposed
Uprate Munising-Seney-Blaney Park 69-kV line to 167 degrees F	2014	2014	2	reliability (69B2)	Provisional
Construct 18th Road-Chandler double circuit 138-kV lines and operate at 138/69	2014	2014	2	reliability (69B3)	Provisional
Construct 18th Road 138/69-kV Substation and install two 138/69-kV transformers	2014	2014	2	reliability (69B3)	Provisional
Install 1-8.16 MVAR 138-kV capacitor bank at 18th Road	2014	2014	2	reliability (69B3)	Provisional
Construct a new Arnold 345-kV Substation and install a 345/138-kV transformer	2015	2015	2	reliability (B1)	Provisional
Uprate Pine River-Nine Mile 69-kV line 6923 to 167 degrees F and Asset Renewal for 6921/3	2016	2016	2	reliability (69B2)	Proposed
Construct Gwinn-Forsyth second 69-kV line	2016	TBD	2	reliability (69B2)	Provisional
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F and minimum asset renewal	2009	TBD	2	reliability (69B2)	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
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	2010	3	reliability (69B2)	Planned
Uprate the Royster Substation terminals	2010	2010	3	reliability (B2)	Planned
Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	2017	2010	3	reliability (69B2)	Planned
Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating*	2017	2010	3	reliability (B2, 69B2)	Planned
Replace two overhead Blount-Ruskin 69-kV lines with one underground 69-kV line	2010	2011	3	Completion of earlier project per agreement with the City of Madison	Planned
Install 2-16.33 MVAR 69-kV capacitor banks at Spring Green Substation	2011	2011	3	reliability (A, 69B3)	Planned
Install 1-32.66 MVAR 138-kV capacitor bank at Femrite Substation	2011	2011	3	reliability (A, C5)	Planned
Install 1-32.66 MVAR 138-kV capacitor bank at Kegonsa Substation	2011	2011	3	reliability (A, C5)	Planned
Rebuild Y-33 Brodhead to South Monroe 69-kV line	2011	2011	3	reliability (B2, 69B2, 69B3)	Planned
Uprate terminal limitations at McCue for the Y-79 McCue-Milton Lawns 69-kV line	2011	2011	3	reliability (69B2)	Proposed
Rebuild part of the Y-8 Dane-Dam Heights 69-kV line*	2015	2012	3	reliability, asset renewal, potential T-D interconnection	Planned

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
Install 2-16.33 MVAR 69-kV capacitor banks at Nine Springs Substation	2006	2013	3	reliability (69B2)	Proposed
Uprate Fitchburg-Nine Springs 69-kV and Royster-Pflaum 69-kV lines and move AGA load to the Royster-Femrite 69-kV line	2006	2013	3	reliability (69B2)	Proposed
Install a 138/69-kV transformer at Bass Creek Substation	2010	2013	3	reliability (69B2)	Planned
Uprate X-12 Town Line Road-Bass Creek 138-kV line to 300 deg F	2010	2013	3	reliability (69B2)	Planned
Construct 345-kV line from Rockdale to West Middleton	2013	2013	3	reliability (B2, C5)	Planned
Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at West Middleton Substation	2013	2013	3	reliability (B2, C5)	Planned
Rebuild the Y-119 Verona to Oregon 69-kV line	2008	2014	3	reliability, condition (69B3, 69C3)	Proposed
Uprate 6927 West Middleton-Stage Coach 69-kV line to 106 MVA SE	2015	2015	3	reliability (69B2, 69B3)	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
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	2016	2016	3	reliability (69B2)	Proposed
Construct new 138-kV line from North Lake Geneva to South Lake Geneva Substation	2016	2016	3	reliability (69B2), T-D interconnection	Proposed
Construct 69-kV double-circuit line between McCue and Lamar substations	2017	2017	3	reliability (A, 69B2), economics	Provisional
Install 2-24.5 MVAR 138-kV capacitor bank and 1-18 MVAR 69-kV capacitor bank at Brick Church substation	2017	2017	3	reliability (69B2)	Provisional
Rebuild Y-32 Colley Road-Brick Church 69-kV line	2013	2018	3	reliability (B2, 69B3, 69C5, C3) condition	Provisional
Install a second 100 MVA 138/69 kV transformer at Hillman Substation	2018	2018	3	reliability (69B2, 69B3)	Provisional
Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	2018	2018	3	reliability (69B3)	Provisional
Uprate Y87 North Monroe-South Monroe 69-kV line to 115 MVA SE	2018	2018	3	reliability (69B2)	Provisional
Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	2018	2018	3	reliability (A, B2, B3)	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at North Monroe	2018	2018	3	reliability (B2)	Provisional
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2018	2018	3 & 5	T-D interconnection, reliability (69B2)	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
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	2019	2019	3	reliability (69B2)	Provisional
Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	2019	2019	3	reliability (69B3)	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	2019	2019	3	reliability (A, B2)	Provisional
Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	2021	2019	3	reliability (B2)	Provisional
Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	2021	2019	3	reliability (69B2)	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at Dam Heights	2021	2019	3	reliability (69B2), asset renewal, potential T-D interconnection	Provisional
Construct Cardinal-Blount 138-kV line	2020	2020	3	reliability (C5)	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at Sun Prairie	2020	2020	3	reliability (69B2, 69B3)	Provisional
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	2020	2020	3	reliability (69B2)	Provisional
Construct a Lake Delton-Birchwood 138-kV line	2022	2020	3	reliability (B2)	Provisional
Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	2022	2022	3	reliability (69B2)	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
Construct a Hubbard-East Beaver Dam 138-kV line	2022	2022	3	reliability (B2)	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	2025	2025	3	reliability (B2)	Provisional
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	TBD	TBD	3	reliability (B3)	Provisional

Table PR-17
Zone 4 Transmission System Additions

System Additions	System Need Year	Projected In-Service Year	Planning Zone	Need Category	Planned, Proposed or Provisional
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2011	2011	4	reliability (69B2, 69B3)	Planned
Reconfigure Kewaunee 345/138-kV switchyard and install a second 500 MVA 345/138-kV transformer	2011	2011	4	reliability (C3), condition	Proposed
Construct Canal-Dunn Road 138-kV line	2012	2012	4	reliability (69A, 69B2, 69B3, 69C3)	Proposed
Install 100 MVA 138/69-kV transformer at Dunn Road	2012	2012	4	reliability (69A, 69B2, 69B3, 69C3)	Proposed
Construct second Dunn Road-Egg Harbor 69-kV line	2018	2018	4	reliability (69B2)	Provisional
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	2020	2020	4	reliability (69B3)	Provisional
Construct Shoto to Custer 138-kV line	2022	2022	4	reliability (69B2, 69B3)	Provisional
Install 138/69-kV transformer at Custer Substation	2022	2022	4	reliability (69B2, 69B3)	Provisional
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	2024	2024	4	reliability (69B3)	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
Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	2010	2010	5	T-D interconnection	Planned
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Planned
Construct second Shorewood-Humboldt 138-kV underground cable*	2012	2010	5	reliability (B2)	Proposed
Install 3-75 MVAR capacitor banks at Bluemound Substation	2012	2014	5	reliability (B1)	Provisional
Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	2010	2015	5	reliability (B3)	Provisional
Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962	2010	2015	5	reliability (B2)	Provisional
Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	2018	2018	3 & 5	T-D interconnection, reliability (69B2)	Provisional
Upgrade Oak Creek-Pennsylvania 138-kV line	2021	2020	5	reliability (B2)	Provisional
Install 2-32 MVAR capacitor banks at Mukwonago 138-kV Substation	2021	2020	5	reliability (B2)	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			
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 115-kV line from new Woodmin Substation to the Clear Lake Substation	7.5	7.5	2012	2012	1
relieve overloads or low voltages under contingency (B2, C5)	Construct 345-kV line from Rockdale to West Middleton	32.4	32.4	2013	2013	3
relieve overloads or low voltages under contingency (69B3)	Construct 18th Road-Chandler double circuit 138-kV lines and operate at 138/69	4	4	2014	2014	2
T-D interconnection request	Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	1.5	1.5	2015	2015	1
relieve overloads or low voltages under contingency (69B2), T-D interconnection request	Construct new 138-kV line from North Lake Geneva to South Lake Geneva Substation	3.4	3.4	2016	2016	3
relieve overloads or low voltages under contingency (69B2)	Construct Fairwater-Mackford Prairie 69-kV line	5	5	2019	2018	1
relieve overloads or low voltages under contingency (69B2)	Construct second Dunn Road-Egg Harbor 69-kV line	12.66	12.66	2018	2018	4
T-D interconnection request,relieve overloads or low voltages under contingency (69B2)	Construct Spring Valley-Twin Lakes-South Lake Geneva 138-kV line	24.0	15	2018	2018	3 & 5
relieve overloads or low voltages under contingency (69B2, 69B3)	Construct Shoto to Custer 138-kV line	6.9	6.9	2022	2022	4
relieve overloads or low voltages under contingency (B2)	Construct a Hubbard-East Beaver Dam 138-kV line	10	10	2022	2022	3
relieve overloads or low voltages under contingency (B2)	Construct a Lake Delton-Birchwood 138-kV line	5	5	2022	2020	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
relieve overloads or low voltages under contingency (B2)	Construct second Shorewood-Humboldt 138-kV underground cable	0.75	2012	2010	5
Completion of earlier project per agreement with the City of Madison	Replace two overhead Blount-Ruskin 69-kV lines with one underground 69-kV line	2	2010	2011	3
relieve overloads or low voltages under contingency (B2, 69B2, 69B3)	Rebuild Y-33 Brodhead to South Monroe 69-kV line	18	2011	2011	3
relieve overloads or low voltages under contingency (69B3)	Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2.37	2011	2011	4
relieve overloads or low voltages under contingency (69A, 69B2, 69B3, 69C3)	Construct Canal-Dunn Road 138-kV line	7.64	2012	2012	4
relieve overloads or low voltages under contingency, asset renewal, potential T-D interconnection request	Rebuild part of the Y-8 Dane-Dam Heights 69-kV line	5	2015	2012	3
economics, relieve overloads or low voltages under contingency (B2, C3)	Construct Monroe County-Council Creek 161-kV line and Timberwolf 69-kV switching station	17.9	2013	2013	1
economics, relieve overloads or low voltages under contingency (C1)	Uprate Council Creek-Petenwell 138-kV line	32	2013	2013	1
relieve overloads or low voltages under contingency (B2)	Energize Hiawatha-Indian Lake at 138 kV	40	2014	2014	2
relieve overloads or low voltages under contingency (B2)	Rebuild Straits-Pine River lines 6904/5 for 138 kV and operate at 69 kV	25.3	2014	2014	2
relieve overloads or low voltages under contingency (69B2)	Uprate Munising-Seney-Blanney Park 69-kV line to 167 degrees F	52	2014	2014	2
relieve overloads or low voltages under contingency, replace aging facilities (69B3, 69C3)	Rebuild the Y-119 Verona to Oregon 69-kV line	11	2008	2014	3
relieve overloads or low voltages under contingency (69B2)	Uprate Pine River-Nine Mile 69-kV line 6923 to 167 degrees F and minimum Asset Renewal for 6921/3	16.4	2016	2016	2
relieve overloads or low voltages under contingency (A, 69B2)	Construct 69-kV double-circuit line between McCue and Lamar substations	4.0	2017	2017	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
relieve overloads or low voltages under contingency (B2, 69B3, 69C5, C3) replace aging facilities	Rebuild Y-32 Colley Road-Brick Church 69-kV line	19.7	2013	2018	3
relieve overloads or low voltages under contingency (69B3)	Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	3.35	2019	2019	3
relieve overloads or low voltages under contingency (C5)	Construct Cardinal-Blount 138-kV line	5	2020	2020	3
relieve overloads or low voltages under contingency (69B2)	Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F and minimum asset renewal	22	2009	TBD	2
relieve overloads or low voltages under contingency (69B2)	Construct Gwinn-Forsyth second 69-kV line	1	2016	TBD	2
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			
relieve overloads under contingency (69B3)	Install second 138/69-kV transformer and a 138-kV ring bus at Chandler Substation	60	0	2012	2012	2
relieve overloads under contingency (C3), 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 (69A, 69B2, 69B3, 69C3)	Install 100 MVA 138/69-kV transformer at Dunn Road	100	0	2012	2012	4
economics, relieve overloads under contingency (B2, C3)	Install a 161/138-kV transformer at Council Creek Substation	100	0	2013	2013	1
relieve overloads under contingency (69B2)	Install a 138/69-kV transformer at Bass Creek Substation	100	0	2010	2013	3
relieve overloads under contingency (B2, C5)	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 (69B3)	Construct 18th Road 138/69-kV Substation and install two 138/69-kV transformers	120	0	2014	2014	2
relieve overloads under contingency (B2)	Install 138/69-kV 150 MVA transformer at Nine Mile	150	0	2014	2014	2
relieve overloads under contingency (B2)	Install 138/69-kV 150 MVA transformer at Pine River	150	0	2014	2014	2
relieve overloads under contingency (A, 69B2)	Replace Petenwell 138/69-kV transformer	60	33.0	2015	2015	1
relieve overloads under contingency (B1)	Construct a new Arnold 345-kV Substation and install a 345/138-kV transformer	500	0	2015	2015	2
relieve overloads under contingency (B3)	Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	500	672	2010	2015	5
relieve overloads under contingency (A)	Replace existing 56 MVA Harrison 138/69-kV transformer with a 100 MVA transformer	100	56	2016	2016	1
relieve overloads under contingency (69B2)	Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	100	0	2016	2016	35
relieve overloads under contingency (A, 69B3)	Replace 138/69-kV transformer at Metomen Substation	100	47	2017	2017	1
relieve overloads under contingency (A, 69B2)	Install a second 138/69-kV transformer at Wautoma Substation	100	0	2018	2017	1
relieve overloads under contingency (69B3)	Replace existing Caroline 115/69-kV transformer	60	33	2018	2018	1

**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 (69B2, 69B3)	Convert Necedah distribution substation from 69 kV to 138 kV	N/A	N/A	2018	2018	1
relieve overloads under contingency (69B2, 69B3)	Install a second 100 MVA 138/69 kV transformer at Hillman Substation	100	0	2018	2018	3
relieve overloads under contingency (69B3)	Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	100	0	2018	2018	3
relieve overloads under contingency (69B3)	Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	200	116	2020	2020	4
relieve overloads under contingency (69B2, 69B3)	Install 138/69-kV transformer at Custer Substation	100	0	2022	2022	4
relieve overloads under contingency (69B3)	Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	200	142	2024	2024	4
relieve overloads under contingency (B2)	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	0	2025	2025	31
relieve overloads under contingency (B3)	Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	527	400	TBD	TBD	31

**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 (B1)	Install 2-8.0 MVAR capacitor bank at Indian Lake 69-kV Substation	16.33	2010	2010	2
relieve overloads or low voltages under contingency (B1)	Install reactor at Straits Substation	N/A	2010	2010	2
relieve overloads or low voltages under contingency (B2)	Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	N/A	2012	2010	2
relieve overloads or low voltages under contingency (69B2)	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	2010	3
relieve overloads or low voltages under contingency (B2)	Uprate the Royster Substation terminals	N/A	2010	2010	3
relieve overloads or low voltages under contingency (69B2)	Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	N/A	2017	2010	3
relieve overloads or low voltages under contingency (B2, 69B2)	Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating*	N/A	2017	2010	3
T-D interconnection request	Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	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
relieve overloads or low voltages under contingency (69B2)	Upgrade McKenna 6.3 MVAR capacitor bank to 15.3 MVAR and upgrade Chaffee Creek 8.1 MVAR bank to 14.4 MVAR	29.7	2011	2011	1
relieve overloads or low voltages under contingency (A, 69B3)	Install 2-16.33 MVAR 69-kV capacitor banks at Spring Green Substation	32.66	2011	2011	3
relieve overloads or low voltages under contingency (A, C5)	Install 1-32.66 MVAR 138-kV capacitor bank at Femrite Substation	32.66	2011	2011	3
relieve overloads or low voltages under contingency (A, C5)	Install 1-32.66 MVAR 138-kV capacitor bank at Kegonsa Substation	32.66	2011	2011	3
relieve overloads or low voltages under contingency (69B2)	Uprate terminal limitations at McCue for the Y-79 McCue-Milton Lawns 69-kV line	N/A	2011	2011	35
relieve overloads or low voltages under contingency (69B2)	Relocate Engadine 69-kV load	N/A	2012	2012	2
relieve overloads or low voltages under contingency (C1)	Reconfigure Petenwell 138-kV bus	N/A	2013	2013	1

**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 (69B2)	Install 2-16.33 MVAR 69-kV capacitor banks at Nine Springs Substation	32.66	2006	2013	3
relieve overloads or low voltages under contingency (69B2)	Uprate Fitchburg-Nine Springs 69-kV and Royster-Pflaum 69-kV lines and move AGA load to the Royster-Femrite 69-kV line	N/A	2006	2013	3
relieve overloads or low voltages under contingency (69B2)	Uprate X-12 Town Line Road-Bass Creek 138-kV line to 300 deg F	N/A	2010	2013	3
relieve overloads or low voltages under contingency (B1)	Install power flow control at Straits 138-kV Substation	N/A	2010	2014	2
relieve overloads or low voltages under contingency (69B3)	Install 1-8.16 MVAR 138-kV capacitor banks at 18th Road	8.16	2014	2014	2
reliability (C1), operating flexibility	Upgrade 69-kV equipment at Delta Substation	N/A	2012	2012	2
relieve overloads or low voltages under contingency (B1)	Install 3-75 MVAR capacitor banks at Bluemound Substation	225	2012	2014	5
relieve overloads or low voltages under contingency (69B2)	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	2015	2015	1
relieve overloads or low voltages under contingency (69B2, 69B3)	Uprate 6927 West Middleton-Stage Coach 69-kV line to 106 MVA SE	N/A	2015	2015	3
relieve overloads or low voltages under contingency (B2)	Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962 (What the gens will they be available talk to WE)	N/A	2010	2015	5
relieve overloads or low voltages under contingency (69B2, 69B3)	Uprate Castle Rock-Mckenna 69-kV line	N/A	2016	2017	1
relieve overloads or low voltages under contingency (69B2)	Install 2-24.5 Mvar 138-kV capacitor bank and 1-18 Mvar 69-kV capacitor bank at Brick Church substation	67	2017	2017	35
relieve overloads or low voltages under contingency (69B2)	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	N/A	2019	2018	1
relieve overloads or low voltages under contingency (69B2)	Uprate Y87 North Monroe-South Monroe 69-kV line to 115 MVA SE	N/A	2018	2018	3
relieve overloads or low voltages under contingency (A, B2, B3)	Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	16.33	2018	2018	3
relieve overloads or low voltages under contingency (B2)	Install 2-16.33 Mvar 69-kV capacitor banks at North Monroe	32.66	2018	2018	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 (69B2)	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	10.92	2019	2019	3
relieve overloads or low voltages under contingency (A, B2)	Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	32.66	2019	2019	3
relieve overloads or low voltages under contingency (B2)	Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	196	2021	2019	35
relieve overloads or low voltages under contingency (69B2)	Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	N/A	2021	2019	35
relieve overloads or low voltages under contingency (69B2)	Uprate Ripon-Northwest Ripon 69-kV line Y-93	N/A	2019	2019	1
relieve overloads or low voltages under contingency (69B2)	Uprate Winneconne-Sunset Point 69-kV line Y-103	N/A	2019	2019	1
reliability (69B2), asset renewal, potential T-D interconnection	Install 2-16.33 Mvar 69-kV capacitor banks at Dam Heights	32.66	2021	2019	31
relieve overloads or low voltages under contingency (69B2, 69B3)	Install 2-16.33 Mvar 69-kV capacitor banks at Sun Prairie	32.66	2020	2020	3
relieve overloads or low voltages under contingency (69B2)	Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	24.5	2020	2020	3
relieve overloads or low voltages under contingency (B2)	Upgrade Oak Creek-Pennsylvania 138-kV line	N/A	2021	2020	5
relieve overloads or low voltages under contingency (B2)	Install 2-32 Mvar capacitor banks at Mukwonago 138-kV Substation	64	2021	2020	5
relieve overloads or low voltages under contingency (69B2)	Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	N/A	2022	2022	31

Table PR-23**Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2010 10-Year Assessment**

PROJECTS CANCELED	Former In-Service Date	Planning Zone	Reason for Removal
Install 1-4.08 MVAR capacitor bank at North Bluff 69-kV Substation	2011	2	Updated load/model information
Rebuild/convert Bayport – Suamico – Sobieski – Pioneer 69-kV line to 138 kV	2020	4	Updated load/model information
Install 28.8 MVAR capacitor bank at Butternut 138-kV Substation	2020	4	Updated load/model information
Uprate the Melissa-Tayco to 229 MVA (300F)	2020	4	Updated load/model information
Install 2-16.33 MVAR 69-kV capacitor banks at Rio	2022	3	Updated load/model information
Install 2-16.33 MVAR 69-kV capacitor banks and 2-24.5 MVAR 138-kV capacitor banks at Femrite Substation	2014	3	Replaced with a similar Femrite capacitor bank project
Install a 12.2 MVAR capacitor bank at Hilltop 69-kV Substation	2023	1	Updated load/model information
Rebuild Pine River-Nine Mile lines 6921 and 6923 to 138/69-kV double-circuit line	2012	2	Uncertain status of Kinross load
Install 138/69-kV 150 MVA transformer at Nine Mile	2012	2	Uncertain status of Kinross load
Install 138/69-kV 150 MVA transformer at Pine River	2012	2	Uncertain status of Kinross load
Construct tap from Kinross load to Pine River/Nine Mile 69-kV line	2012	2	Uncertain status of Kinross load
PROJECTS DEFERRED	New Date	Planning Zone	Reason for Deferral
Install 2-16.33 MVAR 69-kV capacitor banks at Spring Green Substation	2011	3	Was 2010; resource scheduling requirements
Install second 138/69-kV transformer and a 138-kV ring bus at Chandler Substation	2012	2	Was 2011 and a transformer at Lakehead; delay due to resource scheduling requirements
Rebuild Straits-Pine River lines 6904/5 for 138 kV and operate at 69 kV	2014	2	Was 2012; uncertain status of Kinross load

Table PR-23**Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2010 10-Year Assessment**

PROJECTS DEFERRED	New date	Planning Zone	Reason for Deferral
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	2014	2	Was 2012; resource scheduling requirements
Rebuild the Y-119 Verona to Oregon 69-kV line	2014	3	Was 2011; updated load information and pending rating validation
Install 3-75 MVAR capacitor banks at Bluemound Substation	2014	5	Was 2012; updated load/model information
Uprate Arcadian-Waukesha 138-kV lines KK9942/KK9962	2015	5	Was 2013; updated load/model information
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2015	1	Was 2014; customer postponed interconnection
Replace two existing 345/138-kV transformers at Arcadian Substation with 1-500 MVA transformer	2015	5	Was 2013; updated load/model information
Install 2-24.5 Mvar 138-kV capacitor bank and 1-18 Mvar 69-kV capacitor bank at Brick Church substation	2017	3	Was 2011; updated study results
Install a second 100 MVA 138/69 kV transformer at Hillman Substation	2018	3	Was 2015 replace existing xfmr; updated load/model information
Rebuild Y-32 Colley Road-Brick Church 69-kV line	2018	3	Was 2013; updated study results
Install a second 138/69-kV transformer at Spring Green with a 100 MVA summer normal rating	2018	3	Was 2016; updated load/model information
Install 1-16.33 MVAR 69-kV capacitor bank at Verona Substation	2018	3	Was 2014; updated load/model information
Construct second Dunn Road-Egg Harbor 69-kV line	2018	4	Was 2016; updated load/model information
Uprate Y159 Brick Church-Walworth 69-kV line to 115 MVA	2019	3	Was 2017; updated load/model information
Uprate the 6986 Royster to Sycamore 69-kV line to 115 MVA	2019	3	Was 2016; updated load/model information
Install 2-16.33 MVAR 69-kV capacitor banks at Dam Heights	2019	3	Was 2017; updated load/model information
Install 4-49 MVAR 138-kV capacitor banks at Concord Substation	2019	3	Was 2016; updated load/model information

Table PR-23**Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2010 10-Year Assessment**

PROJECTS DEFERRED (continued)	New date	Planning Zone	Reason for Deferral
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	2019	3	Was 2016; updated load/model information
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	2019	3	Was 2015; updated load/model information
Construct a Lake Delton-Birchwood 138-kV line	2020	3	Was 2017; updated load/model information
Construct Cardinal-Blount 138-kV line	2020	3	Was 2017; updated load/model information
Install 2-16.33 MVAR 69-kV capacitor banks at Sun Prairie	2020	3	Was 2016; updated load/model information
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	2020	3	Was 2017; updated load/model information
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	2020	4	Was 2016; updated load/model information
Upgrade Oak Creek-Pennsylvania 138-kV line	2020	5	Was 2015; updated load/model information
Install 2-32 MVAR capacitor banks at Mukwonago 138-kV Substation	2020	5	Was 2019; updated load/model information
Construct a Hubbard-East Beaver Dam 138-kV line	2022	3	Was 2019, was Horicon-East Beaver Dam; updated load/model information
Upgrade X-67 Portage-Trienda 138-kV line to 373 MVA	2022	3	Was 2016; updated load/model information
Construct Shoto to Custer 138-kV line	2022	4	Was 2020; updated load/model information
Install 138/69-kV transformer at Custer Substation	2022	4	Was 2020; updated load/model information
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	2024	4	Was 2018; updated load/model information

Table PR-23**Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2010 10-Year Assessment**

PROJECTS DEFERRED (continued)	New date	Planning Zone	Reason for Deferral
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	2025	3	Was 2021; updated load/model information
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F and minimum asset renewal	TBD	2	Was 2013; updating study results
Construct Gwinn-Forsyth second 69-kV line	TBD	2	Was 2014; updating study results
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	TBD	3	Was 2015; updated load/model information
OTHER PROJECT CHANGES AND POSSIBLE CHANGES	Date	Planning Zone	Nature of Change or Update
Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating	2010	3	Was 2017; advanced to uprate in conjunction with another project
Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	2010	3	Was 2017; advanced to uprate in conjunction with another project
Upgrade McKenna 6.3 MVAR capacitor bank to 15.3 MVAR and upgrade Chaffee Creek 8.1 MVAR bank to 14.4 MVAR	2011	1	Was two banks at McKenna in 2013; advanced due to updated scope of project and related study results
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69-kV Substation	2015	1	Was 2016; updated load/model information
Install 2-8.0 MVAR capacitor bank at Indian Lake 69-kV Substation	2010	2	Was 1-16.33 MVAR capacitor banks
Rebuild part of the Y-8 Dane-Dam Heights 69-kV line	2012	3	Was provisional status, now proposed

Table PR-23**Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2010 10-Year Assessment**

NEW PROJECTS	In-Service Date	Planning Zone	Reason for Project
Install reactors at Straits Substation	2010	2	reliability
Install 1-32.66 MVAR 138-kV capacitor bank at Femrite Substation	2011	3	reliability
Install 1-32.66 MVAR 138-kV capacitor bank at Kegonsa Substation	2011	3	reliability
Upgrade 69-kV equipment at Delta Substation	2012	2	reliability, operating flexibility
Relocate Engadine 69-kV load	2012	2	reliability
Reconfigure Petenwell 138-kV bus	2013	1	reliability, operating flexibility
Install power flow control at Straits 138-kV Substation	2014	2	reliability
Energize Hiawatha-Indian Lake at 138 kV	2014	2	reliability
Construct 18th Road-Chandler double circuit 138-kV lines and operate at 138/69	2014	2	reliability
Construct 18th Road 138/69-kV Substation and install two 138/69-kV transformers	2014	2	reliability
Install 1-8.16 MVAR 138-kV capacitor banks at 18th Road	2014	2	reliability
Replace Petenwell 138/69-kV transformer	2015	1	reliability
Construct a new Arnold 345-kV Substation and install a 345/138-kV transformer	2015	2	reliability
Uprate 6927 West Middleton-Stage Coach 69-kV line to 106 MVA SE	2015	3	reliability
Replace existing 56 MVA Harrison 138/69-kV transformer with a 100 MVA transformer	2016	1	reliability
Uprate Pine River-Nine Mile 69-kV line 6923 to 167 degrees F and asset renewal for 6921/3	2016	2	reliability, condition
Replace existing Caroline 115/69-kV transformer	2018	1	reliability

Table PR-23

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2010 10-Year Assessment

NEW PROJECTS (continued)	In-Service Date	Planning Zone	Reason for Project
Uprate Y87 North Monroe-South Monroe 69-kV line to 115 MVA SE	2018	3	reliability
Uprate Winneconne-Sunset Point 69-kV line Y-103	2019	1	reliability
Uprate Ripon-Northwest Ripon 69-kV line Y-93	2019	1	reliability

*Table PR-24
Projects In Design or Construction*

Project	Zone
Construct 69-kV line from new Warrens Substation to the Council Creek-Tunnel City 69-kV line	1
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	3
Uprate the Royster Substation terminals	3
Uprate Y-61 Sheepskin-Dana 69-kV line to 95 MVA	3
Uprate Y-40 Gran Grae-Boscobel 69-kV line to achieve a 99 MVA summer emergency rating*	3
Rebuild Y-33 Brodhead to South Monroe 69-kV line	3
Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	5
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	5

*Table PR-25
Projects Awaiting Regulatory Review/Approval*

Project	Zone
Construct 115-kV line from new Woodmin Substation to the Clear Lake Substation	1
Construct Monroe County-Council Creek 161-kV line and Timberwolf 69-kV switching station	1

Table PR-25a
Projects approved but not yet under construction

Project	Zone
Construct 345-kV line from Rockdale to West Middleton	3
Construct Canal-Dunn Road 138-kV line	4

*Table PR-26
Former Generator Requests Now In-Service*

<u>Date</u>	<u>Requests on-line</u>	<u>Megawatts</u>
6/14/01	IC006 (Eden/Little Badger)	31
2001	G074 (Combined Locks)	53
6/1/03	G111 (Pulliam CT)	85
6/1/03	G148 (Petenwell/Big Pond)	19.5
3/19/04	G165 & G383 (Kewaunee uprate)	43
6/1/04	G225 (Kaukauna CT)	60
6/15/04	G035 & G072 (Riverside)	655
5/1/05	G096 & G160 (West Campus)	150
6/1/05	G044 (Fox Energy)	602
6/2/05	G103 (Sheboygan)	370
7/16/05, 9/1/06, 6/1/08,	G014 & G093 (Port Washington) G510 (Port Washington increase)	1200
4/1/07	G240 (Manitowoc)	54
5/07, 6/09	G550 (Concord uprate)	24
4/30/08	G353 & G354 (Cypress)	145
3/31/08	G368 (Forward)	129
6/26/08	G144 (Weston)	550
12/11/08	G507 & G507B (Cedar Ridge)	68
3/16/09	G338 (Butler Ridge)	54
12/29/09	G051 (Oak Creek)	650

Table PR-27
Proposed Projects Active in the Generation Queue as of July 1, 2010

Zone	Queue #	County	Project capacity	Interconnection voltage	Generator technology and fuel	Developer projected in-service date
1	G588	Wood	55 MW	115 kV	simple cycle/gas	5/10
1	J040	Marathon	50 MW	115 kV	biomass	12/13
1	Total		105 MW			
2	J060	Delta	29 MW	138 kV	wind turbine	12/11
2	J061	Delta	71 MW	138 kV	wind turbine	12/13
2	J066	Chippewa	60 MW	69 or 138 kV	wind turbine	8/11
2	J119	Chippewa	120.6 MW	69 or 138 kV	wind turbine	7/12
2	J078	Marquette	26 MW	69 kV	Bio mass	7/11
2	Total		306.6 MW			
3	G282/J109	Lafayette	99 MW	138 kV	wind turbine	12/10 12/12
3	G546	Walworth	100 MW	138 kV	wind turbine	12/10 suspended
3	G706/H012	Columbia	249 MW	138 kV	wind turbine	3/11
3	G749	Lafayette	50 MW	69 or 138 kV	wind turbine	8/10
3	J084	Grant	50 MW	69 kV	wind turbine	12/12
3	J116	Dane	999 MW	345 kV	wind turbine	9/13
3	Total		1547 MW			
4	G376	Green Lake/Fond du Lac	160 MW	138 kV	wind turbine	9/10
4	G427	Fond du Lac	98 MW	345 kV	wind turbine	TBD
4	G590	Calumet	98 MW	138 kV	wind turbine	12/10 suspended
4	G611	Calumet	99 MW	138 kV	wind turbine	12/11
4	G927	Calumet	1.5 MW	138 kV	wind turbine	9/09
4	G773	Brown	150 MW	138 kV	wind turbine	12/12
4	G833	Manitowoc	53 MW	345 kV	nuclear	5/11
4	G834	Manitowoc	53 MW	345 kV	nuclear	5/10
4	J022	Manitowoc	6 MW	345 kV	nuclear	5/10
4	J023	Manitowoc	6 MW	345 kV	nuclear	5/11
4	J094	Manitowoc and Kewaunee	200 MW	138 or 345 kV	wind turbine	9/12 9/13
4	Total		924.5 MW			
5	G051	Milwaukee	650 MW	345 kV	steam/coal	8/10
5	Total		650 MW			

Notes:

1. Suspended = 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-28
Requests Previously in the Generation Queue
Which Have been Withdrawn/Removed between July 1, 2009
and July 1, 2010*

Zone	Queue no.	County	Size	Voltage	Type	In-Service Date
1	none					
2	G937	Delta	200 MW	138 kV	wind	12/10
	J039	Delta	50 MW	69 kV	biomass	12/13
	J104	Alger	25.6	69 kV	biomass	9/11
3	G366	Columbia	80MW	138 kV	wind	12/10
	G483	Green	50 MW	69 kV	wind	12/10
	H024	Columbia	48 MW	69 kV	wind	12/11
	J079	Columbia	30 MW	138 kV	wind	3/11
4	G977	Calumet	100.5 MW	138 kV	wind	8/10
	G987	Brown	400 MW	345 kV	wind	12/10
	H090	Calumet	60 MW	138 kV	wind	9/10
5	none					

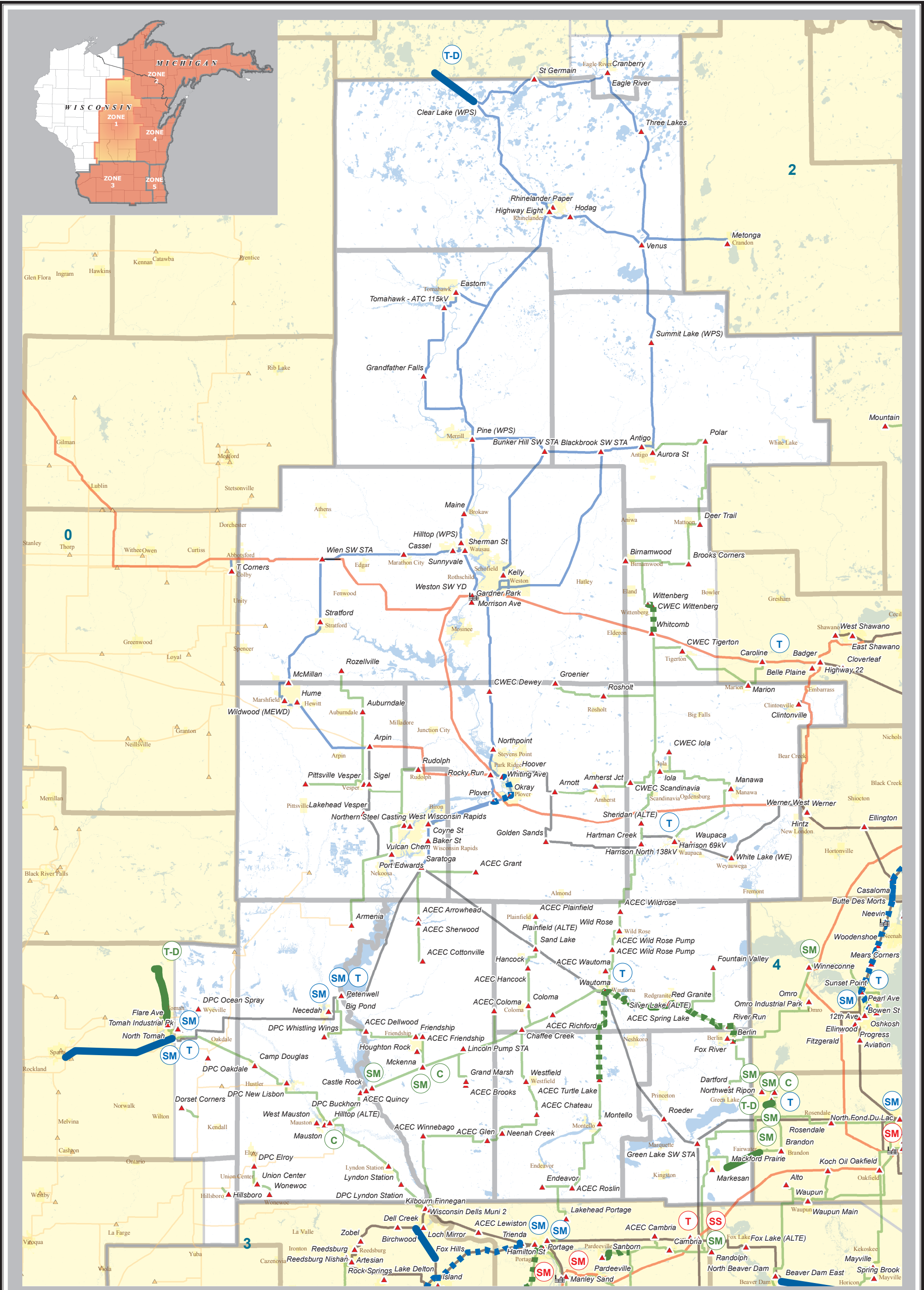
Table PR-29
Required Upgrades for Active Projects in the Generator Queue with a Signed Interconnection Agreement as of July 1, 2010

Zone	Queue #	County	Project Capacity	Upgrades
1	G588	Wood	55 MW	<ul style="list-style-type: none"> ▪ New 115 kV Interconnection Substation. ▪ Communication Upgrades at Hume and Arpin 115 kV Substations.
2	None			
3	G282	Lafayette	99 MW	<ul style="list-style-type: none"> ▪ New 138 kV Interconnection Substation. ▪ Engineering Upgrades at Hillman and Darlington 138 kV Substations.
3	G546	Walworth	100 MW	<ul style="list-style-type: none"> ▪ New 138 kV Interconnection Substation. ▪ Relay Communication Upgrades at Sugar Creek, Burlington, and North Lake Geneva 138 kV Substations. ▪ Reconductor Paris – Albers 138 kV Line. ▪ Thermal Upgrades at St. Martins 138 kV Substation.
3	G706	Columbia	99 MW	<ul style="list-style-type: none"> ▪ New 138 kV Interconnection Substation
3	H012	Columbia	150 MW	<ul style="list-style-type: none"> ▪ Upgrade G706 138 kV Interconnection Substation. ▪ Upgrade Portage – N. Randolph 138 kV Line. ▪ Thermal, Communication and Relay Upgrades at North Randolph 138 kV Substation. ▪ Stability and Communication Upgrades at Portage 138 kV Substation.
3	G749	Lafayette	50 MW	<ul style="list-style-type: none"> ▪ New 69 kV Interconnection Substation. ▪ Communication Upgrades at Hillman and Eden 69 kV Substations.
4	G376	Green Lake/Fond du Lac	160 MW	<ul style="list-style-type: none"> ▪ New 138 kV Interconnection Substation. ▪ Relay Setting Changes at Green Lake and N. Fond du Lac 138 kV Substations.
4	G427	Fond du Lac	98 MW	<ul style="list-style-type: none"> ▪ None required.
4	G590	Calumet	98 MW	<ul style="list-style-type: none"> ▪ Expansion of Tecumseh Road Substation for Interconnection Substation ▪ Thermal Upgrades at Melissa Substation
4	G611 & G927	Calumet	100.5 MW	<ul style="list-style-type: none"> ▪ New 138 kV Interconnection Substation ▪ Upgrade Forest Junction – Elkhart Lake 138 kV Line ▪ Thermal Upgrades at Melissa Substation
4	G773	Brown	150 MW	<ul style="list-style-type: none"> ▪ New 138 kV Interconnection Substation. ▪ Relay Setting Changes at Lost Dauphin and Forest Junction Substations. ▪ Thermal Upgrades at Melissa Substation.

Table PR-29

Required Upgrades for Active Projects in the Generator Queue with a Signed Interconnection Agreement as of July 1, 2010 (continued)

Zone	Queue #	County	Project Capacity	Upgrades
4	G833 G834 J022 J023	Manitowoc	118 MW	<ul style="list-style-type: none"> ▪ Uprate Point Beach – Sheboygan Energy Center 345 kV Line. ▪ Uprate Cypress – Arcadian 345 kV Line. ▪ Stability Upgrades at North Appleton and Point Beach 345 kV Substations. ▪ Conversion of portions of existing Forest Junction – Holland 138 kV line to 345 kV to interconnect North and South Switching Stations. ▪ Creation of a New North 345 kV Switching Station and a New South 345 kV and 138 kV Switching Station. ▪ New 345 kV North Switching Station Interconnecting Point Beach – Forest Junction, Point Beach – Sheboygan Energy Center and the new South – North Switching Station 345 kV Lines. ▪ The new 345 kV South Switching Station Interconnecting Sheboygan Energy Center – Granville, Edgewater – Fond du Lac, Edgewater – Cedar Sauk and the new South – North Switching Station 345 kV Lines. ▪ New 138 kV Line from Howards Grove to Holland 138 kV substations. ▪ New 138 kV Line from Howards Grove to Erdman 138 kV substations. ▪ New South 138 kV Switching Station interconnecting 345/138 kV transformation, Howards Grove – Erdman and Mullet River – South Sheboygan Falls 138 kV Lines.
5	G051	Milwaukee	650 MW	<ul style="list-style-type: none"> ▪ Fault Duty Upgrade at Bluemound 138 kV Substation (Phase 2 Upgrade Only).



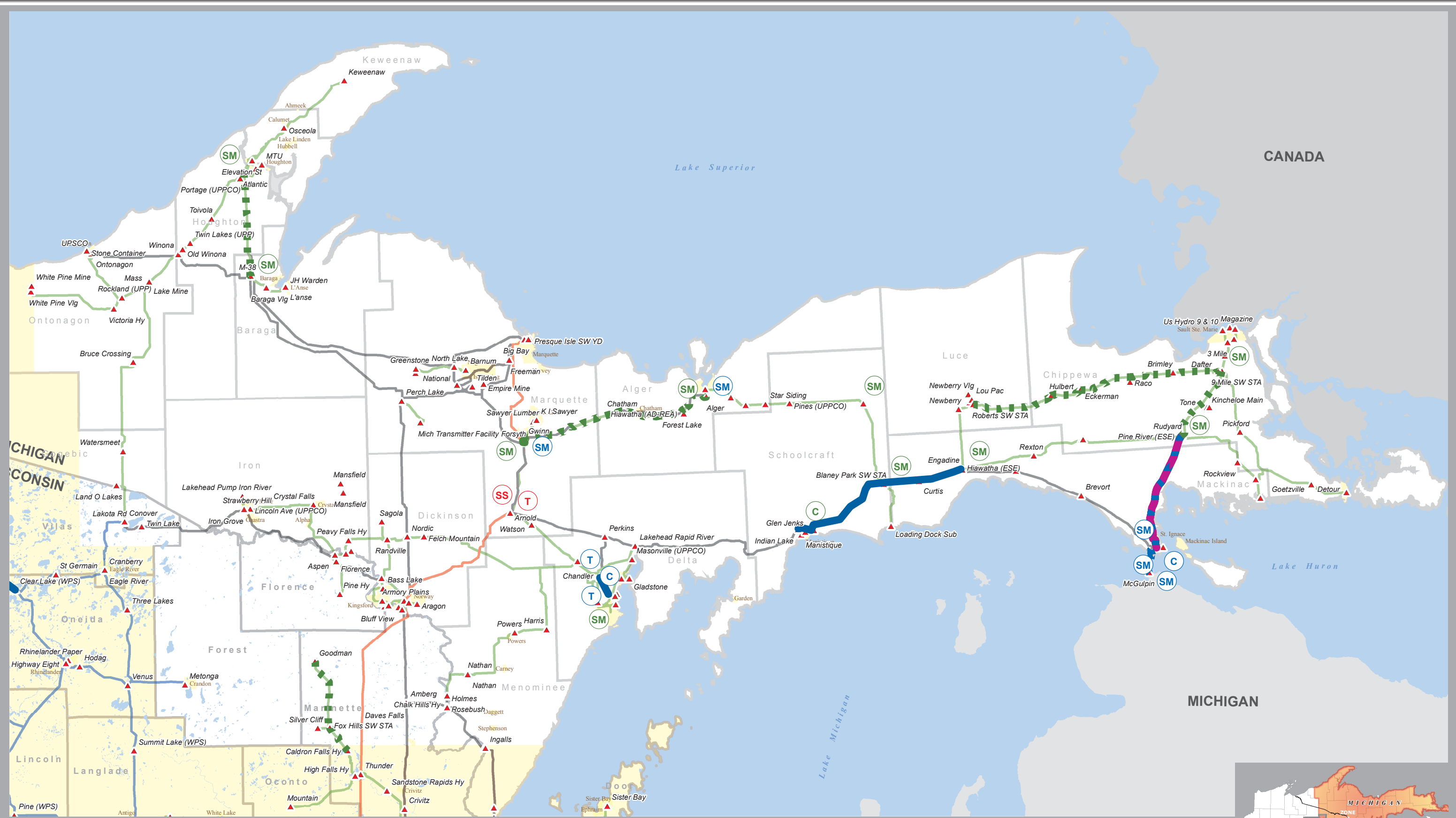
2010 10-Year Assessment Projects PLANNING ZONE 1

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

- * Approximately 9425 miles of transmission lines
- * 96 wholly owned substations
- * 410 jointly owned substations
- * ATC offices in Madison, Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, WI

- | | | | |
|---|--|---|--|
| <ul style="list-style-type: none"> — New 69 kV Transmission Line — New 115, 138 or 161 kV Transmission Line — New 345 kV Transmission Line - - - Rebuilt 69 kV Transmission Line - - - Rebuilt 115, 138 or 161 kV Transmission Line - - - Rebuilt 345 kV Transmission Line — Transmission Line Voltage Conversion | <ul style="list-style-type: none"> (SS) New Substation (SM) Substation Modifications (T-D) T-D Interconnection (C) Capacitor Bank (T) Transformer | <p>ATC Transmission Lines</p> <ul style="list-style-type: none"> — 69 kV — 115 kV — 138 kV — 161 kV — 230 kV — 345 kV | <ul style="list-style-type: none"> ▲ ATC Substation, Switchyard or Terminal Generation ▲ Non-ATC Substation, Switchyard or Terminal — Non-ATC Transmission Line |
|---|--|---|--|

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.



**2010 10-Year Assessment Projects
PLANNING ZONE 2**

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

- New Substation
- Substation Modifications
- T-D Interconnection
- Capacitor Bank or Reactor
- Transformer

Existing Transmission Facilities

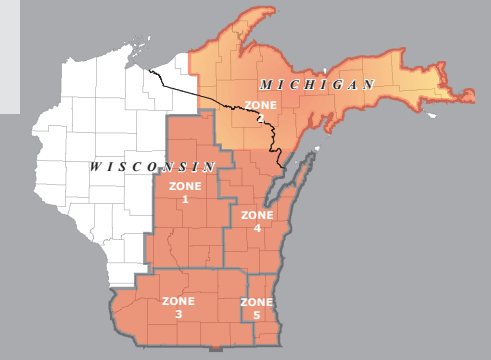
- ATC Substation, Switchyard or Terminal
 - Generation
 - Non-ATC Substation, Switchyard or Terminal
 - Non-ATC Transmission Line
- ATC Transmission Lines**
- 69 kV
 - 115 kV
 - 138 kV
 - 161 kV
 - 230 kV
 - 345 kV

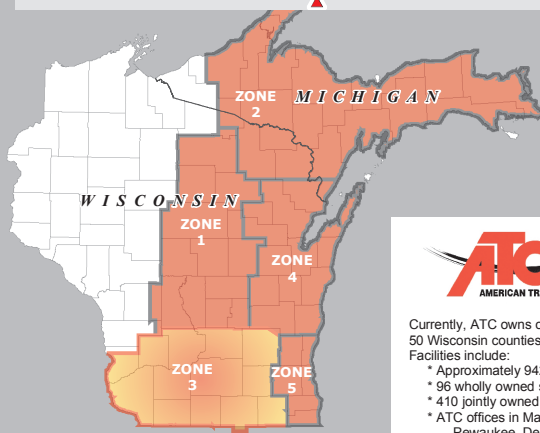
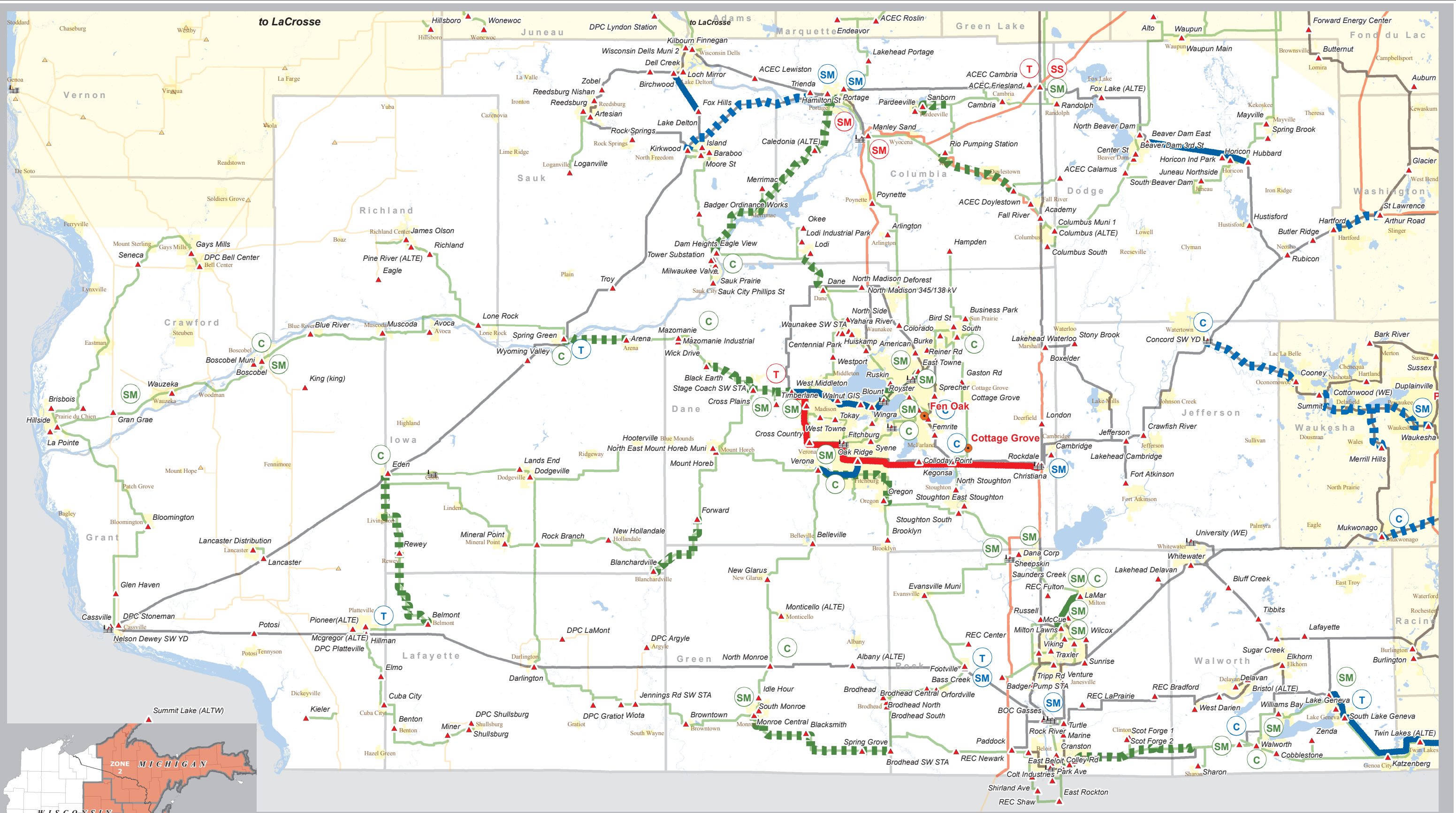
ATC
AMERICAN TRANSMISSION COMPANY

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

- * Approximately 9425 miles of transmission lines
- * 96 wholly owned substations
- * 410 jointly owned substations
- * ATC offices in Madison, Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, WI

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.





ATC
AMERICAN TRANSMISSION COMPANY

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

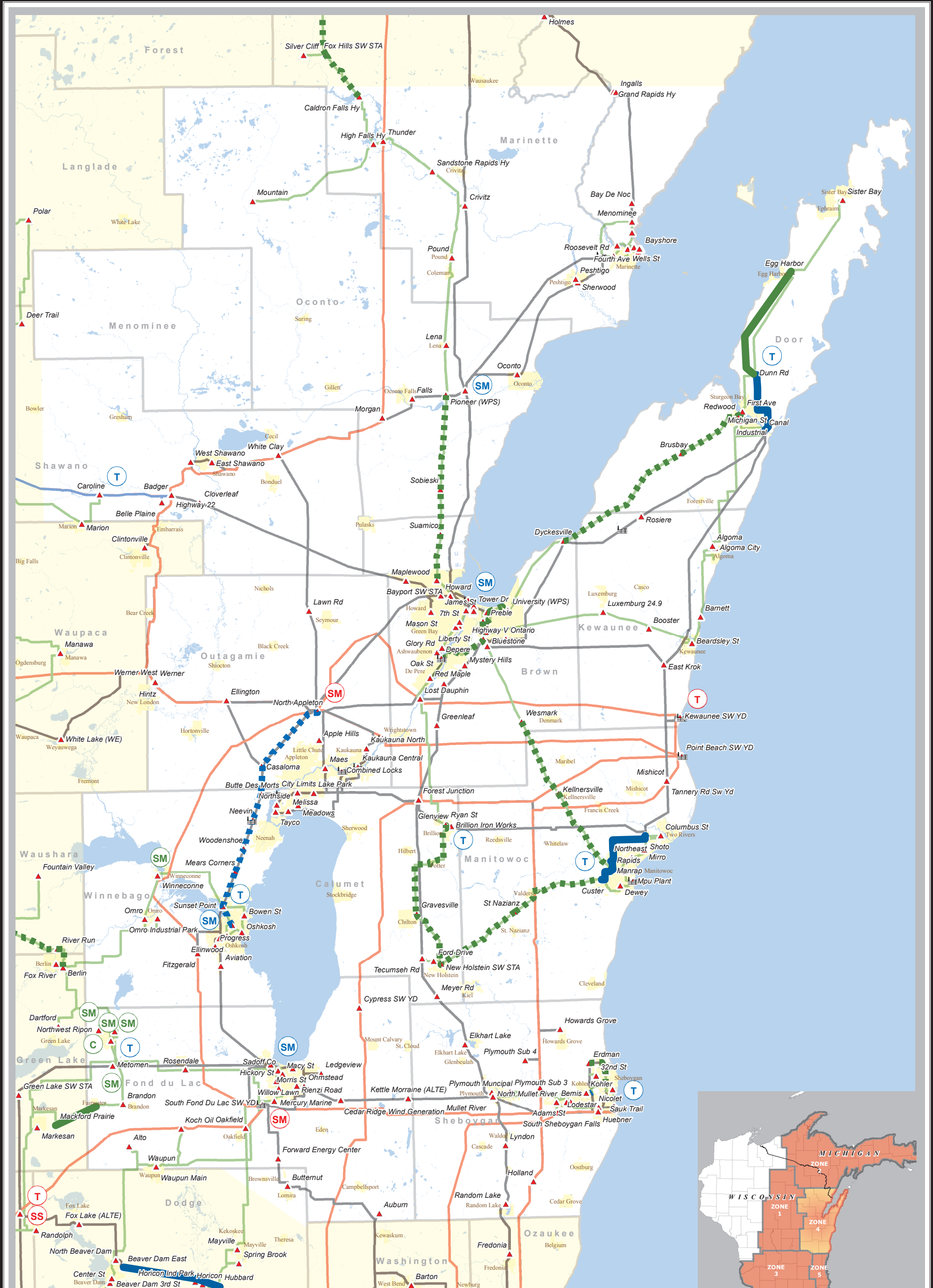
- * Approximately 9425 miles of transmission lines
- * 96 wholly owned substations
- * 410 jointly owned substations
- * ATC offices in Madison, Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, WI

2010 10-Year Assessment Projects

PLANNING ZONE 3

<ul style="list-style-type: none"> — New 69kV Transmission Line — New 115, 138 or 161 kV Transmission Line — New 345 kV Transmission Line — Transmission Line Voltage Conversion 	<ul style="list-style-type: none"> - - - Rebuilt 69 kV Transmission Line - - - Rebuilt 115, 138 or 161 kV Transmission Line - - - Rebuilt 345 kV Transmission Line
--	---

<ul style="list-style-type: none"> (SS) New Substation (SM) Substation Modifications (T) T-D Interconnection (C) Capacitor Bank (T) Transformer 	<p>Existing Transmission Facilities</p> <ul style="list-style-type: none"> ▲ ATC Substation, Switchyard or Terminal ⚡ Generation ▲ Non-ATC Substation, Switchyard or Terminal — Non-ATC Transmission Line <p>ATC Transmission Lines</p> <ul style="list-style-type: none"> — 69 kV — 115 kV — 138 kV — 161 kV — 230 kV — 345 kV
--	---



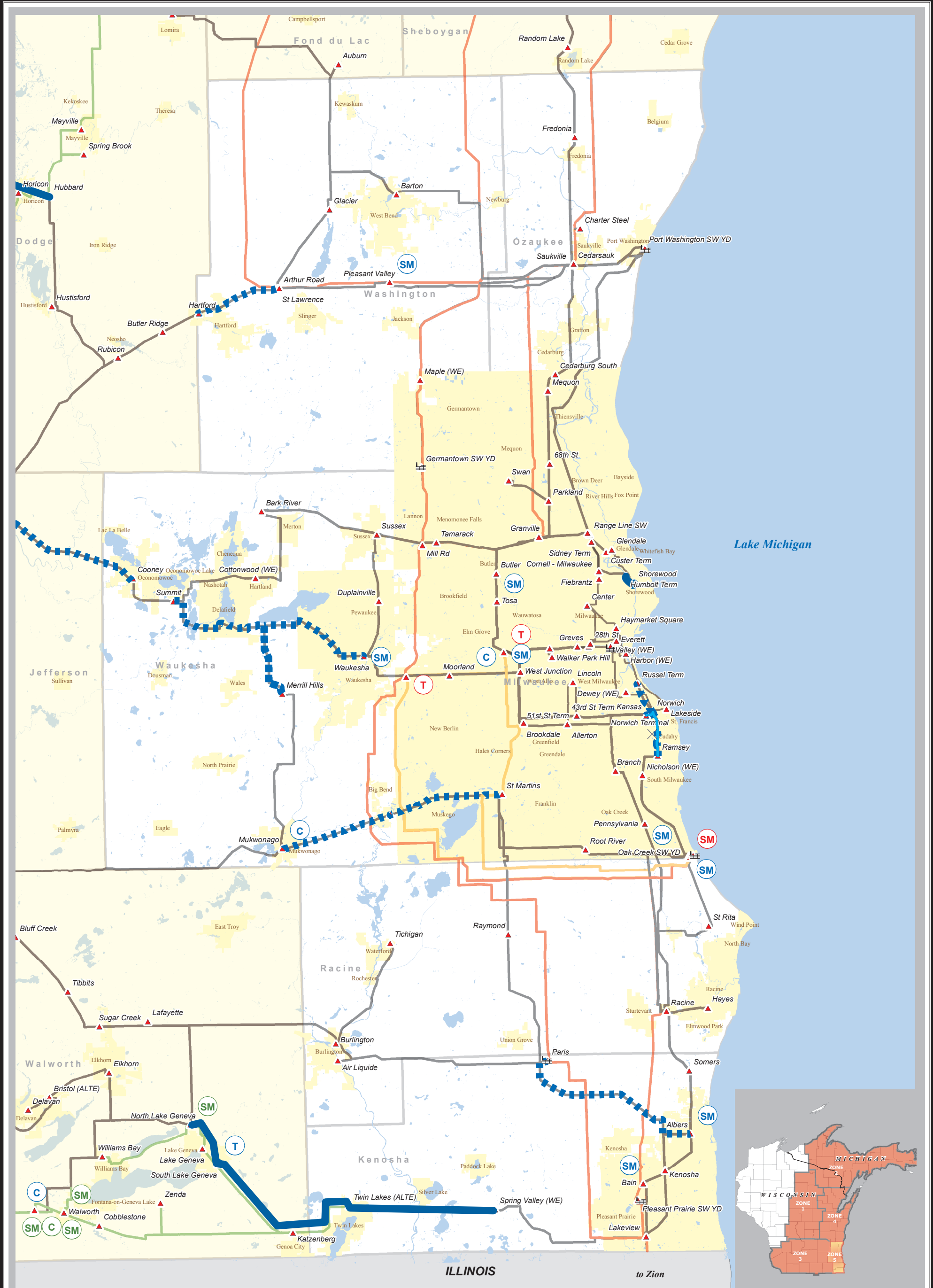
2010 10-Year Assessment Projects PLANNING ZONE 4

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

- * Approximately 9425 miles of transmission lines
- * 96 wholly owned substations
- * 410 jointly owned substations
- * ATC offices in Madison, Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, MI

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> — New 69kV Transmission Line — New 115, 138 or 161 kV Transmission Line — New 345 kV Transmission Line - - - Rebuilt 69 kV Transmission Line - - - Rebuilt 115, 138 or 161 kV Transmission Line - - - Rebuilt 345 kV Transmission Line — Transmission Line Voltage Conversion | <ul style="list-style-type: none"> (SS) New Substation (SM) Substation Modifications (T-D) T-D Interconnection (C) Capacitor Bank (T) Transformer | <p>Existing Transmission Facilities</p> <ul style="list-style-type: none"> Generation ATC Substation, Switchyard or Terminal Non-ATC Substation, Switchyard or Terminal Non-ATC Transmission Line |
|--|--|--|

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.



ILLINOIS

to Zion



2010 10-Year Assessment Projects PLANNING ZONE 5

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

- * Approximately 9425 miles of transmission lines
- * 96 wholly owned substations
- * 410 jointly owned substations
- * ATC offices in Madison, Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, MI

- New 69kV Transmission Line
- New 115, 138 or 161 kV Transmission Line
- New 345 kV Transmission Line
- - - Rebuilt 69 kV Transmission Line
- - - Rebuilt 115, 138 or 161 kV Transmission Line
- - - Rebuilt 345 kV Transmission Line
- Transmission Line Voltage Conversion
- (SS) New Substation
- (SM) Substation Modifications
- (T) T-D Interconnection
- (C) Capacitor Bank
- (T) Transformer

- Existing Transmission Facilities**
- ▲ ATC Substation, Switchyard or Terminal
 - ⚡ Generation
 - ▲ Non-ATC Substation, Switchyard or Terminal
 - Non-ATC Transmission Line
- ATC Transmission Lines**
- 69 kV
 - 115 kV
 - 138 kV
 - 161 kV
 - 230 kV
 - 345 kV

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-6

*American Transmission Company - Number of Projects by Status
10-Year Assessments 2001-2010
System Reliability and Economics Projects Only*

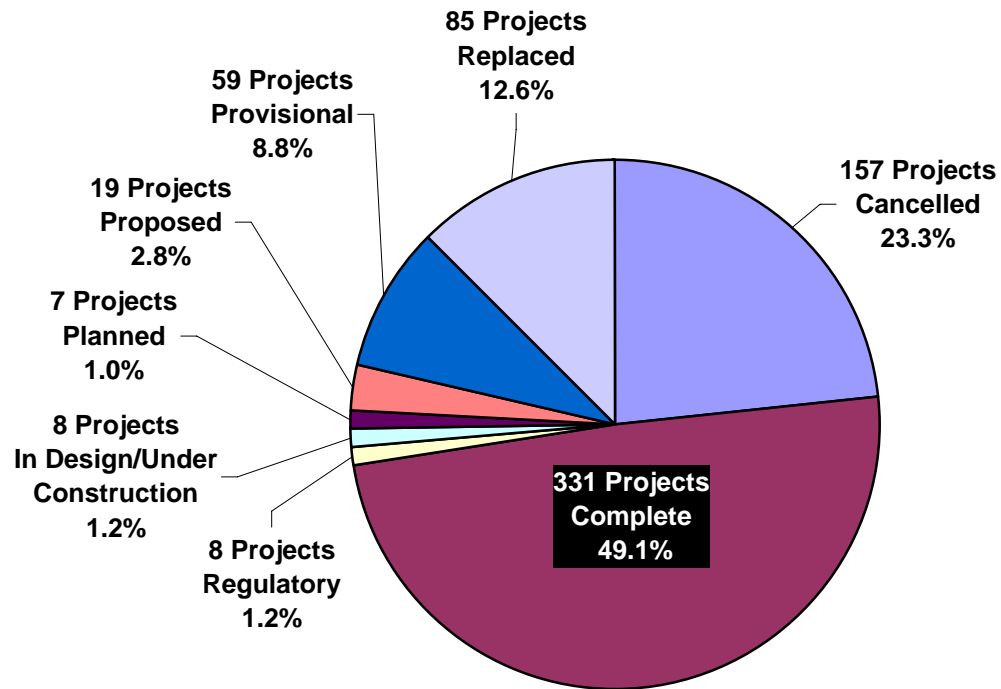


Figure PR-7

*American Transmission Company - Cost of Projects by Status
10-Year Assessments 2001-2010
System Reliability and Economics Projects Only*

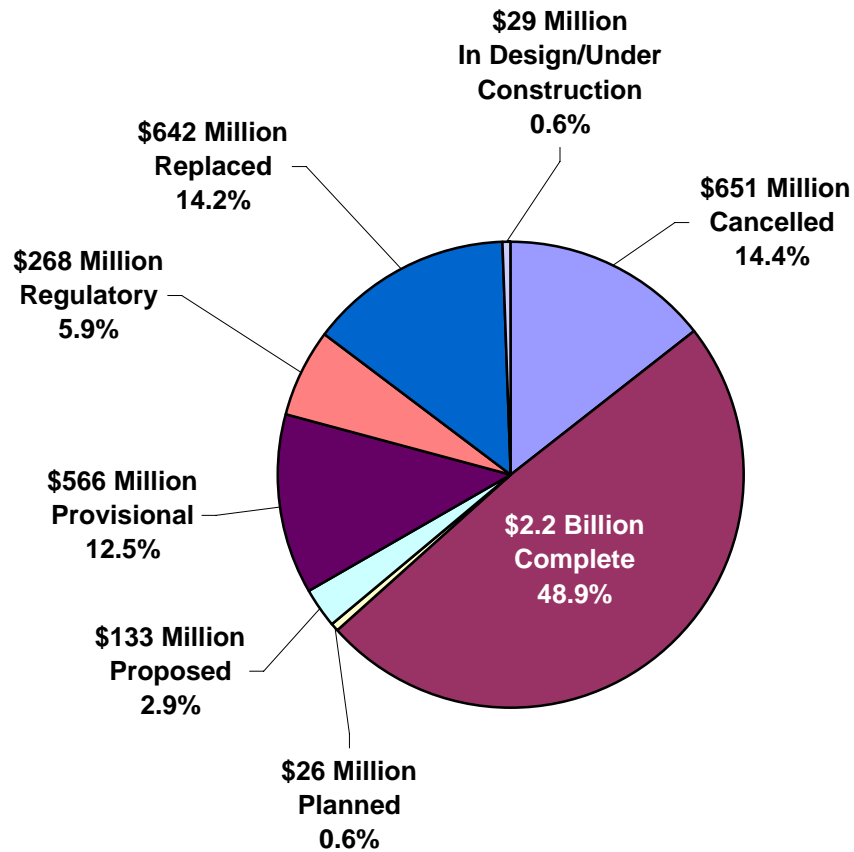


Figure PR-8

*American Transmission Company - Cost of Projects by Status
2010 10-Year Assessment*

Planned, Proposed and Provisional - System Reliability and Economics Projects Only

Total 2010 Assessment (2010-2019) Expenditures = \$1.0 billion

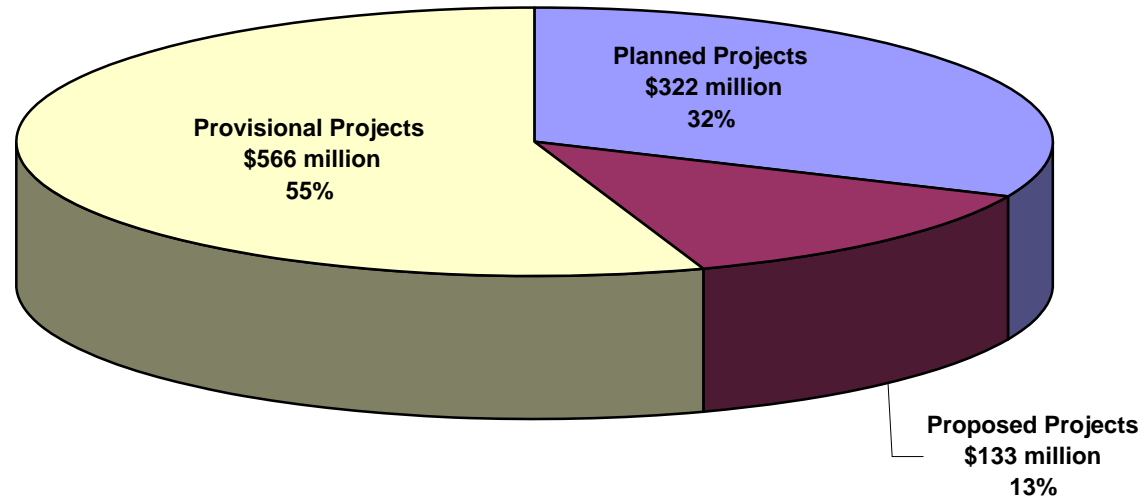


Figure PR-9
 Generation Interconnection Requests
 as of 7/1/10

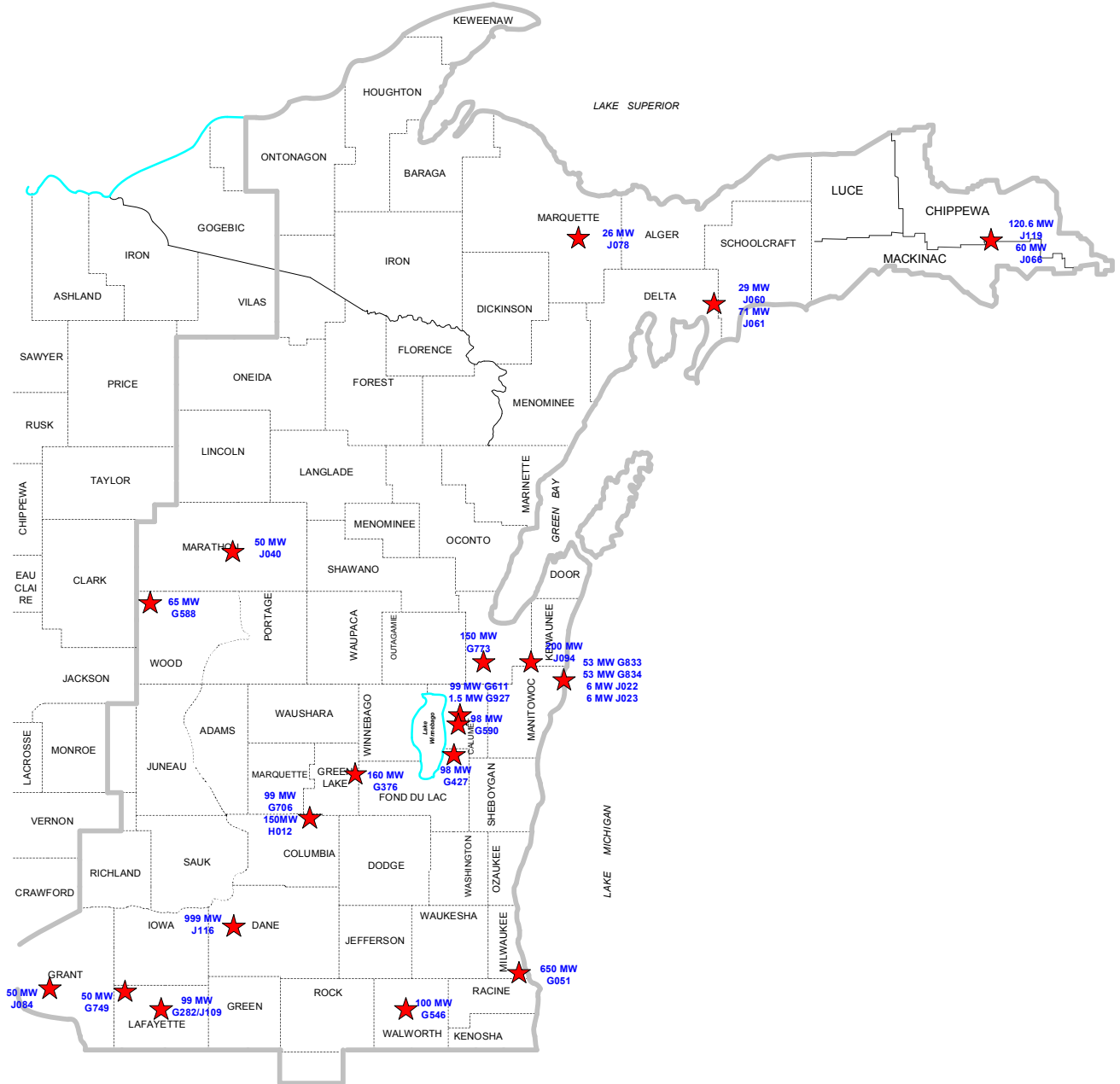
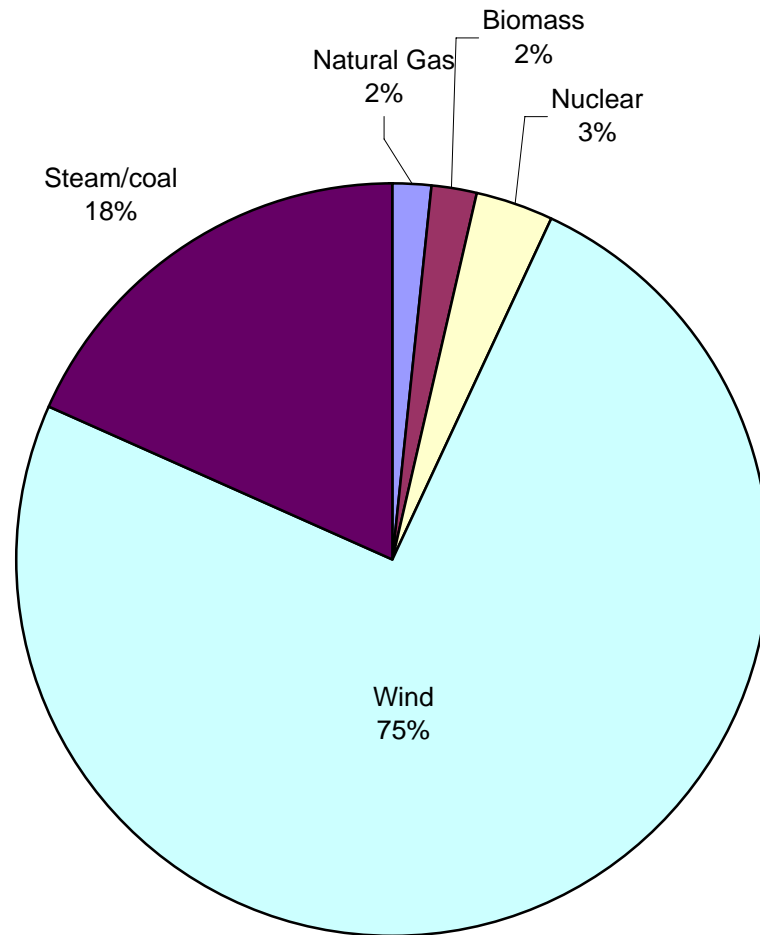
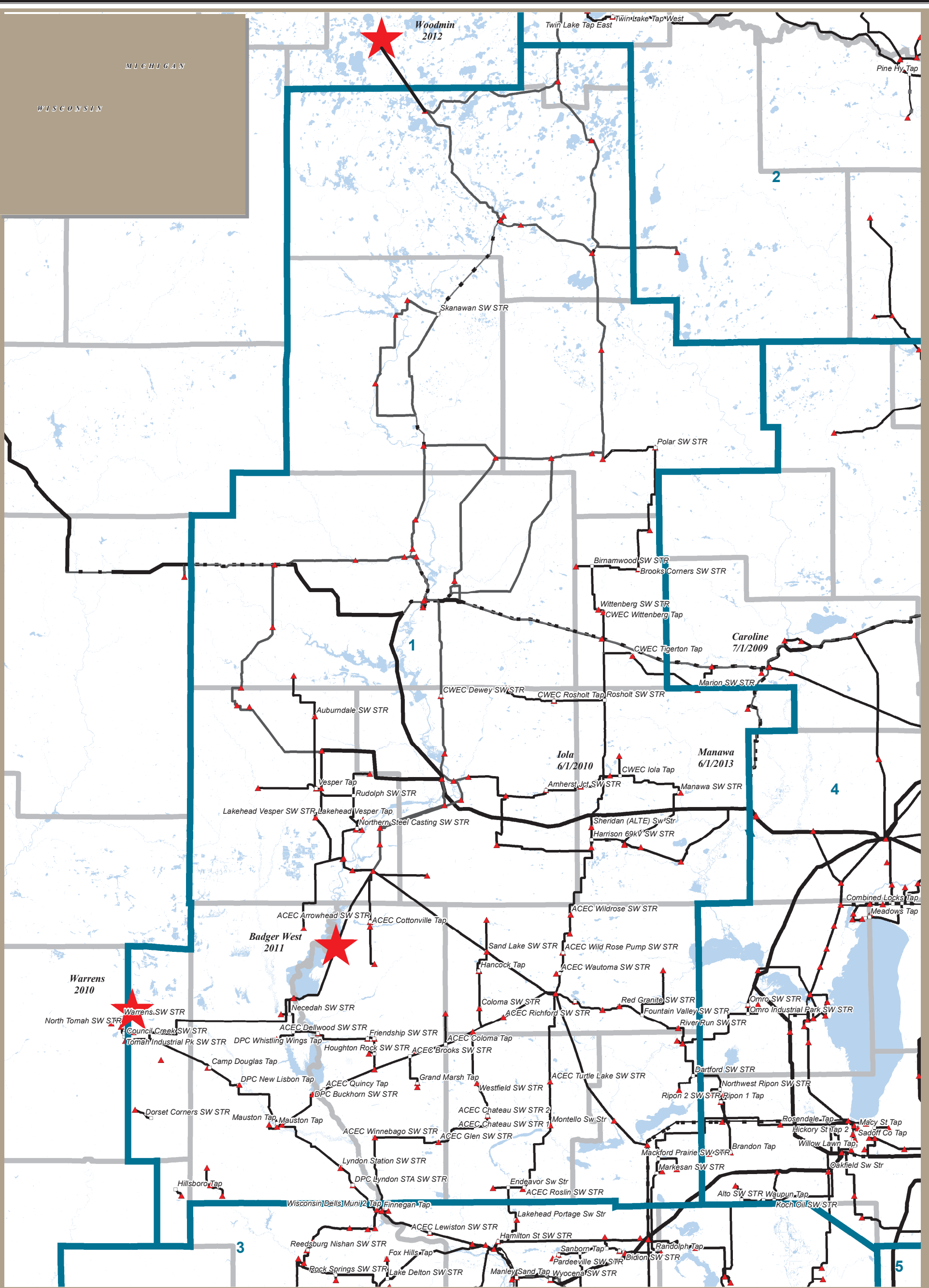


Figure PR-10
ATC Generation in Queue by Type





Transmission-Distribution Interconnection Requests PLANNING ZONE 1

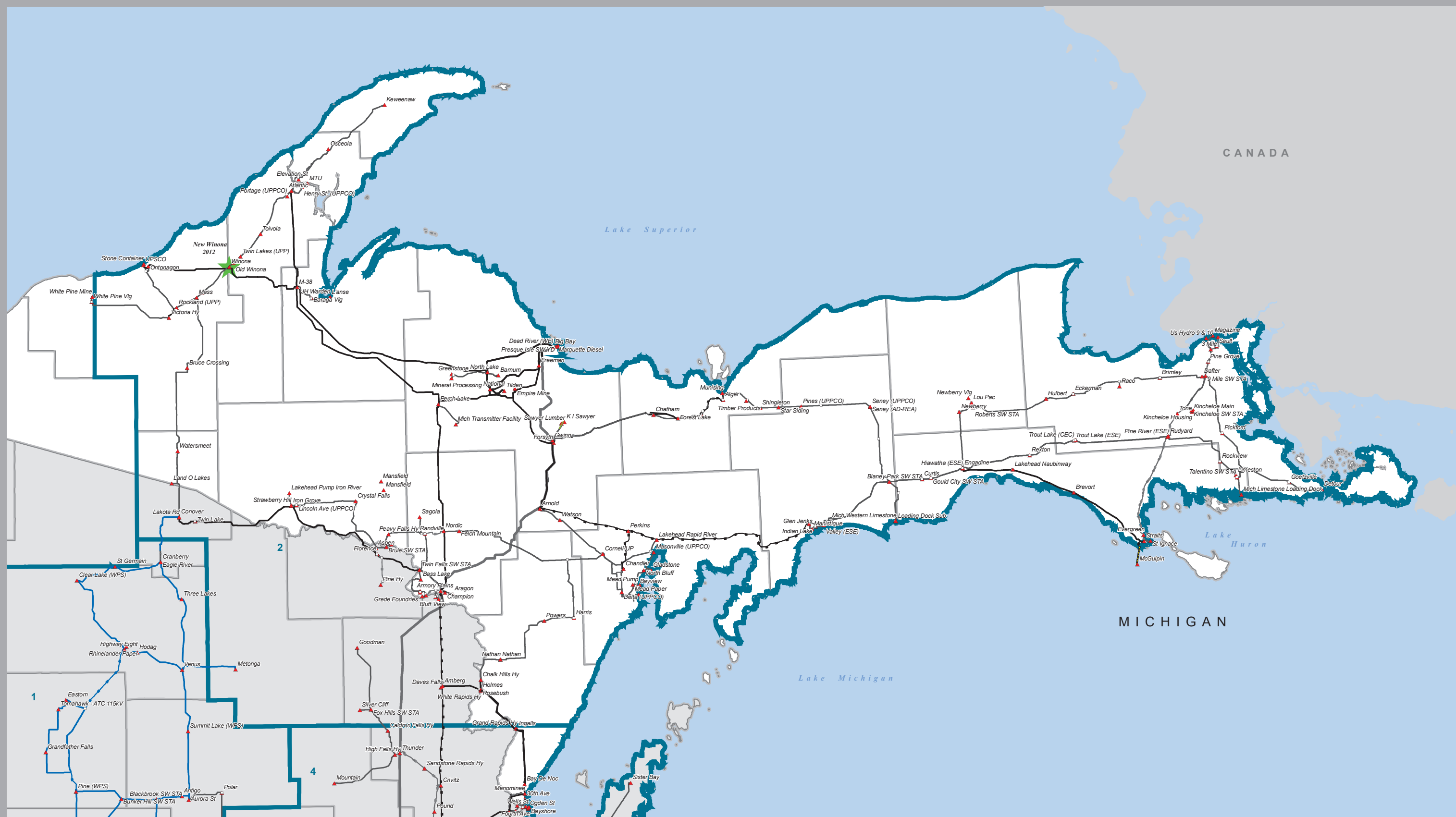
Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:
 * Approximately 8900 miles of transmission lines
 * 98 wholly owned substations
 * 358 jointly owned substations
 * Offices in Madison (2), Cottage Grove, Pewaukee, De Pere,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

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

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-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

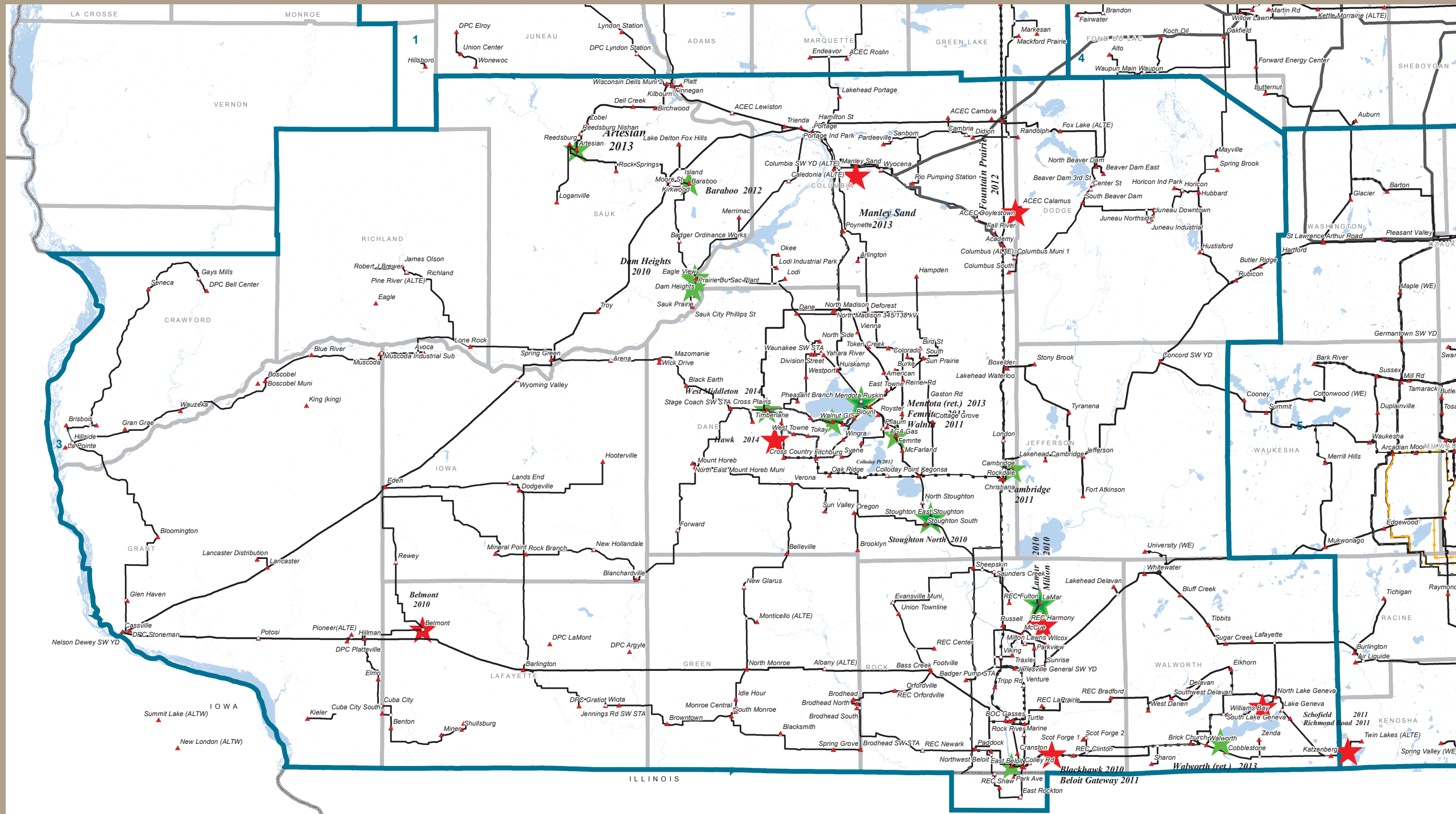
- ★ New Substation Interconnection Request
- ★ Transformer Addition/Replacement

Transmission Related Facilities

- ▲ Substation, Switchyard or Terminal
- 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.

Figure PR-13

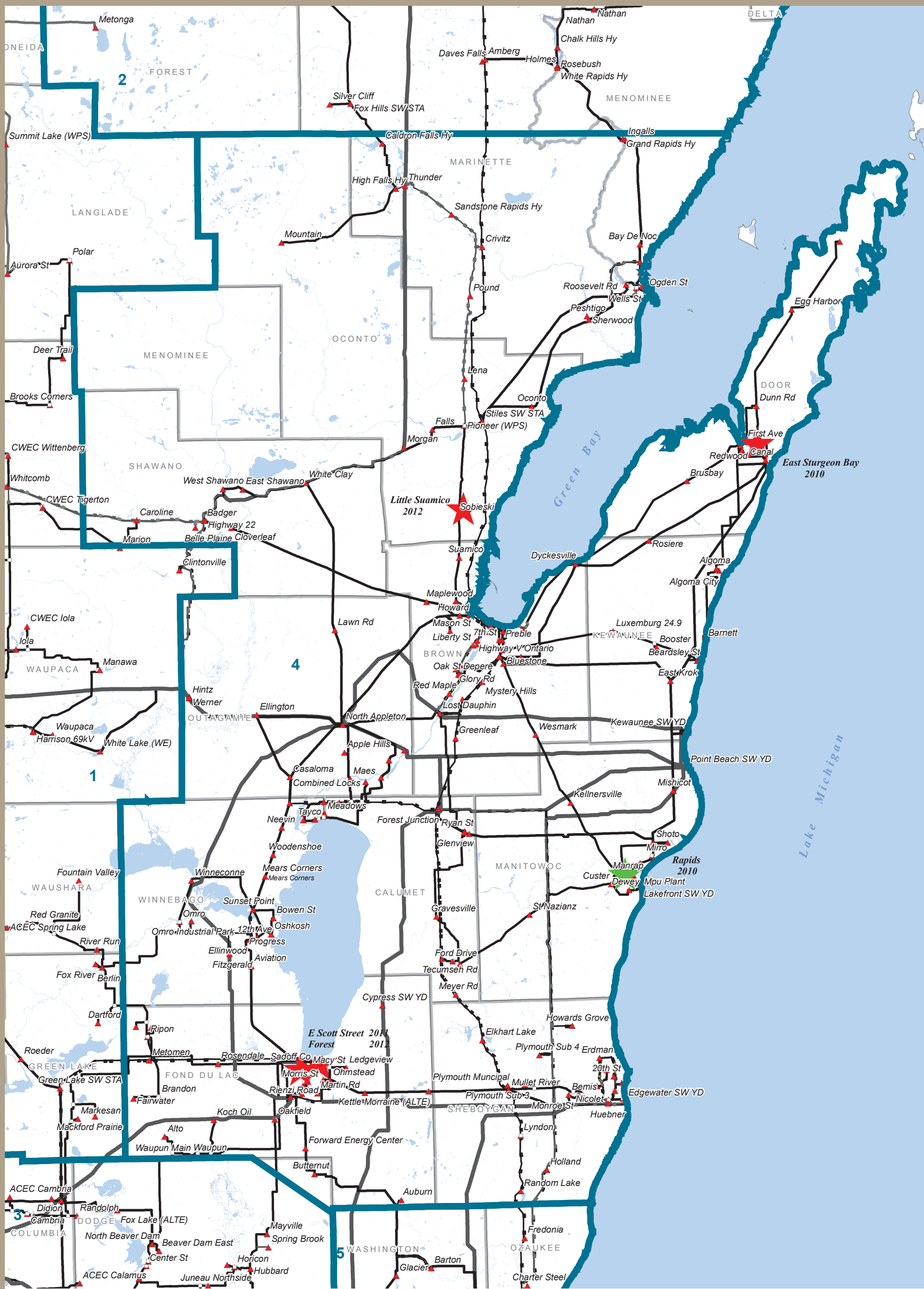


**Transmission-Distribution Interconnection Requests
PLANNING ZONE 3**

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

- Transmission Related Facilities**
- ▲ Substation, Switchyard or Terminal
 - Generation
 - Other Facility
 - ★ New Substation Interconnection Request
 - ★ Transformer Addition/Replacement

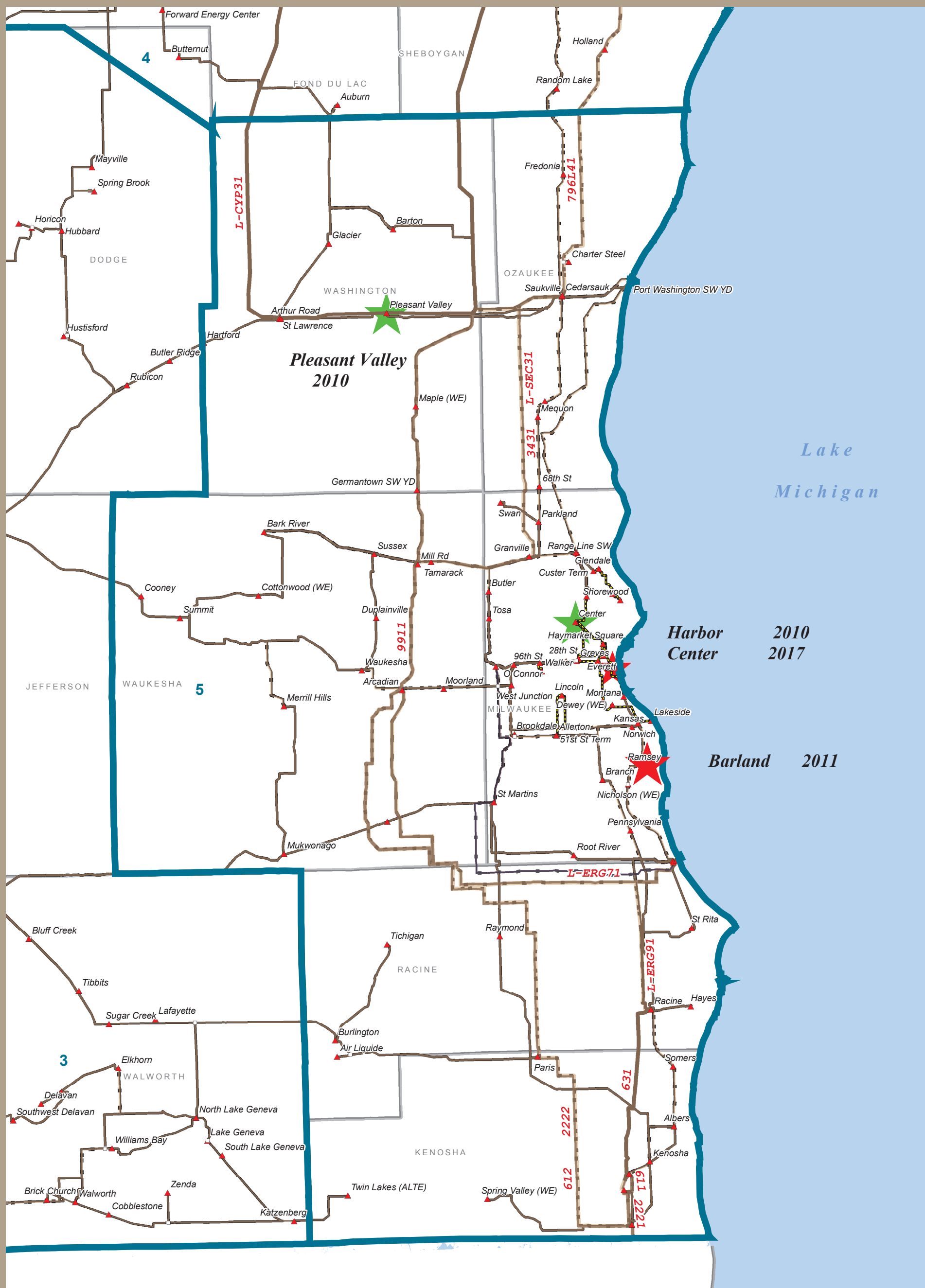


Transmission-Distribution Interconnection Requests
PLANNING ZONE 4

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
- 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-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
- ★ Transformer Addition/Replacement

Transmission Related Facilities

- ▲ Substation, Switchyard or Terminal
- 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.