



Projects section

Project classifications

In our 10-Year Assessments and Updates, projects are identified that address reliability issues, transmission service issues, generation interconnections or some distribution interconnections, or a combination of two or more of the above. In general, these projects address system performance issues per the governing system planning criteria. We have numerous other projects under way or under evaluation that address other issues, including obsolete substation equipment, line facilities in poor condition, line relocations and most distribution interconnections. The projects referenced in the project tables PR-2 through PR-27 include only those projects that address system performance issues.

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

Planned projects:

- ATC planning is complete;
- if required, we have applied for regulatory approvals, which may be pending or have been issued;
- project may be under construction or in construction planning phase; and
- project typically is included in power flow models used to analyze transmission service requests.

Proposed projects:

- ATC planning is not complete;
- ATC has not yet pursued regulatory approvals;
- project represents ATC's preliminary preferred project alternatives from a system performance perspective; and
- project typically is not included in power flow models used to analyze transmission service requests.

Provisional projects:

- ATC planning is not complete;
- ATC has not yet sought regulatory approvals;
- project does not necessarily represent ATC's preliminary preferred project alternative, but reflects a placeholder project designation; and
- project is not included in power flow models used to analyze transmission service requests.

In the 2001-2006 10-Year Assessments and Updates, we identified or assumed responsibility for 591 projects that address system performance issues. Figure PR-6



illustrates the status of all Planned, Proposed, and Provisional projects from 2001-2006. Regarding Figure PR-6, it is worthwhile to note that:

- ATC has completed 181 projects and another 14 are under construction. Notable projects most recently completed are listed in Table PR-1. Projects under construction range from capacitor bank installations to the Arrowhead-Weston/Gardner Park transmission line project.
- 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 112 projects that were identified in previous Assessment reports. Due to changing needs and up-to-date information, these projects were determined unnecessary. Most of these projects were relatively minor projects, involving only replacement of equipment at existing substations.
- 199 future projects are in various stages of evaluation or development (Planned, Proposed or Provisional).

Projects completed since 2005 Assessment Update

Transmission projects significantly affecting system performance that have been completed since the 2005 Assessment Update was issued in March 2006 are listed in Table PR-1.

Most notable include:

- Build new breaker and a half 345/138-kV substation on site adjacent to existing North Madison Substation and replace existing transformers with two new 500 MVA units
- Reconfigure 345-kV bus at the Columbia Substation
- Convert Columbia-North Madison 138-kV line to 345 kV
- Rebuild and convert one Hiawatha-Indian Lake 69-kV circuit to double circuit 138 kV standards; initially only operate one circuit (at 69 kV) and
- Construct new Gardner Park 345/115-kV Substation.

New in 2006

Summary of Planned, Proposed and Provisional additions, 2006-2016

The transmission facilities that we are proposing based on this 2006 Assessment are listed in Tables PR-2 through PR-21, and shown graphically by zone in Figures PR-1 through PR-5. In addition, alternatives for some of the primary alternatives shown in Tables PR-2 through PR-21 are listed in Table PR-22. Also, portions of the plan not reflected in the 2005 Update Assessment that have been cancelled, deferred, changed or are new to the 2006 10-Year Assessment are listed in Table PR-23. Finally, Table PR-24 describes operations, maintenance and protection projects greater than \$0.5 million for the years 2007-2011.



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. There are numerous facilities for which the year it is 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 may have existed but had been addressed with operating procedures that are becoming less effective or ineffective.
- The preferred alternative to address a particular need may need to be implemented in phases, thus delaying certain phases.
- New data or information became available that affected the nature of the need or limitation, which necessitated a change in the alternative to be implemented, 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 2006-2016 respectively.

Tables PR-13 through PR-17 show the facilities planned by zone.

Table PR-18 provides a list of planned transmission lines involving new right-of-way for 2006-2016. 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-19 provides a list of proposed transmission line rebuilds, reconductoring and uprates on existing right-of-way.

Table PR-20 provides a list of proposed new substations and transformer additions (excluding transmission-to-distribution transformers).

Table PR-21 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



10-Year Assessment

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

2006

November 2006 10-Year Assessment
www.atc10yearplan.com

exceeded under single 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 contingency conditions (see Planning criteria). Impending overload or voltage violations are noted as appropriate.

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

TLR: We have identified this facility as a chronic cause for interrupting, curtailing, limiting or denying transmission service in real time.

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

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

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

Import capability: Facility will enhance import capability of our transmission system.

Access initiative: Preliminary and partial list of facilities emerging from our Access Initiative studies that may be beneficial in enhancing system transfer capability and periodic economic benefit.



Projects in design or under construction

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

- construction of the Arrowhead-Gardner Park (Weston) 345-kV line
- rebuilding the Stiles-Amberg double circuit 138-kV line
- construction of a 345/138-kV switchyard at a new Werner West Substation, including the installation of a 345/138-kV transformer
- construction of the Gardner Park-Central Wisconsin and Morgan-Werner West 345-kV lines

One of the more challenging aspects to implementing many of the system reinforcements is scheduling transmission outages and distribution system reconfigurations necessary to construct and connect the projects. Because of the number of projects in certain areas, finding sufficient outage opportunities has become an issue. We are striving to more accurately predict the potential cost implications of construction/connection outages and schedule outages to minimize such potential costs.

Projects with regulatory approval

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

The most notable project in this category is the construction of the Jefferson-Lake Mills-Stony Brook 138-kV line.

Projects pending regulatory review/approval

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

Notable projects include:

- construction of the Rubicon-Hustisford 138-kV line and the rebuild/conversion of the Hustisford-Horicon 69-kV line to 138-kV operation (Dodge County)
- construction of the Cranberry-Conover 115-kV line and the rebuild/conversion of Conover-Plains to 138-kV operation
- construction of the North Madison-Huiskamp 138-kV line

Project costs

The estimated capital costs for all of the projects reflected in Figure PR-6 are shown in Figure PR-7. The figure shows that the combined capital costs for projects that are completed, canceled, replaced, in licensing and under construction account for roughly 68 percent of the estimated total capital costs, with future projects accounting for the



remaining 32 percent. 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 estimated capital cost of those projects as reported in the 2006 10-Year Assessment is approximately \$1.7 billion. Other anticipated projects, including substation equipment replacements, pole and conductor replacements, most T-D interconnections, road relocations and generation interconnections not included in the 2006 10-Year Assessment, made up the remaining \$1.4 billion of the \$3.1 billion in capital expenditures that ATC projected at that time through the year 2015. The cost estimate for all projects to be placed in-service through 2015 is approximately \$1.7 billion, or about \$600 million less than the 2005 Assessment Update estimate.

Transfer capability

2007 analysis

We conducted cursory transfer capability analyses to provide a relative indication of the simultaneous transfer capability into the ATC system in 2007, assuming we are able to implement all of the planned and proposed projects listed in Table PR-2 and PR-3 with projected in-service dates of June 2007 or before. This calculation also assumes the base case power transactions throughout the eastern interconnection system that were in the 2007 model discussed in Methodology & assumptions. The summary of this analysis is shown in Figures PR-8.

In Figure PR-8, the red box inside the shaded area represents the base transfers modeled in the 2007 case used. The shaded area represents the total transfer capability into our system based on the analyses performed. Total simultaneous transfer capability can be determined by selecting a transfer level from either the west (horizontal axis) or the south (vertical axis) below the first limiting element (dashed lines) and drawing a straight line to the limit (dashed line) for the other direction. For instance, for a 500-MW transfer from the west, the maximum transfer achievable from the south is 1,750 MW, or a total transfer capability of 2,250 MW.

It is important to note that the simultaneous transfer capability depicted in Figure PR-8 is a relative indication of transfer capability and *not* necessarily an indication of what is commercially available. The simultaneous transfer capability information in this Assessment was developed by reducing generation within our service territory and increasing generation in surrounding regions to model imports and then identifying limiting transmission facilities per generally accepted industry criteria. We assumed that the distribution of power flow across an overloaded transmission facility for a particular transaction must exceed 3 percent to be considered a contributor to an overload of that facility. We also assumed there was a linear relationship between the limits to transfers from the west and transfers from the south, which result in straight lines between the end points. In reality, the relationship is not necessarily linear, so the actual limitations between the end points are likely to vary from what is shown.



The transfer capability graph in Figure PR-8 shows that the transfer capability ranges from 650 MW to 2,000 MW, depending on the bias of the transfers. The most limiting element for transfers from the west is the Barron-Washington County 161-kV for the outage of the Eau Claire-Arpin 345-kV line, which limits transfers from the west to about 650 MW. The most limiting element for transfers from the south is the Paris-St. Martins 138-kV line for outage of the Pleasant Prairie-Racine 345-kV line, which limits transfers from the south to about 2,000 MW.

2011 analysis

We conducted transfer capability analysis to provide a relative indication of the simultaneous transfer capability into the ATC system in 2011 assuming we are able to implement all of the planned and proposed projects listed in Tables PR-2 through PR-7 with projected in-service dates of June 2011 or before, most notably the Arrowhead-Gardner Park (Weston) project. The summary of that analysis is shown in Figure PR-9.

In Figure PR-9, the red box inside the shaded area represents the base transfers modeled in the 2011 case used. The shaded area represents the total transfer capability into the ATC system based on the cursory analyses. Total simultaneous transfer capability can be determined by selecting a transfer level from either the west (horizontal axis) or the south (vertical axis) below the first limiting element (dashed lines) and drawing a straight line to the limit (dashed line) for the other direction. For instance, for a 1,250-MW transfer from the west, the maximum transfer achievable from the south is 1,750 MW, or a total transfer capability of 3,000 MW.

The simultaneous transfer capability depicted in Figure PR-9 is a relative indication of transfer capability and *not* necessarily an indication of what is commercially available. The simultaneous transfer capability information in this Assessment was developed by reducing generation within our service territory and increasing generation in surrounding regions and then identifying limiting transmission facilities. We assumed that the distribution of power flow across an overloaded transmission facility for a particular transaction must exceed 3 percent to be considered a contributor to an overload. We also assumed there was a linear relationship between the limits to transfers from the west and transfers from the south.

The transfer capability graph in Figure PR-9 shows that the maximum transfer from the south is about 3,000 MW and the maximum transfer from the west is about 2,600 MW. The most limiting element for transfers from the west is the Turkey River-Cassville 161-kV line for outage of the Seneca-Genoa 161-kV line, limiting transfers from the west to about 2,600 MW. The maximum simultaneous transfer capability is approximately 3,000 MW.



Interconnections

Generation developments

Providing some information about connection facilities for proposed generators that have requested but not completed interconnection studies is one purpose of this section of the Assessment.

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, 2006, of ATC's portion of the Midwest Independent System Operator generation interconnection queue is provided in this section.

While reduced from previous years, 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. This dynamic situation is a challenging aspect of the transmission planning environment, as regular changes in the generation planning environment must be correspondingly accommodated.

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

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

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



The results of the interconnection studies are needed to develop a comprehensive picture of the transmission facilities that will be required for a proposed generator. This is why we included in our Assessment models of 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, ten new generators have gone into service and one uprate to an existing generator has been completed, totaling 2,669 MW. These generators are shown in Table PR-29.

Table PR-30 lists the proposed generators in the generation queue for our service territory as of July 1, 2006. This table lists each proposed generation project and summarizes them by zone and MW amount. These proposed projects also are shown by approximate location in Figure PR-10. As shown, the total capacity of proposed generators in the queue is 5316.5 MW. Of that proposed capacity, 59 percent reflects new coal units; wind units reflect 26 percent; combined cycle (natural gas) units reflect 13 percent; and the remaining 2 percent is comprised of simple cycle (natural gas) turbines and an uprate of an existing steam plant using biogas (see Figure PR-11). 49 percent of this generation is proposed in Zone 5, 12 percent in Zone 1, 13 percent in Zone 3, 20 percent in Zone 4, and 6 percent in Zone 2.

The developer projected in-service date listed in Table PR-30 is the last official commercial operation in-service date provided by the developer for that request. A developer may, per the Midwest ISO's Attachment X procedures, suspend their Interconnection Agreement which may delay the project. A developer is not required to update their official in-service date as part of this suspension.

The following requests have been suspended:

- G282
- G338
- G353
- G354
- G366
- G368
- G384



□ G483

Generation interconnection requests previously in the generation queue, which have been cancelled or removed from the queue since July 2005 (because the developer withdrew the request or missed contractual milestones), are summarized in Table PR-31.

Link to publicly posted generation queue:

<http://oasis.midwestiso.org/documents/ATC/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

There are several aspects to be considered in siting generation. Availability of fuel, water and transmission are key among those.

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

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

Zone 1

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



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

The northern portion of Zone 1, the Rhinelander Loop, is a potential candidate for moderate-sized (up to 150 MW, depending on location) generation development, provided generator stability can be maintained, and provided it can be located in the northern portion of the Loop. Generation in this area could defer the need for transmission reinforcements planned to be implemented in the 2008-2010 timeframe. Whether this generation would be cost-effective as a transmission-deferral mechanism would depend on a number of factors. The need for additional reinforcements outside of the Loop would be a function of where the power from the generation is to be delivered.

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

Zone 1 completed generation study links:

http://oasis.midwestiso.org/documents/ATC/GIC044_System_Impact_Study_report.pdf
http://oasis.midwestiso.org/documents/ATC/GIC044_Facility_Study_Report.pdf
http://oasis.midwestiso.org/documents/ATC/G376_Evaluation_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G376_Impact_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G522_Feasibility_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G522_Impact_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G523_Feasibility_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G523_Impact_Study.pdf

Zone 2

We have completed two generation interconnection studies in Zone 2 and currently are building a base of knowledge similar to that which we have in other zones relating to likely generation interconnection impacts.

The most logical locations from a transmission infrastructure standpoint would be near the existing Presque Isle Power Plant or the Plains Substation due to the number of 138 kV lines emanating from these substations. However, any significant generation development at or near the Presque Isle Power Plant likely would require transmission reinforcements or additions due to the existing stability issues there. 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.

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 study links

http://oasis.midwestiso.org/documents/ATC/G583_Feasibility_Study.pdf

http://oasis.midwestiso.org/documents/ATC/G567-568_Feasibility_Study.pdf

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 Madison area is going to become subject to voltage instability in the next five or six years. Thus, we believe that extending the 345-kV network to the west side of Madison coupled with additional 138-kV reinforcements within the city will resolve this issue over the long term. Generation on the west side of Madison potentially could defer the need for portions of these reinforcements provided the generation is not too large (> 200 MW), provides dynamic reactive power support and is appropriately located.

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

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

Zone 3 completed generation study links:

http://oasis.midwestiso.org/documents/ATC/G281-282_System_Impact_Study_Report.pdf



http://oasis.midwestiso.org/documents/ATC/G282_Facility_Study_Report.pdf
http://oasis.midwestiso.org/documents/ATC/G338_System_Impact_Study_Report.pdf
http://oasis.midwestiso.org/documents/ATC/G338_Facility_Study_Report.pdf
http://oasis.midwestiso.org/documents/ATC/G366_System_Impact_Study_Report.pdf
http://oasis.midwestiso.org/documents/ATC/G366_Facility_Study_Report.pdf
http://oasis.midwestiso.org/documents/ATC/G371_Evaluation_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G483_Impact_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G483_Facility_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G527_Feasibility_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G527_Impact_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G528_Feasibility_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G528_Impact_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G546_Feasibility_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G550_Impact_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G553_Feasibility_Study.pdf

Zone 4

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

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

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

Zone 4 completed generation study links:

http://oasis.midwestiso.org/documents/ATC/G240_System_Impact_Study_Report.pdf
http://oasis.midwestiso.org/documents/ATC/G240_Facility_Study_Report.pdf
http://oasis.midwestiso.org/documents/ATC/G338_System_Impact_Study_Report.pdf
http://oasis.midwestiso.org/documents/ATC/G353_G354_Facility_Study_Report.pdf



http://www.midwestiso.org/plan_inter/documents/G368_Evaluation_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G368_Facility_Study_Report.pdf
http://oasis.midwestiso.org/documents/ATC/G376_Evaluation_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G376_Impact_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G376_Facility_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G384-410_Evaluation_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G384-410_Impact_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G384_Facility_Study_Report.pdf
http://oasis.midwestiso.org/documents/ATC/G421_Evaluation_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G427_Evaluation_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G486_Impact_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G507_Feasibility_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G590_Feasibility_Study.pdf

Zone 5

Two major generation additions have been proposed in Zone 5. The first addition is at Port Washington Power Plant, which has been approved by the Public Service Commission of Wisconsin. Two groups of units will be installed. The first phase went in service in 2005 and the second phase is under construction to go in service in 2008. Rebuilding existing transmission lines in the Port Washington area is required to support this new generation.

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

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

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

Zone 5 completed generation study links:

http://oasis.midwestiso.org/documents/ATC/G051_Facility_Study_Report_Rev1.pdf
http://oasis.midwestiso.org/documents/ATC/GIC027_Impact_Report_Rev1.pdf
http://oasis.midwestiso.org/documents/ATC/GIC027_Facilities_Study_Report.pdf
http://oasis.midwestiso.org/documents/ATC/G510_Impact_Study.pdf



Transmission to distribution interconnections

We have received numerous requests from distribution companies for new transmission to distribution interconnections. These interconnection requests generally take on three different types of projects:

1. *Constructing new T-D substations.* Typically, these new interconnections involve constructing a new T-D substation adjacent to an existing transmission line and looping the transmission line into the new substation. In some instances, the new substation cannot be sited adjacent to the transmission line and we are required to construct a transmission line to the new substation site. Since this type of interconnection is a way for a distribution company to redistribute load between the two existing substations, it typically does not materially affect transmission system performance. In some instances, however, the optimum site for the new substation, from a distribution planning perspective, is such that a new transmission line from two substations that were not previously interconnected is warranted, forming a new network line, which can materially affect transmission system performance.
2. *Adding T-D transformers at existing substations.* These new interconnections involve expanding an existing T-D substation to accommodate a new T-D transformer. Typically, this type of interconnection is a way for a distribution company to improve reliability by providing redundancy, lowering the loading on existing T-D transformers and meeting increasing customer demand.
3. *Replacing existing T-D transformers at existing substations.* These are not technically new interconnections since no expansion is required at the existing T-D substation; it's merely a means of increasing transformer capacity. This type of project is a way to reliably serve increasing customer demand.

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

All of the T-D interconnection requests that are being implemented, designed or evaluated by ATC are shown in Figures PR-12 through PR-16 for Zones 1-5, respectively. A corresponding list of these interconnection requests is available on ATC's Web site: www.atcllc.com.

Table PR-2
Transmission System Additions for 2006

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Install a 345/161-kV transformer at Stone Lake Substation (temporary installation for construction outages)	2006	2006	1	reliability	Planned	F-1546 & F-1685
Construct Gardner Park-Stone Lake 345-kV line	1997	2006	1	service limitation, reliability, import capability & Weston stability	Planned	F1325, F1546, F1564 & F1685
Reconductor Stratford-McMillan 115-kV line (MEWD portion)	2006	2006	1	reliability	Planned	F0845
Construct new Eagle River Muni distribution substation directly adjacent to the existing Cranberry 115-kV Substation	2006	2006	1	T-D interconnection	Planned	F1643
Increase size of existing Summit Lake 115-kV capacitor bank from 11.3 to 16.9 MVAR	2006	2006	1	reliability	Planned	F1899
Uprate Victoria-Ontonagon 69-kV line clearance to 135 degrees F	2006	2006	2	new generation	Planned	F1903
Uprate Victoria-Mass 69-kV line clearance to 135 degrees F	2006	2006	2	new generation	Planned	F1903
Uprate Mass-Winona 69-kV line clearance to 135 degrees F	2006	2006	2	new generation	Planned	F1903
Uprate Winona-Atlantic 69-kV line clearance to 135 degrees F	2006	2006	2	new generation	Planned	F1903
Rebuild Stiles-Amberg double circuit 138-kV line	1996	2006	2 & 4	reliability, service limitation, condition	Planned	F1431
Reconnect the 138/69-kV transformers at Kilbourn Substation on separate breakers to operate individually	2006	2006	3	reliability	Planned	F1430
Construct new 138-kV line from North Beaver Dam to East Beaver Dam Substation	2006	2006	3	T-D interconnection	Planned	F1561
Construct a 345/138-kV switchyard at a new Werner West Substation; install a 345/138-kV transformer. Loop existing Rocky Run to North Appleton 345 kV and existing Werner to White Lake 138-kV lines into Werner West	2004	2006	4	reliability, service limitation	Planned	F1432

Table PR-2 (continued)
Transmission System Additions for 2006

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Construct a 138-kV substation at a new Forward Energy Center; loop existing Butternut-South Fond du Lac line into Forward Energy Center	2006	2006	4	new generation	Planned	F1716
Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress	2006	2006	4	new generation	Planned	F1513
Improve clearance on Kenosha-Lakeview 138-kV line KK9341	2006	2006	5	congestion, reliability	Proposed	F0845

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 2007

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Rebuild Weston-Sherman St. and Sherman St.-Hilltop 115-kV lines as double circuits with a new Gardner Park-Hilltop 115-kV line	2007	2007	1	new generation, reliability	Planned	F0833
Reconductor Weston-Northpoint 115-kV line	2007	2007	1	achieve transfer capability associated with Arrowhead-Gardner Park, reliability, new generation	Planned	F1700
Construct Venus-Metonga 115-kV line	2007	2007	1	T-D interconnection	Planned	F1291
Uprate Metomen-North Fond du Lac 69-kV line terminal equipment	2006	2007	1	reliability	Planned	F1427
Install 2-24.5 MVAR capacitor banks at the Wautoma 138-kV and one-16.33 MVAR capacitor bank at 69-kV Substation	2007	2007	1	reliability	Planned	F2054
Install 1-5.4 MVAR capacitor bank at Sawyer 69-kV Substation	2007	TBD	2	reliability	Provisional	F1818
Install 1-8.16 MVAR capacitor bank at Lincoln 69-kV Substation	2007	2007	2	reliability	Planned	F1376
Relocate Brule Substation (Aspen)	2007	2007	2	reliability, condition	Planned	F1659
Uprate White Pine-Victoria 69-kV line clearance to 200 degrees F	2007	2007	2	new generation	Planned	F1735
Uprate Victoria-Ontonagon 69-kV line clearance to 185 degrees F	2007	2007	2	new generation	Planned	F1735
Uprate Victoria-Mass 69-kV line clearance to 185 degrees F	2007	2007	2	new generation	Planned	F1735
Install 2-8.16 MVAR capacitor banks at Ontonagon 138 kV	2007	2007	2	reliability	Proposed	F1816
Convert Kegonsa-McFarland-Femrite 69-kV line to 138 kV	2007	2007	3	reliability, new generation	Planned	F1241
Construct Sprecher-Femrite 138-kV line	2007	2007	3	reliability, new generation	Planned	F1241
Install 138/69-kV transformer at Femrite Substation	2007	2007	3	reliability, new generation	Planned	F1241
Install 138/69-kV transformer at Reiner Substation	2007	2007	3	reliability, new generation	Planned	F1241
Convert Sycamore-Reiner-Sprecher from 69 kV to 138 kV	2007	2007	3	reliability	Planned	F1241

Table PR-3 (continued)
Transmission System Additions for 2007

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Uprate Rock River 138/69-kV transformer to 65 MVA and uprate Rock River-Turtle 69-kV line to 94 MVA	2006	TBD	3	reliability	Provisional	N/A
Upgrade the 5.4 MVAR capacitor bank to 10.8 MVAR at New Glarus Substation	2006	TBD	3	reliability	Provisional	N/A
Uprate Colley Road-Park Ave Tap 69-kV line to 95 MVA	2006	2007	3	reliability	Proposed	F 1868
Construct Butler Ridge 138-kV Substation	2007	2007	3	new generation	Provisional	F 1367
Uprate Brodhead-South Monroe 69-kV line	2006	2007	3	reliability	Proposed	F 1834
Construct new 69-kV line from Columbia to Rio to feed the proposed Wycocena Substation	2004	2007	3	T-D interconnection, reliability	Planned	F 1393
Install 2-16.33 MVAR capacitor banks at Rubicon 138-kV Substation	2006	2007	3	reliability	Planned	F 1395
Construct new line from Southwest Delavan to Bristol at 138 kV and operate at 69 kV	2007	2007	3	T-D interconnection	Planned	F 1667
Uprate Janesville-Parkview 69-kV line to 92 MVA	2007	2007	3	reliability	Proposed	F 1836
Uprate North Lake Geneva-Lake Geneva 69-kV line to 84 MVA	2006	2007	3	reliability	Proposed	F 1868
Uprate Lakefront-Revere 69-kV line	2006	2007	4	reliability, service limitation	Provisional	F 1800
String a new Elinwood-Sunset Point 138-kV line on existing structures	2007	2007	4	reliability	Planned	F 1353
Install 2-16.3 MVAR capacitor bank at Canal 69-kV Substation	2007	2007	4	reliability	Planned	F 1471
Uprate North Appleton-Lawn Road-White Clay 138-kV line	2007	2007	4	reliability	Planned	F 1601

Table PR-3 (continued)
Transmission System Additions for 2007

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Construct double circuit 138-kV line from Forest Junction/Howards Grove/Charter Steel to Plymouth #4 Substation	2007	2007	4	T-D interconnection	Planned	F1682

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 2008

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Upgrade Kelly-Whitcomb 115-kV line conductor clearances to 300F	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	F0373
Construct Stone Lake-Arrowhead 345-kV line	1997	2008	1	service limitation, reliability, import capability & Weston stability	Planned	F1191
Construct the new permanent Stone Lake 345/161-kV Substation	2008	2008	1	reliability, import capability & Weston stability	Planned	F1556
Install 1-75 MVAR capacitor bank and 1-45 MVAR inductor at Stone Lake 345-kV Substation	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	F1195
Construct new Arrowhead 345-kV Substation, install 2-75 MVAR capacitor banks, 1-800 MVA PST and 1-800 MVA 345/230-kV transformer	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	F1196
Construct Cranberry-Conover 115-kV line	2008	2008	1	reliability, transfer capability	Planned	F1363
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Berlin 69-kV Substation	2008	2008	1	reliability	Planned	F1476
Construct Brandon-Fairwater 69-kV line	2008	2008	1	T-D interconnection	Proposed	F1844
Construct 138 kV bus and install 138/115-kV 150 MVA and 138/69-kV 60 MVA transformers at Conover Substation	2008	2008	2	reliability, transfer capability	Planned	F1363
Install 1-5.4 MVAR capacitor bank at Munising 69-kV Substation	2008	2008	2	reliability	Proposed	F1820
Relocate Cedar Substation (North Lake)	2005	2008	2	reliability, condition	Proposed	F1605
Install 1-5.4 MVAR capacitor bank at Roberts 69-kV Substation	2007	2008	2	reliability	Proposed	F1849
Install second 345/138-kV transformer at Plains Substation	2008	2008	2	reliability, transfer capability	Proposed	F1568
Rebuild Atlantic-Osceola 69-kV line (Laurium #1)	2006	2008	2	reliability, condition	Planned	F1684
Upgrade Mass-Winona 69-kV line clearance to 185 degrees F	2008	2008	2	generation	Planned	F1735

Table PR-4 (continued)
Transmission System Additions for 2008

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Uprate Winona-Atlantic 69-kV line clearance to 185 degrees F	2008	2008	2	generation	Planned	F1735
Increase ground clearance of Atlantic-Osceola (Laurium #2) 69-kV line from 120 to 167 degrees F	2008	2008	2	reliability	Proposed	F1780
Install 1-5.4 MVAR capacitor bank at L'Anse 69-kV Substation	2007	2008	2	reliability	Provisional	F1819
Install 2-5.4 MVAR capacitor banks at Osceola 69-kV Substation	TBD	TBD	2	reliability	Provisional	N/A
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F	2008	TBD	2	reliability	Provisional	N/A
Uprate Brick Church-Zenda 69-kV line to 115 MVA	2008	2008	3	reliability	Proposed	F2084
Install 1-16.33 MVAR 69-kV capacitor bank at South Lake Geneva Substation	2007	2008	3	reliability	Provisional	F2084
Uprate Portage-Trienda 138-kV line to 339 MVA	2008	2008	3	reliability	Proposed	F2098
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	2008	2008	3	reliability	Provisional	F1868
Install 2-16.33 MVAR capacitor bank at the South Monroe 69-kV Substation and remove existing 10.8 MVAR bank	2007	2008	3	reliability	Proposed	F1476
Uprate Rockdale to Jefferson 138-kV line	2008	2008	3	reliability	Planned	F0930
Uprate Rockdale to Boxelder 138-kV line	2008	2008	3	reliability	Planned	F0930
Uprate Boxelder to Stonybrook 138-kV line	2008	2008	3	reliability	Planned	F0930
Construct a Jefferson-Lake Mills-Stony Brook 138-kV line	2006	2008	3	reliability	Planned	F0924
Construct a Rubicon-Hustisford 138-kV line	2008	2008	3	reliability	Proposed	F0956
Rebuild Hustisford-Horicon 69 kV to 138 kV	2008	2008	3	reliability	Proposed	F0956
Construct 138/69-kV substation at a site near Horicon and install a 138/69-kV transformer	2008	2008	3	reliability	Proposed	F0956
Construct a new 138-kV line from North Madison to Huiskamp (was Waunakee)	2008	2008	3	reliability	Proposed	F1626

Table PR-4 (continued)
Transmission System Additions for 2008

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Construct a new 138/69-kV substation near Huiskamp and install a 187 MVA 138/69-kV transformer	2008	2008	3	reliability	Proposed	F 1626
Rebuild the Verona to Oregon 69-kV line Y119	2008	2008	3	reliability	Proposed	F 1731
Rebuild Brodhead to South Monroe 69-kV line	2008	2008	3	generation interconnection, reliability	Proposed	F 1635
Uprate Darlington-Rock Branch 69-kV line	2008	2008	3	reliability	Proposed	F 1868
Rebuild Crivitz-High Falls 69-kV double-circuit line	2008	2008	4	reliability	Proposed	F 1357
Expand the Menominee 69-kV Substation and install 138 kV terminals. Loop the West Marinette-Bay De Noc 138-kV line into the Substation	2008	2008	4	reliability	Provisional	F 1621
Install 138/69-kV transformer at the expanded Menominee Substation	2008	2008	4	reliability	Provisional	F 1621
Uprate North Appleton-Mason Street 138-kV line	2008	2008	4	reliability, service limitation	Proposed	F 1765
Uprate North Appleton-Lost Dauphin 138-kV line	2008	2008	4	reliability, service limitation	Proposed	F 1765
Install 2-4.1 MVAR capacitor bank at Sister Bay 69-kV Substation	2008	2008	4	reliability	Provisional	F 1920
Reconductor Pleasant Valley-Saukville 138-kV line	2008	2008	5	new generation	Planned	F 1324
Reconductor Pleasant Valley-St Lawrence 138-kV line	2008	2008	5	new generation	Planned	F 1324
Install series reactor at Cornell Substation	2007	2008	5	congestion, generator deliverability	Proposed	F 1688
Install 200 MVAR capacitor bank at Bluemound Substation	2007	2008	5	reliability	Provisional	F 2085

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 2009

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Construct Gardner Park-Central Wisconsin 345-kV line	2009	2009	1	service limitation, reliability, import capability and Weston stability	Planned	F0301
Construct new Central Wisconsin 345-kV Substation	2009	2009	1	service limitation, reliability, import capability and Weston stability	Planned	F0301
Rebuild Hiawatha-Pine River 69-kV line ESE_6908	2009	2009	2	maintenance	Proposed	F2075
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2009	2009	2	reliability, transfer capability	Planned	F1363
Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Iron Grove Substation	2009	2009	2	reliability, transfer capability	Planned	F1363
Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Aspen Substation	2009	2009	2	reliability	Planned	F1363
Relocate Iron River Substation (Iron Grove)	2009	2009	2	reliability	Planned	F1363
Install 2-24.5 MVAR 138-kV capacitor banks at North Beaver Dam Substation	2005	2009	3	reliability	Provisional	F1476
Install a second 138/69-kV transformer at Hillman Substation	2008	2009	3	reliability	Provisional	F0339
Install 2-8.16 MVAR capacitor banks at new Brewer 69-kV Substation	2009	2009	3	reliability	Proposed	F1476
Convert Rock River to Bristol to Elkhorn 138-kV operation; rebuild Bristol with a new 138-kV bus	2008	2009	3	reliability	Planned	F1690
Construct new Oak Ridge-Verona 138-kV line and install a 138/69-kV transformer at Verona Substation	2009	2009	3	reliability	Proposed	F1407
Upgrade North Lake Geneva-Lake Geneva 69-kV line to 115 MVA	2009	2009	3	reliability	Provisional	F2084

Table PR-5 (continued)
Transmission System Additions for 2009

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Uprate Walworth- North Lake Geneva 69-kV to 69 MVA	2009	2009	3	reliability	Provisional	F2084
Install 2-16.33 MVAR 69 kV capacitor banks at Kilbourn Substation and install 2-24.5 MVAR 138-kV capacitor banks at Artesian Substation	2009	2009	3	reliability	Provisional	F1712
String a new 138-kV line from Clintonville-Werner West primarily on Morgan-Werner West 345-kV line structures	2004	2009	4	reliability, service limitation	Planned	F0823
Construct Morgan-Werner West 345-kV line	2004	2009	4	reliability, service limitation	Planned	F0823
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2009	2009	4	reliability	Proposed	F1361
Replace relaying on 230-kV circuits at Oak Creek Substation	2009	2009	5	new generation	Proposed	F0283
Replace two 345-kV circuit breakers at Pleasant Prairie Substation on the Racine and Zion lines with IPO breakers and upgrade relaying	2009	2009	5	new generation	Proposed	F0283
Expand Oak Creek 345-kV switchyard to interconnect one new generator	2009	2009	5	new generation	Proposed	F1729
Reconductor Oak Creek-Ramsey 138-kV line	2009	2009	5	new generation	Proposed	F0763
Reconductor Oak Creek-Allerton 138-kV line	2009	2009	5	new generation	Proposed	F0763
Install second 500 MVA 345/138-kV transformer at Oak Creek Substation	2009	2009	5	new generation	Proposed	F0763
Loop Ramsey5-Harbor 138-kV line into Norwich and Kansas to form new Ramsey-Norwich and Harbor-Kansas 138-kV lines	2009	2009	5	new generation	Provisional	F0763
Replace current transformers at Racine 345-kV Substation	2009	2009	5	new generation	Proposed	F1165
Construct a 345-kV bus at Bain Substation	2005	2009	5	reliability	Provisional	F0033

Table PR-5 (continued)
Transmission System Additions for 2009

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Construct a 138-kV bus at Hale Substation to permit third Brookdale distribution transformer interconnection	2009	2009	5	T-D interconnection	Proposed	F2097
Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	2009	2009	5	T-D interconnection	Proposed	F2086

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 2010

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Construct Monroe County-Council Creek 161-kV line	2010	2010	1	access initiative, reliability	Provisional	F1727
Install a 161/138-kV transformer at Council Creek Substation	2010	2010	1	access initiative, reliability	Provisional	F1727
Uprate Council Creek-Petenwell 138-kV line	2010	2010	1	access initiative, reliability	Provisional	F1727
Rebuild/reconductor Petenwell-Saratoga 138-kV line	2010	2010	1	access initiative, reliability	Provisional	F1727
Replace 138/69-kV transformer at Metomen Substation	2010	2010	1	reliability	Provisional	F1867
Convert Indian Lake-Hiawatha 69-kV line to double-circuit 138-kV operation, construct new Hiawatha 138-kV Substation	2010	TBD	2	reliability	Provisional	N/A
Construct new Mackinac 138/69-kV Substation	2010	TBD	2	reliability	Provisional	N/A
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	2010	TBD	2	reliability	Provisional	N/A
Uprate Empire-Forsyth 138-kV line terminal equipment	2010	TBD	2	reliability	Provisional	N/A
Uprate Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	2010	TBD	2	reliability	Provisional	N/A
Construct second Paddock-Rockdale 345-kV line	2010	2010	3	access initiative	Proposed	F1981
Loop Nine Springs-Pflaum 69-kV line into Femrite Substation	2006	2010	3	reliability	Provisional	F2088
Install 2-16.33 MVAR capacitor banks at Spring Green 69-kV Substation	2010	2010	3	reliability	Provisional	F1476
Install a 138/69-kV transformer at Bass Creek Substation	2010	2010	3	reliability	Provisional	F1869
Rebuild/reconductor Town Line Road-Bass Creek 138-kV line	2010	2010	3	reliability	Provisional	F1869
Install the second 16.33 MVAR 69-kV capacitor bank at South Lake Geneva Substation	2010	2010	3	reliability	Provisional	F2084

Table PR-6 (continued)
Transmission System Additions for 2010

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Install two 69-kV breakers at Beardsley Street Substation	2010	2010	4	reliability	Provisional	F2082
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Proposed	F0763
Upgrade Oak Creek-Root River 138-kV line	2010	2010	5	new generation	Proposed	F0763
Upgrade Oak Creek-Nicholson 138-kV line	2010	2010	5	new generation	Proposed	F0763

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 2011

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69-kV Substation	2011	2011	1	reliability	Provisional	F1476
Uprate McCue-Milton Lawns 69-kV line	2011	2011	3	reliability	Provisional	F1836
Construct 345-kV line from Rockdale to West Middleton	2011	2011	3	reliability	Proposed	F1435
Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at West Middleton Substation	2011	2011	3	reliability	Proposed	F1435
Loop the Deforest to Token Creek 69-kV line into the Yahara River Substation	2011	2011	3	reliability	Provisional	F1641
Uprate Yahara River - Token Creek 69-kV line	2011	2011	3	reliability	Provisional	F1868
Replace the 400 amp metering CT at North Mullet River 69-kV Substation	2011	2011	4	reliability	Provisional	F1164
Install 2-16.3 MVAR capacitor bank at Mears Corners 138-kV Substation	2011	2011	4	reliability	Provisional	F1924
Install 2-16.3 MVAR capacitor bank at Rosiere 138-kV Substation	2011	2011	4	reliability	Provisional	F1925
A second distribution transformer at Somers Substation requires a rebuild of the Racine-Somers-Albers 138-kV line; extend Albers 138-kV bus to permit connecting the Racine-Somers-Albers radial line to the Albers 138-kV bus	2011	2011	5	T-D interconnection	Provisional	F2095

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

Table PR-8
Transmission System Additions for 2012

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Construct a 69-kV line from SW Ripon Substation to the Ripon-Metomen 69-kV line	2012	2012	1	T-D interconnection	Provisional	F1847
Upgrade Gardner Park-Black Brook 115-kV line – scope TBD	2012	2012	1	reliability	Provisional	F1355
Rebuild Blaney Park-Munising 69 kV to 138 kV	2012	2012	2	reliability, condition	Provisional	F0365
Upgrade M38 138/69-kV transformer	TBD	TBD	2	reliability	Provisional	N/A
Install 2-8.16 MVAR capacitor banks at M38 69-kV Substation	TBD	TBD	2	reliability	Provisional	N/A
Construct North Lake Geneva-White River 138-kV line	2012	2012	3	T-D interconnection	Provisional	F1609
Upgrade Brick Church-Walworth 69-kV line to 115 MVA	2012	2012	3	reliability	Provisional	F2084
Construct Huiskamp-Blount 138-kV line	2012	2012	3	reliability	Proposed	F1642
Upgrade North Monroe-Idle Hour 69-kV line	2012	2012	3	reliability	Provisional	F1868
Construct Shoto-Custer 138-kV line	2012	2012	4	reliability	Provisional	F2081
Install 138/69-kV transformer at Custer Substation	2012	2012	4	reliability	Provisional	F2081
Construct 138-kV line from Canal to Dunn Road	2012	2012	4	reliability	Proposed	F1358
Install 60 MVA 138/69-kV transformer at Dunn Road Substation	2012	2012	4	reliability	Proposed	F1358
Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69-kV Substation	TBD	TBD	2	reliability	Provisional	N/A

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 2013

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Upgrade Mckenna 6.3 MVAR capacitor bank to 10.8 MVAR and install a second new 10.8 MVAR capacitor bank	2013	2013	1	reliability	Provisional	F1476
Rebuild/convert Holmes-Chandler 69 kV to 138-kV operation	2013	2013	2 & 4	reliability, condition	Provisional	F1269
Install 1-8.16 MVAR capacitor bank at Boscobel 69-kV Substation and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2013	2013	3	reliability	Provisional	F1476
Uprate Sheepskin-Dana 69-kV line to 95 MVA	2013	2013	3	reliability	Provisional	F1868
Construct a Lake Delton-Birchwood 138-kV line	2013	2013	3	reliability	Provisional	F1638
Expand Oak Creek 345-kV switchyard to interconnect three new generators plus one new 345-kV line and 138-kV switchyard to accommodate new St. Martins line	2013	2013	5	new generation	Provisional	F1865
Construct a 345/138-kV switchyard at Hale (Brookdale) to accommodate two 345-kV lines, a 500 MVA 345/138-kV transformer and 4-138-kV lines plus three 138-26.2 kV transformers	2013	2013	5	new generation	Provisional	F1865
Install two 345-kV line terminations at Pleasant Prairie and loop Zion-Arcadian 345-kV line into Pleasant Prairie Substation	2013	2013	5	new generation	Provisional	F1865
Construct an Oak Creek-Hale (Brookdale) 345-kV line installing 4 mi. new structures, converting 16.2 mi. of non-operative 230 kV and 5 mi. 138 kV	2013	2013	5	new generation	Provisional	F1865
Construct Oak Creek-St. Martins 138-kV circuit #2 installing 16.6 mi. conductor on existing towers	2013	2013	5	new generation	Provisional	F1865

Table PR-9 (continued)
Transmission System Additions for 2013

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Construct a Hale (Brookdale)-Granville 345-kV line converting/reconductoring 5.6 mi. 138 kV, rebuilding 7 mi. 138 kV double circuit tower line and converting/reconductoring 3 mi. 138 kV on existing 345-kV structures	2013	2013	5	new generation	Provisional	F 1865
Restring Bluemound-Butler 138-kV line (KK5051) on new 345-kV structures installed with Hale (Brookdale)-Granville line	2013	2013	5	new generation	Provisional	F 1865
String Butler-Tamarack 138-kV line on new 345-kV structures installed with Hale (Brookdale)-Granville line	2013	2013	5	new generation	Provisional	F 1865

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 2014

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Construct Fairwater-Mackford Prairie 69-kV line	2014	2014	1	reliability	Provisional	N/A
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	2014	2014	1	reliability	Provisional	N/A
Install a second 138/69-kV transformer at McCue Substation	2014	2014	3	reliability	Provisional	F1637
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	2014	2014	3	reliability	Provisional	F1476
Install 2-16.33 MVAR 69-kV capacitor banks and 2-24.5 MVAR capacitor banks at Femrite Substation	2014	2014	3	reliability	Provisional	F1476
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	2014	2014	3	reliability	Provisional	F1476
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	2014	2014	3	reliability	Provisional	F2093
Upgrade X-67 Portage-Trienda 138-kV line to 373 MVA	2014	2014	3	reliability	Provisional	F2092
Install 2-16.33 MVAR capacitor banks at Montrose Substation	2014	2014	3	reliability	Provisional	F1476
Construct a Horicon-East Beaver Dam 138-kV line	2014	2014	3	reliability	Provisional	F1640
Replace the existing 138/69-kV transformer at South Sheboygan Falls Substation with 100 MVA transformer	2014	2014	4	reliability	Provisional	F1681
Replace the 1200 A breaker at Edgewater T22 345/138-kV transformer	2014	2014	4	reliability	Proposed	F1714
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	2014	2014	4	reliability	Provisional	F2079
Upgrade the Melissa-Tayco to 229 MVA (300F)	2014	2014	4	reliability	Provisional	F1874

Table PR-10 (continued)
Transmission System Additions for 2014

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Reconductor Cornell-Range Line 138-kV line	2014	2014	5	new generation	Proposed	F 1737

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 2015

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Install a second 138/69-kV transformer at Wautoma Substation	2015	2015	1	reliability	Provisional	F0817
Install 2-16.3 MVAR capacitor bank at Aviation Substation	2015	2015	4	reliability	Provisional	F1923
Install 28.8 MVAR capacitor bank at Butternut 138-kV Substation	2015	2015	4	reliability	Provisional	F1403
Replace two existing 138/69-kV transformers at Sunset Point with 100 MVA transformers	2015	2015	4	reliability	Provisional	F2080
Reconductor Pulliam-Danz 69-kV line	2015	2015	4	reliability	Provisional	F1622
Reconductor Danz-Henry Street 69-kV line	2015	2015	4	reliability	Provisional	F1623
Reconductor Pulliam-Van Buren 69-kV line	2015	2015	4	reliability	Provisional	F1624

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 2016

System additions	System need year	Projected In-service year	Planning zone	Need category	Planned, Proposed or Provisional	Cost Estimate - Refer to Funding Project and Sum of Total (2006-2015) in Financial Table
Install a 12.2 MVAR capacitor bank at Hilltop 69-kV Substation	2016	2016	1	reliability	Provisional	F1476
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	2016	2016	3	reliability	Provisional	F1417 & F1609
Construct new 138-kV line from South Lake Geneva to White River Substation	TBD	TBD	3	reliability, T-D interconnection	Provisional	N/A
Construct West Middleton-Blount 138-kV line	2016	2016	3	reliability	Provisional	N/A
Upgrade the Royster to Sycamore 69-kV line to 115 MVA	2016	2016	3	reliability	Provisional	F1871
Construct West Middleton-North Madison 345-kV line	2016	2016	3	reliability, access initiative	Proposed	F1458
Construct Evansville-Brooklyn 69-kV line	2016	2016	3	reliability	Provisional	F1848
Construct a Northside-City Limits 138-kV line	2016	2016	4	reliability	Provisional	F1406
Rebuild/Convert Bayport-Suamico-Sobieski-Pioneer 69-kV line to 138 kV	2016	2016	4	reliability, condition	Provisional	F1619 & F1830
Construct a second Dunn Road-Egg Harbor 69-kV line	2016	2016	4	reliability	Proposed	F0181

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 for Zone 1

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Install a 345/161-kV transformer at Stone Lake Substation (temporary installation for construction outages)	2006	2006	1	reliability	Planned
Construct Gardner Park-Stone Lake 345-kV line	1997	2006	1	service limitation, reliability, import capability & Weston stability	Planned
Reconductor Stratford-McMillan 115-kV line (MEWD portion)	2006	2006	1	reliability	Planned
Construct new Eagle River Muni distribution substation directly adjacent to the existing Cranberry 115-kV Substation	2006	2006	1	T-D interconnection	Planned
Increase size of existing Summit Lake 115-kV capacitor bank from 11.3 to 16.9 MVAR	2006	2006	1	reliability	Planned
Rebuild Weston-Sherman St. and Sherman St.-Hilltop 115-kV lines as double circuits with a new Gardner Park-Hilltop 115-kV line	2007	2007	1	new generation, reliability	Planned
Reconductor Weston-Northpoint 115-kV line	2007	2007	1	achieve transfer capability associated with Arrowhead-Gardner Park, reliability, new generation	Planned
Construct Venus-Metonga 115-kV line	2007	2007	1	T-D interconnection	Planned
Upgrade Metomen-North Fond du Lac 69-kV line terminal equipment	2006	2007	1	reliability	Planned
Install 2-24.5 MVAR capacitor banks at the Wautoma 138-kV and one-16.33 MVAR capacitor bank at the 69-kV Substation	2007	2007	1	reliability	Planned
Upgrade Kelly-Whitcomb 115-kV line conductor clearances to 300F	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned
Construct Stone Lake-Arrowhead 345-kV line	1997	2008	1	service limitation, reliability, import capability & Weston stability	Planned
Construct the new permanent Stone Lake 345/161-kV Substation	2008	2008	1	reliability, import capability & Weston stability	Planned
Install 1-75 MVAR capacitor bank and 1-45 MVAR inductor at Stone Lake 345-kV Substation	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned
Construct new Arrowhead 345-kV Substation, install 2-75 MVAR capacitor banks, 1-800 MVA PST and 1-800 MVA 345/230-kV transformer	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned

**Table PR-13
Transmission System Additions for Zone 1 (continued)**

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Construct Cranberry-Conover 115-kV line	2008	2008	1	reliability, transfer capability	Planned
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Berlin 69-kV Substation	2008	2008	1	reliability	Planned
Construct Brandon-Fairwater 69-kV line	2008	2008	1	T-D interconnection	Proposed
Construct Gardner Park-Central Wisconsin 345-kV line	2009	2009	1	service limitation, reliability, import capability and Weston stability	Planned
Construct new Central Wisconsin 345-kV Substation	2009	2009	1	service limitation, reliability, import capability and Weston stability	Planned
Construct Monroe County-Council Creek 161-kV line	2010	2010	1	access initiative, reliability	Provisional
Install a 161/138-kV transformer at Council Creek Substation	2010	2010	1	access initiative, reliability	Provisional
Upgrade Council Creek-Petenwell 138-kV line	2010	2010	1	access initiative, reliability	Provisional
Rebuild/reconductor Petenwell-Saratoga 138-kV line	2010	2010	1	access initiative, reliability	Provisional
Replace 138/69-kV transformer at Metomen Substation	2010	2010	1	reliability	Provisional
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at the Ripon 69-kV Substation	2011	2011	1	reliability	Provisional
Construct a 69-kV line from SW Ripon Substation to the Ripon-Metomen 69-kV line	2012	2012	1	T-D interconnection	Provisional
Upgrade Gardner Park-Black Brook 115-kV line – scope TBD	2012	2012	1	reliability	Provisional
Upgrade Mckenna 6.3 MVAR capacitor bank to 10.8 MVAR and install a second new 10.8 MVAR capacitor bank	2013	2013	1	reliability	Provisional
Construct Fairwater-Mackford Prairie 69-kV line	2014	2014	1	reliability	Provisional

**Table PR-13
Transmission System Additions for Zone 1 (continued)**

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Reconfigure the North Randolph-Ripon 69-kV line to form a second Ripon-Metomen 69-kV line and retire the circuit between Metomen and the Mackford Prairie tap	2014	2014	1	reliability	Provisional
Install a second 138/69-kV transformer at Wautoma Substation	2015	2015	1	reliability	Provisional
Install a 12.2 MVAR capacitor bank at Hilltop 69-kV Substation	2016	2016	1	reliability	Provisional

Table PR-14
Transmission System Additions for Zone 2

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Uprate Victoria-Ontonagon 69-kV line clearance to 135 degrees F	2006	2006	2	new generation	Planned
Uprate Victoria-Mass 69-kV line clearance to 135 degrees F	2006	2006	2	new generation	Planned
Uprate Mass-Winona 69-kV line clearance to 135 degrees F	2006	2006	2	new generation	Planned
Uprate Winona-Atlantic 69-kV line clearance to 135 degrees F	2006	2006	2	new generation	Planned
Rebuild Stiles-Amberg double circuit 138-kV line	1996	2006	2 & 4	reliability, service limitation, condition	Planned
Install 1-5.4 MVAR capacitor bank at the Sawyer 69-kV Substation	2007	TBD	2	reliability	Provisional
Install 1-8.16 MVAR capacitor bank at the Lincoln 69-kV Substation	2007	2007	2	reliability	Planned
Relocate Brule Substation (Aspen)	2007	2007	2	reliability, condition	Planned
Uprate White Pine-Victoria 69-kV line clearance to 200 degrees F	2007	2007	2	new generation	Planned
Uprate Victoria-Ontonagon 69-kV line clearance to 185 degrees F	2007	2007	2	new generation	Planned
Uprate Victoria-Mass 69-kV line clearance to 185 degrees F	2007	2007	2	new generation	Planned
Install 2-8.16 MVAR capacitor banks at Ontonagon 138-kV Substation	2007	2007	2	reliability	Proposed
Construct 138 kV bus and install 138/115-kV 150 MVA and 138/69-kV 60 MVA transformers at Conover Substation	2008	2008	2	reliability, transfer capability	Planned
Install 1-5.4 MVAR capacitor bank at Munising 69-kV Substation	2008	2008	2	reliability	Proposed
Relocate Cedar Substation (North Lake)	2005	2008	2	reliability, condition	Proposed
Install 1-5.4 MVAR capacitor bank at the Roberts 69-kV Substation	2007	2008	2	reliability	Proposed
Install second 345/138-kV transformer at Plains Substation	2008	2008	2	reliability, transfer capability	Proposed
Rebuild Atlantic-Osceola 69-kV line (Laurium #1)	2006	2008	2	reliability, condition	Planned

**Table PR-14
Transmission System Additions for Zone 2 (continued)**

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Uprate Mass-Winona 69-kV line clearance to 185 degrees F	2008	2008	2	generation	Planned
Uprate Winona-Atlantic 69-kV line clearance to 185 degrees F	2008	2008	2	generation	Planned
Increase ground clearance of Atlantic-Osceola (Laurium #2) 69-kV line from 120 to 167 degrees F	2008	2008	2	reliability	Proposed
Install 1-5.4 MVAR capacitor bank at L'Anse 69-kV Substation	2007	2008	2	reliability	Provisional
Install 2-5.4 MVAR capacitor banks at Osceola 69-kV Substation	TBD	TBD	2	reliability	Provisional
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F	2008	TBD	2	reliability	Provisional
Rebuild Hiawatha-Pine River 69-kV line ESE_6908	2009	2009	2	maintenance	Proposed
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2009	2009	2	reliability, transfer capability	Planned
Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Iron Grove Substation	2009	2009	2	reliability, transfer capability	Planned
Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Aspen Substation	2009	2009	2	reliability	Planned
Relocate Iron River Substation (Iron Grove)	2009	2009	2	reliability	Planned
Convert Indian Lake-Hiawatha 69-kV line to double-circuit 138-kV operation, construct new Hiawatha 138-kV Substation	2010	TBD	2	reliability	Provisional
Construct new Mackinac 138/69-kV Substation	2010	TBD	2	reliability	Provisional
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	2010	TBD	2	reliability	Provisional
Uprate Empire-Forsyth 138-kV line terminal equipment	2010	TBD	2	reliability	Provisional
Uprate Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	2010	TBD	2	reliability	Provisional
Rebuild Blaney Park-Munising 69 kV to 138 kV	2012	2012	2	reliability, condition	Provisional
Uprate M38 138/69-kV transformer	TBD	TBD	2	reliability	Provisional

**Table PR-14
Transmission System Additions for Zone 2 (continued)**

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Install 2-8.16 MVAR capacitor banks at M38 69-kV Substation	TBD	TBD	2	reliability	Provisional
Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69-kV Substation	TBD	TBD	2	reliability	Provisional
Rebuild/convert Holmes-Chandler 69 kV to 138-kV operation	2013	2013	2 & 4	reliability, condition	Provisional

Table PR-15
Transmission System Additions for Zone 3

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Reconnect the 138/69-kV transformers at Kilbourn Substation on separate breakers to operate individually	2006	2006	3	reliability	Planned
Construct new 138-kV line from North Beaver Dam to East Beaver Dam Substation	2006	2006	3	T-D interconnection	Planned
Convert Kegonsa-McFarland-Femrite 69-kV line to 138 kV	2007	2007	3	reliability, new generation	Planned
Construct Sprecher-Femrite 138-kV line	2007	2007	3	reliability, new generation	Planned
Install 138/69-kV transformer at Femrite Substation	2007	2007	3	reliability, new generation	Planned
Install 138/69-kV transformer at Reiner Substation	2007	2007	3	reliability, new generation	Planned
Convert Sycamore-Reiner-Sprecher from 69 kV to 138 kV	2007	2007	3	reliability	Planned
Uprate Rock River 138/69-kV transformer to 65 MVA and uprate Rock River-Turtle 69-kV line to 94 MVA	2006	TBD	3	reliability	Provisional
Upgrade the 5.4 MVAR capacitor bank to 10.8 MVAR at New Glarus Substation	2006	TBD	3	reliability	Provisional
Uprate Colley Road-Park Ave Tap 69-kV line to 95 MVA	2006	2007	3	reliability	Proposed
Construct Butler Ridge 138-kV Substation	2007	2007	3	new generation	Provisional
Uprate Brodhead-South Monroe 69-kV line	2006	2007	3	reliability	Proposed
Construct new 69-kV line from Columbia to Rio to feed the proposed Wycocena Substation	2004	2007	3	T-D interconnection, reliability	Planned
Install 2-16.33 MVAR capacitor banks at Rubicon 138-kV Substation	2006	2007	3	reliability	Planned
Construct new line from Southwest Delavan to Bristol at 138 kV and operate at 69 kV	2007	2007	3	T-D interconnection	Planned
Uprate Janesville-Parkview 69-kV line to 92 MVA	2007	2007	3	reliability	Proposed
Uprate North Lake Geneva-Lake Geneva 69-kV line to 84 MVA	2006	2007	3	reliability	Proposed
Uprate Brick Church-Zenda 69-kV line to 115 MVA	2008	2008	3	reliability	Proposed

Table PR-15
Transmission System Additions for Zone 3 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Install 1-16.33 MVAR 69-kV capacitor bank at South Lake Geneva Substation	2007	2008	3	reliability	Provisional
Uprate Portage-Trienda 138-kV line to 339 MVA	2008	2008	3	reliability	Proposed
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	2008	2008	3	reliability	Provisional
Install 2-16.33 MVAR capacitor bank at the South Monroe 69-kV Substation and remove existing 10.8 MVAR bank	2007	2008	3	reliability	Proposed
Uprate Rockdale to Jefferson 138-kV line	2008	2008	3	reliability	Planned
Uprate Rockdale to Boxelder 138-kV line	2008	2008	3	reliability	Planned
Uprate Boxelder to Stonybrook 138-kV line	2008	2008	3	reliability	Planned
Construct a Jefferson-Lake Mills-Stony Brook 138-kV line	2006	2008	3	reliability	Planned
Construct a Rubicon-Hustisford 138-kV line	2008	2008	3	reliability	Proposed
Rebuild Hustisford-Horicon 69 kV to 138 kV	2008	2008	3	reliability	Proposed
Construct 138/69 kV substation at a site near Horicon Substation and install a 138/69-kV transformer	2008	2008	3	reliability	Proposed
Construct a new 138-kV line from North Madison to Huiskamp (was Waunakee)	2008	2008	3	reliability	Proposed
Construct a new 138/69-kV substation near Huiskamp and install a 187 MVA 138/69-kV transformer	2008	2008	3	reliability	Proposed
Rebuild the Verona to Oregon 69-kV line Y119	2008	2008	3	reliability	Proposed
Rebuild Brodhead to South Monroe 69-kV line	2008	2008	3	generation interconnection, reliability	Proposed
Uprate Darlington-Rock Branch 69-kV line	2008	2008	3	reliability	Proposed
Install 2-24.5 MVAR 138-kV capacitor banks at North Beaver Dam Substation	2005	2009	3	reliability	Provisional
Install a second 138/69-kV transformer at Hillman Substation	2008	2009	3	reliability	Provisional
Install 2-8.16 MVAR capacitor banks at new Brewer 69-kV Substation	2009	2009	3	reliability	Proposed
Convert Rock River to Bristol to Elkhorn 138-kV operation; rebuild Bristol with a new 138 kV bus	2008	2009	3	reliability	Planned

**Table PR-15
Transmission System Additions for Zone 3 (continued)**

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Construct new Oak Ridge-Verona 138-kV line and install a 138/69-kV transformer at Verona Substation	2009	2009	3	reliability	Proposed
Uprate North Lake Geneva-Lake Geneva 69-kV line to 115 MVA	2009	2009	3	reliability	Provisional
Uprate Walworth- North Lake Geneva 69-kV to 69 MVA	2009	2009	3	reliability	Provisional
Install 2-16.33 MVAR 69 kV capacitor banks at Kilbourn Substation and install 2-24.5 MVAR 138-kV capacitor banks at Artesian Substation	2009	2009	3	reliability	Provisional
Construct second Paddock-Rockdale 345-kV line	2010	2010	3	access initiative	Proposed
Loop Nine Springs-Pflaum 69-kV line into Femrite Substation	2006	2010	3	reliability	Provisional
Install 2-16.33 MVAR capacitor banks at Spring Green 69-kV Substation	2010	2010	3	reliability	Provisional
Install a 138/69-kV transformer at Bass Creek Substation	2010	2010	3	reliability	Provisional
Rebuild/reconductor Town Line Road-Bass Creek 138-kV line	2010	2010	3	reliability	Provisional
Install the second 16.33 MVAR 69-kV capacitor bank at South Lake Geneva Substation	2010	2010	3	reliability	Provisional
Uprate McCue-Milton Lawns 69-kV line	2011	2011	3	reliability	Provisional
Construct 345-kV line from Rockdale to West Middleton	2011	2011	3	reliability	Proposed
Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at West Middleton Substation	2011	2011	3	reliability	Proposed
Loop the Deforest to Token Creek 69-kV line into the Yahara River Substation	2011	2011	3	reliability	Provisional
Uprate Yahara River-Token Creek 69-kV line	2011	2011	3	reliability	Provisional
Uprate Brick Church-Walworth 69-kV line to 115 MVA	2012	2012	3	reliability	Provisional
Construct Huiskamp-Blount 138-kV line	2012	2012	3	reliability	Proposed
Uprate North Monroe-Idle Hour 69-kV line	2012	2012	3	reliability	Provisional

**Table PR-15
Transmission System Additions for Zone 3 (continued)**

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Construct North Lake Geneva-White River 138-kV line	2012	2012	3	T-D interconnection	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	2013	2013	3	reliability	Provisional
Uprate Sheepskin-Dana 69-kV line to 95 MVA	2013	2013	3	reliability	Provisional
Construct a Lake Delton-Birchwood 138-kV line	2013	2013	3	reliability	Provisional
Install a second 138/69-kV transformer at McCue Substation	2014	2014	3	reliability	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	2014	2014	3	reliability	Provisional
Install 2-16.33 MVAR 69-kV capacitor banks and 2-24.5 MVAR capacitor banks at Femrite Substation	2014	2014	3	reliability	Provisional
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	2014	2014	3	reliability	Provisional
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	2014	2014	3	reliability	Provisional
Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	2014	2014	3	reliability	Provisional
Install 2-16.33 MVAR capacitor banks at Montrose Substation	2014	2014	3	reliability	Provisional
Construct a Horicon-East Beaver Dam 138-kV line	2014	2014	3	reliability	Provisional
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	2016	2016	3	reliability	Provisional
Construct new 138-kV line from South Lake Geneva to White River Substation	TBD	TBD	3	reliability, T-D interconnection	Provisional
Construct West Middleton-Blount 138-kV line	2016	2016	3	reliability	Provisional
Uprate the Royster to Sycamore 69-kV line to 115 MVA	2016	2016	3	reliability	Provisional

*Table PR-15
Transmission System Additions for Zone 3 (continued)*

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Construct West Middleton-North Madison 345-kV line	2016	2016	3	reliability, access initiative	Proposed
Construct Evansville-Brooklyn 69-kV line	2016	2016	3	reliability	Provisional

Table PR-16
Transmission System Additions for Zone 4

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Construct a 345/138-kV switchyard at a new Werner West Substation; install a 345/138-kV transformer. Loop existing Rocky Run to North Appleton 345 kV and existing Werner to White Lake 138-kV lines into Werner West	2004	2006	4	reliability, service limitation	Planned
Construct a 138-kV substation at a new Forward Energy Center; loop existing Butternut-South Fond du Lac line into Forward Energy Center	2006	2006	4	new generation	Planned
Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress	2006	2006	4	new generation	Planned
Rebuild Stiles-Amberg double circuit 138-kV line	1996	2006	2 & 4	reliability, service limitation, condition	Planned
Uprate Lakefront-Revere 69-kV line	2006	2007	4	reliability, service limitation	Provisional
String a new Ellinwood-Sunset Point 138-kV line on existing structures	2007	2007	4	reliability	Planned
Install 2-16.3 MVAR capacitor bank at Canal 69-kV Substation	2007	2007	4	reliability	Planned
Uprate North Appleton-Lawn Road-White Clay 138-kV line	2007	2007	4	reliability	Planned
Construct double circuit 138-kV line from Forest Junction/Howards Grove/Charter Steel to Plymouth #4 Substation	2007	2007	4	T-D interconnection	Planned
Rebuild Crivitz-High Falls 69-kV double circuit line	2008	2008	4	reliability	Proposed
Expand the Menominee 69-kV Substation and install 138 kV terminals. Loop the West Marinette-Bay De Noc 138-kV line into the Substation	2008	2008	4	reliability	Provisional
Install 138/69-kV transformer at the expanded Menominee Substation	2008	2008	4	reliability	Provisional
Uprate North Appleton-Mason Street 138-kV line	2008	2008	4	reliability, service limitation	Proposed
Uprate North Appleton-Lost Dauphin 138-kV line	2008	2008	4	reliability, service limitation	Proposed

**Table PR-16
Transmission System Additions for Zone 4 (continued)**

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Install 2-4.1 MVAR capacitor bank at Sister Bay 69-kV Substation	2008	2008	4	reliability	Provisional
String a new 138-kV line from Clintonville-Werner West primarily on Morgan-Werner West 345-kV line structures	2004	2009	4	reliability, service limitation	Planned
Construct Morgan-Werner West 345-kV line	2004	2009	4	reliability, service limitation	Planned
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2009	2009	4	reliability	Proposed
Install two 69-kV breakers at Beardsley Street Substation	2010	2010	4	reliability	Provisional
Replace the 400 amp metering CT at North Mullet River 69-kV Substation	2011	2011	4	reliability	Provisional
Install 2-16.3 MVAR capacitor bank at Mears Corners 138-kV Substation	2011	2011	4	reliability	Provisional
Install 2-16.3 MVAR capacitor bank at Rosiere 138-kV Substation	2011	2011	4	reliability	Provisional
Construct Shoto to Custer 138-kV line	2012	2012	4	reliability	Provisional
Install 138/69-kV transformer at Custer Substation	2012	2012	4	reliability	Provisional
Construct 138-kV line from Canal to Dunn Road	2012	2012	4	reliability	Proposed
Install 60 MVA 138/69-kV transformer at Dunn Road Substation	2012	2012	4	reliability	Proposed
Rebuild/convert Holmes-Chandler 69 kV to 138-kV operation	2013	2013	2 & 4	reliability, condition	Provisional
Replace the existing 138/69-kV transformer at South Sheboygan Falls Substation with 100 MVA transformer	2014	2014	4	reliability	Provisional
Replace the 1200 A breaker at Edgewater T22 345/138-kV transformer	2014	2014	4	reliability	Proposed
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	2014	2014	4	reliability	Provisional
Upgrade the Melissa-Tayco to 229 MVA (300F)	2014	2014	4	reliability	Provisional
Install 2-16.3 MVAR capacitor bank at Aviation Substation	2015	2015	4	reliability	Provisional

**Table PR-16
Transmission System Additions for Zone 4 (continued)**

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Install 28.8 MVAR capacitor bank at Butternut 138-kV Substation	2015	2015	4	reliability	Provisional
Replace two existing 138/69-kV transformers at Sunset Point with 100 MVA transformers	2015	2015	4	reliability	Provisional
Reconductor Pulliam-Danz 69-kV line	2015	2015	4	reliability	Provisional
Reconductor Danz-Henry Street 69-kV line	2015	2015	4	reliability	Provisional
Reconductor Pulliam-Van Buren 69-kV line	2015	2015	4	reliability	Provisional
Construct a Northside-City Limits 138-kV line	2016	2016	4	reliability	Provisional
Rebuild/Convert Bayport-Suamico-Sobieski-Pioneer 69-kV line to 138 kV	2016	2016	4	reliability, condition	Provisional
Construct a second Dunn Road-Egg Harbor 69-kV line	2016	2016	4	reliability	Proposed

Table PR-17
Transmission System Additions for Zone 5

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Improve clearance on Kenosha-Lakeview 138-kV line KK9341	2006	2006	5	congestion, reliability	Proposed
Reconductor Pleasant Valley-Saukville 138-kV line	2008	2008	5	new generation	Planned
Reconductor Pleasant Valley-St Lawrence 138-kV line	2008	2008	5	new generation	Planned
Install series reactor at Cornell Substation	2007	2008	5	congestion, generator deliverability	Proposed
Install 200 MVAR capacitor bank at Bluemound Substation	2007	2008	5	reliability	Provisional
Replace relaying on 230-kV circuits at Oak Creek Substation	2009	2009	5	new generation	Proposed
Replace two 345-kV circuit breakers at Pleasant Prairie Substation on the Racine and Zion lines with IPO breakers and upgrade relaying	2009	2009	5	new generation	Proposed
Expand Oak Creek 345-kV switchyard to interconnect one new generator	2009	2009	5	new generation	Proposed
Reconductor Oak Creek-Ramsey 138-kV line	2009	2009	5	new generation	Proposed
Reconductor Oak Creek-Allerton 138-kV line	2009	2009	5	new generation	Proposed
Install second 500 MVA 345/138-kV transformer at Oak Creek Substation	2009	2009	5	new generation	Proposed
Loop Ramsey5-Harbor 138-kV line into Norwich and Kansas to form new Ramsey-Norwich and Harbor-Kansas 138-kV lines	2009	2009	5	new generation	Provisional
Replace CTs at Racine 345-kV Substation	2009	2009	5	new generation	Proposed
Construct a 345-kV bus at Bain Substation	2005	2009	5	reliability	Provisional
Construct a 138-kV bus at Hale Substation to permit third Brookdale distribution transformer interconnection	2009	2009	5	T-D interconnection	Proposed
Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	2009	2009	5	T-D interconnection	Proposed
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Proposed
Upgrade Oak Creek-Root River 138-kV line	2010	2010	5	new generation	Proposed
Upgrade Oak Creek-Nicholson 138-kV line	2010	2010	5	new generation	Proposed

Table PR-17
Transmission System Additions for Zone 5

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
A second distribution transformer at Somers Substation requires a rebuild of the Racine-Somers-Albers 138-kV line; extend Albers 138-kV bus to permit connecting the Racine-Somers-Albers radial line to the Albers 138-kV bus	2011	2011	5	T-D interconnection	Provisional
Expand Oak Creek 345-kV switchyard to interconnect three new generators plus one new 345-kV line and 138 kV switchyard to accommodate new St. Martins line	2013	2013	5	new generation	Provisional
Construct a 345/138-kV switchyard at Hale (Brookdale) to accommodate two 345-kV lines, a 500 MVA 345/138-kV transformer and 4-138-kV lines plus three 138-26.2 kV transformers	2013	2013	5	new generation	Provisional
Install two 345-kV line terminations at Pleasant Prairie and loop Zion-Arcadian 345-kV line into Pleasant Prairie Substation	2013	2013	5	new generation	Provisional
Construct an Oak Creek-Hale (Brookdale) 345-kV line installing 4 mi. new structures, converting 16.2 mi. of non-operative 230 kV and 5 mi. 138 kV	2013	2013	5	new generation	Provisional
Construct Oak Creek-St. Martins 138-kV circuit #2 installing 16.6 mi. conductor on existing towers	2013	2013	5	new generation	Provisional
Construct a Hale (Brookdale)-Granville 345-kV line converting/reconducting 5.6 mi. 138 kV, rebuilding 7 mi. 138-kV double-circuit tower line and converting/reconducting 3 mi. 138 kV on existing 345-kV structures	2013	2013	5	new generation	Provisional
Restring Bluemound-Butler 138-kV line (KK5051) on new 345-kV structures installed with Hale (Brookdale)-Granville line	2013	2013	5	new generation	Provisional
String Butler-Tamarack 138-kV line on new 345-kV structures installed with Hale (Brookdale)-Granville line	2013	2013	5	new generation	Provisional
Reconductor Cornell-Range Line 138-kV line	2014	2014	5	new generation	Proposed

**Table PR-18
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			
reduce service limitations, relieve overloads or low voltages under contingency, improve transfer capability & Weston stability	Construct Gardner Park-Stone Lake 345-kV line	140	73.4	1997	2006	1
T-D interconnection request	Construct new 138-kV line from North Beaver Dam to East Beaver Dam Substation	1.5	1.5	2006	2006	3
T-D interconnection request	Construct Venus-Metonga 115-kV line	12.5	11.5	2007	2007	1
relieve overloads or low voltages under contingency, accommodate new generation	Construct Sprecher-Femrite 138-kV line	2	2	2007	2007	3
T-D interconnection request, relieve overloads or low voltages under contingency	Construct new 69-kV line from Columbia to Rio to feed the proposed Wyocena Substation	8.16	8.16	2004	2007	3
T-D interconnection request	Construct new line from Southwest Delavan to Bristol at 138 kV and operate at 69 kV	3.5	3.5	2007	2007	3
T-D interconnection request	Construct double circuit 138-kV line from Forest Junction/Howards Grove/Charter Steel to Plymouth #4	1.75	1.75	2007	2007	4
reduce service limitations, relieve overloads or low voltages under contingency, improve transfer capability & Weston stability	Construct Stone Lake-Arrowhead 345-kV line	70	36.6	1997	2008	1
relieve overloads or low voltages under contingency, transfer capability	Construct Cranberry-Conover 115-kV line	14	14	2008	2008	1
T-D interconnection request	Construct Brandon-Fairwater 69-kV line	4	4	2008	2008	1
relieve overloads or low voltages under contingency	Construct a Jefferson-Lake Mills-Stony Brook 138-kV line	12	12	2006	2008	3
relieve overloads or low voltages under contingency	Construct a Rubicon-Hustisford 138-kV line	5	5	2008	2008	3
relieve overloads or low voltages under contingency	Construct a new 138-kV line from North Madison to Huiskamp (was Waunakee)	5	5	2008	2008	3
relieve overloads or low voltages under contingency	Construct new Oak Ridge-Verona 138-kV line and install a 138/69-kV transformer at Verona Substation	9	3	2009	2009	3

**Table PR-18
Identified Needs and Transmission Lines Requiring New Right-of-Way**

Identified need	Potential solutions	Approx. line mileage		System need year	Projected In-service year	Planning zone
		Total	New ROW			
relieve overloads or low voltages under contingency, reduce service limitations	String a new 138-kV line from Clintonville-Werner West primarily on Morgan-Werner West 345-kV line structures	16	2	2004	2009	4
relieve overloads or low voltages under contingency, reduce service limitations	Construct Morgan-Werner West 345-kV line	47	47	2004	2009	4
relieve overloads or low voltages under contingency	Construct 345-kV line from Rockdale to West Middleton	35	35	2011	2011	3
relieve overloads or low voltages under contingency	Loop the DeForest to Token Creek 69-kV line into the Yahara River Substation	1	1	2011	2011	3
T-D interconnection request	Construct a 69-kV line from SW Ripon Substation to the Ripon-Metomen 69-kV line	1.5	1.5	2012	2012	1
T-D interconnection request	Construct a North Lake Geneva-White River 138-kV line	1.4	1.4	2012	2012	3
relieve overloads or low voltages under contingency	Construct Shoto to Custer 138-kV line	9.94	9.94	2012	2012	4
relieve overloads or low voltages under contingency	Construct a Lake Delton-Birchwood 138-kV line	5	5	2013	2013	3
accommodate new generation	Construct an Oak Creek-Hale (Brookdale) 345-kV line installing 4 mi. new structures, converting 16.2 mi. of non-operative 230 kV and 5 mi. 138 kV	25.2	4	2013	2013	5
relieve overloads or low voltages under contingency, replace aging facilities	Rebuild/convert Holmes-Chandler 69 kV to 138-kV operation	54	14	2013	2013	2 & 4
relieve overloads or low voltages under contingency	Construct Fairwater-Mackford Prairie 69-kV line	5	5	2014	2014	1
relieve overloads or low voltages under contingency	Construct a Horicon-East Beaver Dam 138-kV line	9	9	2014	2014	3
relieve overloads or low voltages under contingency, T-D interconnection request	Construct new 138-kV line from South Lake Geneva to White River Substation	3	3	TBD	TBD	3
relieve overloads or low voltages under contingency, access initiative	Construct West Middleton-North Madison 345-kV line	20	20	2016	2016	3
relieve overloads or low voltages under contingency	Construct Evansville-Brooklyn 69-kV line	8	8	2016	2016	3

**Table PR-18
Identified Needs and Transmission Lines Requiring New Right-of-Way**

Identified need	Potential solutions	Approx. line mileage		System need year	Projected In-service year	Planning zone
		Total	New ROW			
relieve overloads or low voltages under contingency	Construct a second Dunn Road-Egg Harbor 69-kV line	12.66	12.66	2016	2016	4

**Table PR-19
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	Reconductor Stratford-McMillan 115-kV line (MEWD portion)	10	2006	2006	1
relieve overloads or low voltages under contingency, reduce service limitations, replace aging facilities	Rebuild Stiles-Amberg double circuit 138-kV line	45	1996	2006	2 & 4
accommodate new generation, relieve overloads or low voltages under contingency	Rebuild Weston-Sherman St. and Sherman St.-Hilltop 115-kV lines as double circuits with a new Gardner Park-Hilltop 115-kV line	9.5	2007	2007	1
achieve transfer capability associated with Arrowhead-Gardner Park, relieve overloads or low voltages under contingency, accommodate new generation	Reconductor Weston-Northpoint 115-kV line	24	2007	2007	1
relieve overloads or low voltages under contingency, accommodate new generation	Convert Kegonsa-McFarland-Femrite 69-kV line to 138 kV	5.9	2007	2007	3
relieve overloads or low voltages under contingency	Convert Sycamore-Reiner-Sprecher from 69 kV to 138 kV	6.5	2007	2007	3
relieve overloads or low voltages under contingency	String a new Ellinwood-Sunset Point 138-kV line on existing structures	3.58	2007	2007	4
relieve overloads or low voltages under contingency	Uprate North Appleton-Lawn Road-White Clay 138-kV line	29.8	2007	2007	4
achieve transfer capability associated with Arrowhead-Gardner Park	Upgrade Kelly-Whitcomb 115-kV line conductor clearances to 300F	24	2008	2008	1
relieve overloads or low voltages under contingency, replace aging facilities	Rebuild Atlantic-Osceola 69-kV line (Laurium #1)	13.7	2006	2008	2
relieve overloads or low voltages under contingency	Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F	22	2008	TBD	2
relieve overloads or low voltages under contingency	Rebuild Hustisford-Horicon 69 kV to 138 kV	8	2008	2008	3
relieve overloads or low voltages under contingency	Rebuild the Verona to Oregon 69-kV line Y119	11	2008	2008	3

**Table PR-19
Transmission Line Rebuilds/Reconductors, New Circuits and Voltage Conversions on
Existing Right-of-Way**

Identified need	Lines to be rebuilt/reconducted on existing ROW	Approx. mileage of rebuilt, reconducted or updated lines	System need year	Projected In-service year	Planning zone
generation interconnection, relieve overloads or low voltages under contingency	Rebuild Brodhead to South Monroe 69-kV line	18	2008	2008	3
relieve overloads or low voltages under contingency	Rebuild Crivitz-High Falls 69-kV double circuit line	14.5	2008	2008	4
relieve overloads or low voltages under contingency, reduce service limitations	Uprate North Appleton-Mason Street 138-kV line	21	2008	2008	4
relieve overloads or low voltages under contingency, reduce service limitations	Uprate North Appleton-Lost Dauphin 138-kV line	12	2008	2008	4
accommodate new generation	Reconductor Pleasant Valley-Saukville 138-kV line	12	2008	2008	5
accommodate new generation	Reconductor Pleasant Valley-St Lawrence 138-kV line	7	2008	2008	5
reduce service limitations, relieve overloads or low voltages under contingency, improve transfer capability and Weston stability	Construct Gardner Park-Central Wisconsin 345-kV line	47	2009	2009	1
maintenance	Rebuild Hiawatha-Pine River 69-kV line ESE 6908	48.28	2009	2009	2
relieve overloads or low voltages under contingency, transfer capability	Rebuild/convert Conover-Plains 69-kV line to 138 kV	73	2009	2009	2
relieve overloads or low voltages under contingency	Convert Rock River to Bristol to Elkhorn 138-kV operation; rebuild Bristol with a new 138 kV bus	27.74	2008	2009	3
relieve overloads or low voltages under contingency	Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2.37	2009	2009	4
accommodate new generation	Reconductor Oak Creek-Ramsey 138-kV line	8.5	2009	2009	5
accommodate new generation	Reconductor Oak Creek-Allerton 138-kV line	5.41	2009	2009	5

**Table PR-19
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
accommodate new generation	Loop Ramsey5-Harbor 138-kV line into Norwich and Kansas to form new Ramsey-Norwich and Harbor-Kansas 138-kV lines	5.72	2009	2009	5
access initiative, relieve overloads or low voltages under contingency	Construct Monroe County-Council Creek 161-kV line	20	2010	2010	1
access initiative, relieve overloads or low voltages under contingency	Uprate Council Creek-Petenwell 138-kV line	32	2010	2010	1
access initiative, relieve overloads or low voltages under contingency	Rebuild/reconductor Petenwell-Saratoga 138-kV line	23	2010	2010	1
relieve overloads or low voltages under contingency	Convert Indian Lake-Hiawatha 69-kV line to double-circuit 138-kV operation, construct new Hiawatha 138-kV Substation	40	2010	TBD	2
access initiative	Construct second Paddock-Rockdale 345-kV line	35	2010	2010	3
relieve overloads or low voltages under contingency	Rebuild/reconductor Town Line Road-Bass Creek 138-kV line	9	2010	2010	3
accommodate new generation	Uprate Oak Creek-Nicholson 138-kV line	6.8	2010	2010	5
T-D interconnection request	A second distribution transformer at Somers Substation requires a rebuild of the Racine-Somers-Albers 138-kV line; extend Albers 138-kV bus to permit connecting the Racine-Somers-Albers radial line to the Albers 138-kV bus	8	2011	2011	5
relieve overloads or low voltages under contingency, replace aging facilities	Rebuild Blaney Park-Munising 69 kV to 138 kV	50	2012	2012	2
relieve overloads or low voltages under contingency	Construct Huiskamp-Blount 138-kV line	5	2012	2012	3
relieve overloads or low voltages under contingency	Construct Canal-Dunn Road 138-kV line	7.64	2012	2012	4
accommodate new generation	Construct Oak Creek-St. Martins 138-kV circuit #2 installing 16.6 mi. conductor on existing towers	16.6	2013	2013	5

**Table PR-19
Transmission Line Rebuilds/Reconductors, New Circuits and Voltage Conversions on
Existing Right-of-Way**

Identified need	Lines to be rebuilt/reconstructed on existing ROW	Approx. mileage of rebuilt, reconstructed or updated lines	System need year	Projected In-service year	Planning zone
accommodate new generation	Construct a Hale (Brookdale)-Granville 345-kV line converting/reconducting 5.6 mi. 138 kV, rebuilding 7 mi. 138 kV double circuit tower line and converting/reconducting 3 mi. 138 kV on existing 345 kV structures	15.6	2013	2013	5
accommodate new generation	Restricting Bluemound-Butler 138-kV line (KK5051) on new 345-kV structures installed with Hale (Brookdale)-Granville line	5.41	2013	2013	5
accommodate new generation	String Butler-Tamarack 138-kV line on new 345-kV structures installed with Hale (Brookdale)-Granville line	4.12	2013	2013	5
relieve overloads or low voltages under contingency	Reconfigure the North Randolph-Ripon 69-kV line to form a second Ripon-Metomen 69-kV line and retire the circuit between Metomen and the Mackford Prairie tap	5	2014	2014	1
accommodate new generation	Reconductor Cornell-Range Line 138-kV line	2.43	2014	2014	5
relieve overloads or low voltages under contingency	Reconductor Pulliam-Danz 69-kV line	3	2015	2015	4
relieve overloads or low voltages under contingency	Reconductor Danz-Henry Street 69-kV line	1.5	2015	2015	4
relieve overloads or low voltages under contingency	Reconductor Pulliam-Van Buren 69-kV line	2	2015	2015	4
relieve overloads or low voltages under contingency	Construct West Middleton-Blount 138-kV line	5	2016	2016	3
relieve overloads or low voltages under contingency	Upgrade the Royster to Sycamore 69-kV line to 115 MVA	3.35	2016	2016	3
relieve overloads or low voltages under contingency	Construct a Northside-City Limits 138-kV line	3.16	2016	2016	4
relieve overloads or low voltages under contingency, replace aging facilities	Rebuild/Convert Bayport-Suamico-Sobieski-Pioneer 69-kV line to 138 kV	21.5	2016	2016	4

**Table PR-20
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	Install a 345/161-kV transformer at Stone Lake Substation (temporary installation for construction outages)	300	0	2006	2006	1
relieve overloads under contingency, reduce service limitations	Construct a 345/138-kV switchyard at a new Werner West Substation; install a 345/138-kV transformer. Loop existing Rocky Run to North Appleton 345 kV and existing Werner to White Lake 138-kV lines into Werner West	500	0	2004	2006	4
accommodate new generation	Construct a 138-kV substation at a new Forward Energy Center Substation; loop existing Butternut-South Fond du Lac line into Forward Energy Center	N/A	0	2006	2006	4
accommodate new generation	Construct a 345-kV substation at new Cypress Substation; loop existing Forest Junction-Arcadian line into new Cypress	N/A	0	2006	2006	4
relieve overloads under contingency, replace aging facilities	Relocate Brule Substation (Aspen)	N/A	0	2007	2007	2
relieve overloads under contingency, accommodate new generation	Install 138/69-kV transformer at Femrite Substation	187	0	2007	2007	3
relieve overloads under contingency, accommodate new generation	Install 138/69-kV transformer at Reiner Substation	100	0	2007	2007	3
relieve overloads under contingency, improve transfer capability & Weston stability	Construct the new permanent Stone Lake 345/161-kV Substation	N/A	0	2008	2008	1
relieve overloads under contingency, transfer capability	Construct 138 kV bus and install 138/115-kV 150 MVA and 138/69-kV 60 MVA transformers at Conover Substation	210	0	2008	2008	2
relieve overloads under contingency, replace aging facilities	Relocate Cedar Substation (North Lake)	N/A	0	2005	2008	2
relieve overloads under contingency, transfer capability	Install second 345/138-kV transformer at Plains Substation	500	0	2008	2008	2
relieve overloads under contingency	Construct 138/69 kV substation at a site near Horicon and install a 138/69-kV transformer	100	0	2008	2008	3
relieve overloads under contingency	Construct a new 138/69-kV substation near Huiskamp and install a 187 MVA 138/69-kV transformer	187	0	2008	2008	3

**Table PR-20
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	Install 138/69-kV transformer at the expanded Menominee Substation	100	0	2008	2008	4
reduce service limitations, relieve overloads under contingency, improve transfer capability and Weston stability	Construct new Central Wisconsin 345-kV Substation	N/A	N/A	2009	2009	1
relieve overloads under contingency, transfer capability	Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Iron Grove Substation	60	0	2009	2009	2
relieve overloads under contingency	Construct 138 kV bus and install a 138/69 kV, 60 MVA transformer at Aspen Substation	60	0	2009	2009	2
relieve overloads under contingency	Relocate Iron River Substation (Iron Grove)		0	2009	2009	2
relieve overloads under contingency	Install a second 138/69-kV transformer at Hillman Substation	47	0	2008	2009	3
accommodate new generation	Install second 500 MVA 345/138-kV transformer at Oak Creek Substation	500	0	2009	2009	5
relieve overloads under contingency	Construct a 345-kV bus at Bain Substation	N/A	0	2005	2009	5
T-D interconnection request	Construct a 138-kV bus at Hale Substation to permit third Brookdale distribution transformer interconnection	N/A	0	2009	2009	5
access initiative, relieve overloads under contingency	Install a 161/138-kV transformer at Council Creek Substation	100	0	2010	2010	1
relieve overloads under contingency	Replace 138/69-kV transformer at Metomen Substation	100	47	2010	2010	1
relieve overloads under contingency	Construct new Mackinac 138/69-kV Substation	N/A	0	2010	TBD	2
relieve overloads under contingency	Install a 138/69-kV transformer at Bass Creek Substation	100	0	2010	2010	3
relieve overloads under contingency	Construct a 345-kV bus and install a 345/138 kV 500 MVA transformer at West Middleton Substation	500	0	2011	2011	3
relieve overloads under contingency	Upgrade M38 138/69-kV transformer	64	47	TBD	TBD	2
relieve overloads under contingency	Install 60 MVA 138/69-kV transformer at Dunn Road Substation	60	0	2012	2012	4
relieve overloads or low voltages under contingency	Install 138/69-kV transformer at Custer Substation	100	0	2012	2012	4

**Table PR-20
New Substations, Transformer Additions and Replacements**

Identified need	Potential additions or replacements	Transformer Capacity (MVA)		System need year	Projected In-service year	Planning zone
		Install	Replace			
accommodate new generation	Construct a 345/138-kV switchyard at Hale (Brookdale) to accommodate two 345-kV lines, a 500 MVA 345/138-kV transformer and 4-138-kV lines plus three 138-26.2 kV transformers	500	0	2013	2013	5
relieve overloads under contingency	Install a second 138/69-kV transformer at McCue Substation	100	0	2014	2014	3
relieve overloads under contingency	Construct a 345-kV bus, install a 345/138-kV 500 MVA transformer at North Randolph and loop the Columbia to South Fond Du Lac 345-kV line into the substation	500	0	2014	2014	3
relieve overloads under contingency	Replace the existing 138/69-kV transformer at South Sheboygan Falls Substation with 100 MVA transformer	100	60	2014	2014	4
relieve overloads under contingency	Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	200	116	2014	2014	4
relieve overloads under contingency	Install a second 138/69-kV transformer at Wautoma Substation	100	0	2015	2015	1
relieve overloads under contingency	Replace two existing 138/69-kV transformers at Sunset Point with 100 MVA transformers	200	142	2015	2015	4
relieve overloads under contingency	Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	100	0	2016	2016	3

**Table PR-21
Substation Equipment Additions and Replacements**

Identified need	Potential additions or replacements	Capacitor bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
T-D interconnection request	Construct new Eagle River Muni distribution substation directly adjacent to the existing Cranberry 115-kV Substation	N/A	2006	2006	1
relieve overloads or low voltages under contingency	Increase size of existing Summit Lake 115-kV capacitor bank from 11.3 to 16.9 MVAR	5.6	2006	2006	1
relieve overloads or low voltages under contingency	Install 1-5.4 MVAR capacitor bank at Sawyer 69-kV Substation	5.4	2007	TBD	2
accommodate new generation	Uprate Victoria-Ontonagon 69-kV line clearance to 135 degrees F	N/A	2006	2006	2
accommodate new generation	Uprate Victoria-Mass 69-kV line clearance to 135 degrees F	N/A	2006	2006	2
accommodate new generation	Uprate Mass-Winona 69-kV line clearance to 135 degrees F	N/A	2006	2006	2
accommodate new generation	Uprate Winona-Atlantic 69-kV line clearance to 135 degrees F	N/A	2006	2006	2
relieve overloads or low voltages under contingency	Reconnect the 138/69-kV transformers at Kilbourn Substation on separate breakers to operate individually	N/A	2006	2006	3
congestion, relieve overloads or low voltages under contingency	Improve clearance on Kenosha-Lakeview 138-kV line KK9341	N/A	2006	2006	5
relieve overloads or low voltages under contingency	Uprate Metomen-North Fond du Lac 69-kV line terminal equipment	N/A	2006	2007	1
relieve overloads or low voltages under contingency	Install 2-24.5 MVAR capacitor banks at Wautoma 138-kV Substation and one-16.33 MVAR capacitor bank at 69 kV	65.3	2007	2007	1
relieve overloads or low voltages under contingency	Install 1-8.16 MVAR capacitor bank at Lincoln 69-kV Substation	8.16	2007	2007	2
accommodate new generation	Uprate White Pine-Victoria 69-kV line clearance to 200 degrees F	N/A	2007	2007	2
accommodate new generation	Uprate Victoria-Ontonagon 69-kV line clearance to 185 degrees F	N/A	2007	2007	2
accommodate new generation	Uprate Victoria-Mass 69-kV line clearance to 185 degrees F	N/A	2007	2007	2
relieve overloads or low voltages under contingency	Install 2-8.16 MVAR capacitor banks at Ontonagon 138-kV Substation	16.32	2007	2007	2
relieve overloads or low voltages under contingency	Uprate Rock River 138/69-kV transformer to 65 MVA and uprate Rock River-Turtle 69-kV line to 94 MVA	N/A	2006	TBD	3

**Table PR-21
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	Upgrade the 5.4 MVAR capacitor bank to 10.8 MVAR at New Glarus Substation	5.4	2006	TBD	3
relieve overloads or low voltages under contingency	Uprate Colley Road-Park Ave Tap 69-kV line to 95 MVA	N/A	2006	2007	3
accommodate new generation	Construct Butler Ridge 138-kV Substation	N/A	2007	2007	3
relieve overloads or low voltages under contingency	Uprate Brodhead-South Monroe 69-kV line	N/A	2006	2007	3
relieve overloads or low voltages under contingency	Install 2-16.33 MVAR capacitor banks at Rubicon 138-kV Substation	32.66	2006	2007	3
relieve overloads or low voltages under contingency	Uprate Janesville-Parkview 69-kV line to 92 MVA	N/A	2007	2007	3
relieve overloads or low voltages under contingency	Uprate North Lake Geneva-Lake Geneva 69-kV line to 84 MVA	N/A	2006	2007	3
relieve overloads or low voltages under contingency, reduce service limitations	Uprate Lakefront-Revere 69-kV line	N/A	2006	2007	4
relieve overloads or low voltages under contingency	Install 2-16.3 MVAR capacitor bank at Canal 69-kV Substation	32.6	2007	2007	4
achieve transfer capability associated with Arrowhead-Gardner Park	Install 1-75 MVAR capacitor bank and 1-45 MVAR inductor at Stone Lake 345-kV Substation	75	2008	2008	1
achieve transfer capability associated with Arrowhead-Gardner Park	Construct new Arrowhead 345-kV Substation, install 2-75 MVAR capacitor banks, 1-800 MVA PST and 1-800 MVA 345/230-kV transformer	150	2008	2008	1
relieve overloads or low voltages under contingency	Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Berlin 69-kV Substation	12.3	2008	2008	1
relieve overloads or low voltages under contingency	Install 1-5.4 MVAR capacitor bank at Munising 69-kV Substation	5.4	2008	2008	2
relieve overloads or low voltages under contingency	Install 1-5.4 MVAR capacitor bank at Roberts 69-kV Substation	5.4	2007	2008	2
accommodate new generation	Uprate Mass-Winona 69-kV line clearance to 185 degrees F	N/A	2008	2008	2
accommodate new generation	Uprate Winona-Atlantic 69-kV line clearance to 185 degrees F	N/A	2008	2008	2
relieve overloads or low voltages under contingency	Increase ground clearance of Atlantic-Osceola (Laurium #2) 69-kV line from 120 to 167 degrees F	N/A	2008	2008	2

**Table PR-21
Substation Equipment Additions and Replacements**

Identified need	Potential additions or replacements	Capacitor bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
relieve overloads or low voltages under contingency	Install 1-5.4 MVAR capacitor bank at L'Anse 69-kV Substation	5.4	2007	2008	2
relieve overloads or low voltages under contingency	Install 2-5.4 MVAR capacitor banks at Osceola 69-kV Substation	10.8	TBD	TBD	2
relieve overloads or low voltages under contingency	Uprate Brick Church-Zenda 69-kV line to 115 MVA	N/A	2008	2008	3
relieve overloads or low voltages under contingency	Install 1-16.33 MVAR 69-kV capacitor bank at South Lake Geneva Substation	16.33	2007	2008	3
relieve overloads or low voltages under contingency	Uprate Portage-Trienda 138-kV line to 339 MVA	N/A	2008	2008	3
relieve overloads or low voltages under contingency	Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	N/A	2008	2008	3
relieve overloads or low voltages under contingency	Install 2-16.33 MVAR capacitor bank at South Monroe 69-kV Substation and remove existing 10.8 MVAR bank	32.66	2007	2008	3
relieve overloads or low voltages under contingency	Uprate Rockdale to Jefferson 138-kV line	N/A	2008	2008	3
relieve overloads or low voltages under contingency	Uprate Rockdale to Boxelder 138-kV line	N/A	2008	2008	3
relieve overloads or low voltages under contingency	Uprate Boxelder to Stonybrook 138-kV line	N/A	2008	2008	3
relieve overloads or low voltages under contingency	Uprate Darlington-Rock Branch 69-kV line	N/A	2008	2008	3
relieve overloads or low voltages under contingency	Expand the Menominee 69-kV Substation and install 138 kV terminals. Loop the West Marinette-Bay De Noc 138-kV line into the Substation	N/A	2008	2008	4
relieve overloads or low voltages under contingency	Install 2-4.1 MVAR capacitor bank at Sister Bay 69-kV Substation	8.2	2008	2008	4
congestion, generator deliverability	Install series reactor at Cornell Substation	N/A	2007	2008	5
relieve overloads or low voltages under contingency	Install 200 MVAR capacitor bank at Bluemound Substation	200	2007	2008	5
relieve overloads or low voltages under contingency	Install 2-24.5 MVAR 138-kV capacitor banks at North Beaver Dam Substation	49	2005	2009	3
relieve overloads or low voltages under contingency	Install 2-8.16 MVAR capacitor banks at new Brewer 69-kV Substation	16.32	2009	2009	3
relieve overloads or low voltages under contingency	Uprate North Lake Geneva-Lake Geneva 69-kV line to 115 MVA	N/A	2009	2009	3

**Table PR-21
Substation Equipment Additions and Replacements**

Identified need	Potential additions or replacements	Capacitor bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
relieve overloads or low voltages under contingency	Uprate Walworth- North Lake Geneva 69-kV to 69 MVA	N/A	2009	2009	3
relieve overloads or low voltages under contingency	Install 2-16.33 MVAR 69 kV capacitor banks at Kilbourn Substation and install 2-24.5 MVAR 138-kV capacitor banks at Artesian Substation	81.66	2009	2009	3
accommodate new accommodate new generation	Replace relaying on 230-kV circuits at Oak Creek Substation	N/A	2009	2009	5
accommodate new accommodate new generation	Replace two 345-kV circuit breakers at Pleasant Prairie Substation on the Racine and Zion lines with IPO breakers and upgrade relaying	N/A	2009	2009	5
accommodate new accommodate new generation	Expand Oak Creek 345-kV switchyard to interconnect one new generator	N/A	2009	2009	5
accommodate new accommodate new generation	Replace CTs at Racine 345-kV Substation	N/A	2009	2009	5
T-D interconnection request	Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	N/A	2009	2009	5
relieve overloads or low voltages under contingency	Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	N/A	2010	TBD	2
relieve overloads or low voltages under contingency	Uprate Empire-Forsyth 138-kV line terminal equipment	N/A	2010	TBD	2
relieve overloads or low voltages under contingency	Uprate Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	N/A	2010	TBD	2
relieve overloads or low voltages under contingency	Loop Nine Springs-Pflaum 69-kV line into Femrite Substation	N/A	2006	2010	3
relieve overloads or low voltages under contingency	Install 2-16.33 MVAR capacitor banks at Spring Green 69 kV	32	2010	2010	3
relieve overloads or low voltages under contingency	Install the second 16.33 MVAR 69-kV capacitor bank at South Lake Geneva Substation	16.33	2010	2010	3
relieve overloads or low voltages under contingency	Install two 69-kV breakers at Beardasley Street Substation	N/A	2010	2010	4
accommodate new accommodate new generation	Expand 345-kV switchyard at Oak Creek to interconnect one new generator	N/A	2010	2010	5
accommodate new accommodate new generation	Uprate Oak Creek-Root River 138-kV line	N/A	2010	2010	5

**Table PR-21
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	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	2011	2011	1
relieve overloads or low voltages under contingency	Uprate McCue-Milton Lawns 69-kV line	N/A	2011	2011	3
relieve overloads or low voltages under contingency	Uprate Yahara-Token Creek 69-kV line	N/A	2011	2011	3
relieve overloads or low voltages under contingency	Replace the 400 amp metering CT at North Mullet River 69-kV Substation	N/A	2011	2011	4
relieve overloads or low voltages under contingency	Install 2-16.3 MVAR capacitor bank at Mears Corners 138-kV Substation	32.6	2011	2011	4
relieve overloads or low voltages under contingency	Install 2-16.3 MVAR capacitor bank at Rosiere 138-kV Substation	32.6	2011	2011	4
relieve overloads or low voltages under contingency	Uprate Gardner Park-Black Brook 115-kV line - scope TBD	N/A	2012	2012	1
relieve overloads or low voltages under contingency	Install 2-8.16 MVAR capacitor banks at M38 69-kV Substation	16.32	TBD	TBD	2
relieve overloads or low voltages under contingency	Uprate Brick Church-Waiworth 69-kV line to 115 MVA	N/A	2012	2012	3
relieve overloads or low voltages under contingency	Uprate North Monroe-Idle Hour 69-kV line	N/A	2012	2012	3
relieve overloads or low voltages under contingency	Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69-kV Substation	5.4	TBD	TBD	2
relieve overloads or low voltages under contingency	Install 1-8.16 MVAR capacitor bank at Boscobel 69-kV Substation and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	10.8	2013	2013	3
relieve overloads or low voltages under contingency	Uprate Sheepskin-Dana 69-kV line to 95 MVA	N/A	2013	2013	3
accommodate new generation	Expand Oak Creek 345-kV switchyard to interconnect three new generators plus one new 345-kV line and 138-kV switchyard to accommodate new St. Martins line	N/A	2013	2013	5
accommodate new generation	Install two 345-kV line terminations at Pleasant Prairie and loop Zion-Arcadian 345-kV line into Pleasant Prairie Substation	N/A	2013	2013	5
relieve overloads or low voltages under contingency	Upgrade Mckenna 6.3 MVAR capacitor bank to 10.8 MVAR and install a second new 10.8 MVAR capacitor bank	15.3	2013	2013	1

**Table PR-21
Substation Equipment Additions and Replacements**

Identified need	Potential additions or replacements	Capacitor bank Capacity (MVAR)	System Need Year	Projected In-Service Year	Planning Zone
relieve overloads or low voltages under contingency	Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	32.66	2014	2014	3
relieve overloads or low voltages under contingency	Install 2-16.33 MVAR 69-kV capacitor banks and 2-24.5 MVAR capacitor banks at Femrite Substation	32.66	2014	2014	3
relieve overloads or low voltages under contingency	Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	24.5	2014	2014	3
relieve overloads or low voltages under contingency	Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	N/A	2014	2014	3
relieve overloads or low voltages under contingency	Install 2-16.33 MVAR capacitor banks at Montrose Substation	32.66	2014	2014	3
relieve overloads or low voltages under contingency	Replace the 1200 A breaker at Edgewater T22 345/138-kV transformer	N/A	2014	2014	4
relieve overloads or low voltages under contingency	Uprate the Melissa-Tayco to 229 MVA (300F)	N/A	2014	2014	4
relieve overloads or low voltages under contingency	Install 2-16.3 MVAR capacitor bank at Aviation Substation	32.6	2015	2015	4
relieve overloads or low voltages under contingency	Install 28.8 MVAR capacitor bank at Butternut 138-kV Substation	28.8	2015	2015	4
relieve overloads or low voltages under contingency	Install a 12.2 MVAR capacitor bank at Hilltop 69-kV Substation	12.2	2016	2016	1

Table PR-22

Alternative Solutions to Proposed or Provisional Additions

Primary Solution(s)	Alternate Solution(s)	Projected In-Service Year	Planning Zone
New Cranberry-Conover 138-kV line and Convert Conover-Iron River-Plains 69-kV to 138 kV	<ol style="list-style-type: none"> 1.) Weston-Venus 345-kV line 2.) Weston-Venus-Plains 345 kV line 3.) Cranberry-Conover 138-kV line and convert Conover-Winona to 138 kV 4.) Venus-Crandon-Laona-Goodman-Plains 138-kV line 5.) Venus-Crandon-Laona-Goodman-Amberg 138-kV line 6.) Generation in upper portion Rhineland Loop 7.) Park Falls-Clear Lake 115-kV line 8.) Convert Whitcomb-Aurora St. 69-kV to 115 kV 	2008	1
Berlin area reinforcements: Reconfigure North Randolph-Ripon 69 kV line to North Randolph-Fairwater-Metomen & Metomen-Ripon 69-kV lines. Install capacitor banks at Ripon and Berlin.	<ol style="list-style-type: none"> 1.) New Omro Industrial-Fitzgerald 69-kV line. Install capacitor banks at Ripon and Berlin Substation 2.) Convert Metomen-Ripon-Berlin 69-kV line to 138-kV with a new 138/69-kV xfmr at Berlin Substation 3.) Rebuild the Metomen-Ripon-Berlin 69-kV line to a 138-69-kV double circuit with new 138/69-kV xfmr at Berlin Substation 	2007 - 2015	1
Rebuild Weston-Sherman St. and Sherman St-Hilltop 115-kV lines as double circuits with a new Gardner Park-Hilltop 115-kV line	<ol style="list-style-type: none"> 1.) Convert WPS's 46-kV system from Maine-Brokaw-Strowbridge-Wausau Hydro-Townline-Kelly to 115 kV 2.) Convert WPS's 46-kV system from Sherman St.-Wausau Hydro-Strowbridge-Townline-Kelly to 115 kV 3.) Rebuilding/uprating both existing Weston-Sherman St. 115-kV lines and the Sherman St.-Hilltop 115-kV line along with the rebuild of the Sherman St. Substation 	2007	1
Monroe County-Council Creek 161-kV line	<ol style="list-style-type: none"> 1.) New Jackson County-Council Creek 161-kV line 2.) New Hillsboro-Council Creek 161-kV line 3.) Rebuild existing Monroe County-Council Creek 69-kV line with a larger conductor 4.) Convert Kilbourn-Hilltop-council Creek 69-kV circuits to 138 kV 	2010	1
Increase ground clearance of Winona-Atlantic 69-kV line from 120 to 167 degrees F	Dispatch Portage generation	2007	2
Increase ground clearance of M38-Atlantic 69-kV line from 120 to 167 degrees F	Dispatch Portage generation	2008	2
Install 2-5.4 MVAR capacitor banks at Osceola 69 kV	Dispatch Portage generation	2008	2
Construct second Hiawatha-Pine River-Mackinac (Straits) 138-kV line	Rebuild Hiawatha-Pine River 69-kV line to 138 kV, install a Phase Shifter at Mackinac to limit flows and add 138-kV capacitors at Brevort or Lakehead Substation	2009	2

Table PR-22

Alternative Solutions to Proposed or Provisional Additions

Primary Solution(s)	Alternate Solution(s)	Projected In-Service Year	Planning Zone
Construct a new 138-kV line from North Madison to Huiskamp and a new substation with a 138/69-kV transformer near Huiskamp Substation	<ol style="list-style-type: none"> 1.) Convert North Madison-Dane-Waunakee 69-kV line to 138 kV 2.) Construct Waunakee-Yahara River 69-kV line 3.) Construct Sycamore-Ruskin 69-kV line 	2008	3
Install a 138/69-kV transformer at Bass Creek Substation and reconductor Townline Road to Bass Creek 138-kV line	<ol style="list-style-type: none"> 1.) Construct Brooklyn-Evansville 69-kV line 2.) Install capacitor banks on 69-kV buses 	2010	3
Loop Nine Springs-Pflaum 69-kV line into Femrite Substation	Rebuild Fitchburg-Royster 69-kV line, install 69-kV capacitor banks	2010	3
Install a 138/69-kV transformer at Yahara River Substation and loop the Token Creek 69-kV line into and out of Yahara River	<ol style="list-style-type: none"> 1.) Reconfigure Sun Prairie 69-kV system, install second 138/69-kV transformer at North Madison Substation 2.) Rebuild Columbia-Deforest 69-kV line, install capacitor banks on 69-kV buses 	2011	3
Construct a new Rockdale-West Middleton 345-kV line	<ol style="list-style-type: none"> 1.) Construct a new 345-kV line from North Madison to West Middleton 2.) Construct a new 345-kV line from Paddock to West Middleton 3.) Construct three new 138-kV lines between Rockdale-West Middleton 4.) Construct a second Kegonsa to Reiner 138-kV line, construct a new Boxelder to Reiner 138-kV line, construct a new Huiskamp-Blount 138-kV line and construct West Middleton-Bount 138-kV line 	2011	3
Add 138-kV conductor for Ellinwood-Sunset Point 138-kV on existing structures	<ol style="list-style-type: none"> 1.) Replace Ellinwood 138/69-kV transformer 2.) Add a third Ellinwood 138/69-kV transformer 	2007	4
Rebuild Crivitz-High Falls 69-kV double-circuit line	<ol style="list-style-type: none"> 1.) Construct a new Amberg/Daves Falls-Goodman 69-kV line 2.) Construct a new Metonga-Goodman 115-kV line 3.) Construct a new Pine-Goodman 69-kV line 	2008	4
Construct a Canal-Dunn Road 138-kV line and add a 138/69-kV transformer at Dunn Road Substation	<ol style="list-style-type: none"> 1.) Add a third 138/69-kV transformer at Canal Substation 2.) Add generation to the 69-kV system in Northern Door County 3.) Replace Canal 138/69-kV transformers 1 and 2 	2012	4

Table PR-22

Alternative Solutions to Proposed or Provisional Additions

Primary Solution(s)	Alternate Solution(s)	Projected In-Service Year	Planning Zone
<p>Replace South Sheboygan Falls 138/69-kV transformer with a minimum of 125 MVA unit</p>	<p>1.) Tap the Forest Junction-Cedarsauk 138-kV line to Sheboygan Falls and add a 138/69-kV transformer 2.) Construct a 138-kV line to the 69-kV Plymouth Sub #2 and convert Plymouth Sub #2 to 138-kV operation 3.) Construct 2.5 miles of 138-kV line from Lodestar to Sheboygan Falls Substation and install a 138/69-kV, 60 MVA transformer at Sheboygan Falls 4.) Construct 3 miles of 69-kV line from Plymouth #4 Substation to Plymouth #3 Substation. Install a 138/69-kV transformer at Plymouth #4 Substation</p>	<p>2014</p>	<p>4</p>
<p>Construct a second Dunn Road-Egg Harbor 69-kV line</p>	<p>1.) Construct a new 138-kV line from Dunn Road to Egg Harbor Substation 2.) Add generation to the 69-kV system in northern Door County</p>	<p>2016</p>	<p>4</p>
<p>Construct a 345-kV bus at Bain Substation</p>	<p>Reconfigure 345-kV bus at Pleasant Prairie Substation</p>	<p>2009</p>	<p>5</p>
<p>Install two 345-kV IPO breakers at Pleasant Prairie Substation on lines to Racine (L631) and Zion (L2221)</p>	<p>Reconfigure 345-kV lines on bus sections 3 and 4. Reconfigure Pleasant Prairie 345-kV straight bus into ring bus. Construct a 345-kV bus at Bain Substation</p>	<p>2009</p>	<p>5</p>
<p>Construct Rockdale-Concord-Bark River-Mill Road 345-kV line with 345/138-kV transformers at Concord, Bark River and Mill Road Substations</p>	<p>1.) Construct a 345-kV line from Rockdale-Concord-St Lawrence 2.) Add a 345/138-kV transformer at St. Lawrence Substation 3.) Add a 345/138-kV transformer at Concord Substation 4.) Install a 4-position 345-kV ring bus and a 345/138-kV transformer at Germantown Substation</p>	<p>2018</p>	<p>3 & 5</p>
<p>Construct Rockdale-Concord-Bark River-Mill Road 345-kV line with 345/138-kV transformers at Concord, Bark River and Mill Road Substations</p>	<p>1.) Construct a Bark River-Concord 138-kV line 2.) Construct a Bark River- Hartford 138-kV line 3.) Add a 138-kV switching station at Mill Road site 4.) Rebuild existing Rockdale-Concord-Cooney-Summit 138-kV to double-circuit 138 kV; construct 8-position ring buses at Jefferson and Concord Substations 5.) Uprate Stonybrook-Boxelder 138-kV line 6.) Install 32 MVAR capacitor bank at Summit and Hartford 138-kV Substations</p>	<p>2018</p>	<p>3 & 5</p>

Table PR-23

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

PROJECTS CANCELLED	Former In-Service Date	Planning Zone	Reason for Removal
Uprate Wautoma-Berlin 69-kV line terminal equipment at Wautoma Substation	2010	1	New line or equipment ratings
Install additional 13.6 MVAR capacitor bank at Clear Lake 115-kV Substation	2015	1	Replaced with cap bank in Cranberry-Conover-Plains project
Uprate Rocky Run-Plover 115-kV line terminal equipment	2009	1	New line or equipment ratings
Uprate Metomen-Ripon 69-kV line - scope TBD	2014	1	Replaced project with a different solution for this area
Construct Fitzgerald-Omro Industrial 69-kV line	2015	1	Replaced project with a different solution for this area
Install second 50 MVAR capacitor bank at Arpin Substation	2008	1	Updated study results
Uprate Atlantic 138/69-kV transformer	2008	2	Revised rating information
Relocate 69-kV Rexton tap to 69-kV Hiawatha-Pine River line (6909)	2009	2	Replaced with 6908 rebuild project
Relocate 69-kV Trout Lake tap to 69-kV Hiawatha-Pine River line (6909)	2009	2	Replaced with 6908 rebuild project
Rebuild Hiawatha-Pine River-Mackinac 69 kV to 138 kV	2009	2	Eastern U.P. review in progress
Construct 138-kV bus and install one 138/69-kV, 50 MVA transformer at Pine River Substation	2009	2	Eastern U.P. review in progress
Install 138-kV substation modifications at Indian Lake Substation	2009	2	Part of Indian Lake-Hiawatha 138 kV project, date TBD
Install 2-5.4 MVAR capacitor banks at M-38 69-kV Substation	2015	2	Revised load/model information
Uprate Colley Road to Brick Church 69-kV line to 72 MVA	2006	3	Revised load/model information
Construct new 138-kV bus and 138/69 kV 100 MVA transformer at Montrose Substation	2009	3	Location changed to Verona Substation

Table PR-23

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

PROJECTS CANCELLED (continued)

	Former In-Service Date	Planning Zone	Reason for Removal
Loop the Femrite to Royster 69-kV line into AGA Gas Substation	2010	3	Replaced by looping Nine Springs to Pflaum 69-kV line into Femrite Substation
Install 4-25 MVAR capacitor banks at Trienda 138-kV Substation	2009	3	Replaced by installing 2-16.33 MVAR capacitor banks at Kilbourn 69-kV Substation and 2-24.5 MVAR capacitor banks at Artesian 138-kV Substation
Uprate Sun Prairie-Bird Street 69-kV line	2012	3	Revised load/model information
Salem-Spring Green-West Middleton 345-kV proxy for Large Access Project, includes rebuild Nelson Dewey-Spring Green-West Middleton 138/69-kV to double-circuit 345/138 kV	2013	3	This is the previous Access Initiative project which was replaced by second Paddock-Rockdale 345-kV project
Expand 345 kV to 6 positions at Paddock Substation	2013	3	This is the previous Access Initiative project which was replaced by second Paddock-Rockdale 345-kV project
Expand 138 kV to 7 positions at Paddock Substation	2013	3	This is the previous Access Initiative project which was replaced by second Paddock-Rockdale 345-kV project
Install second 345/138-kV transformer at Paddock (500 MVA normal/625 MVA emergency) Substation	2013	3	This is the previous Access Initiative project which was replaced by second Paddock-Rockdale 345-kV project
Rebuild Paddock-Town Line Road 138 kV to double-circuit 1600 Amps minimum summer emergency each	2013	3	This is the previous Access Initiative project which was replaced by second Paddock-Rockdale 345-kV project
Reconductor Town Line Road-Russell 138 kV to 1600 Amps minimum summer emergency	2013	3	This is the previous Access Initiative project which was replaced by second Paddock-Rockdale 345-kV project
Install a 69-kV bus and 138/69-kV 100 MVA transformer at Northwest Beloit Substation	2010	3	Revised load/model information
Reroute Paddock to Shirland Avenue 69-kV line into and out of Northwest Beloit Substation	2010	3	Revised load/model information
Convert Hillman to Eden 69-kV line to 138-kV operation	2011	3	Replaced by installing 2-16.33 MVAR capacitor banks at Eden 69-kV Substation
Rebuild and convert Stagecoach-Spring Green 69-kV line to 138 kV	2012	3	Revised load/model information
Construct West Middleton-Stagecoach double-circuit 138/69-kV line	2012	3	Revised load/model information

Table PR-23

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

PROJECTS CANCELLED (continued)	Former In-Service Date	Planning Zone	Reason for Removal
Construct 69-kV line Eden through Muscoda to Richland Center Substation	2012	3	Replaced by capacitor bank addition project at Boscobel Substation
Move Lone Rock 69-kV phase shifter to Richland Center Substation	2012	3	Replaced by capacitor bank addition project at Boscobel Substation
Convert South Lake Geneva to Twin Lakes 69-kV line to 138-kV operation	2013	3	Revised load/model information
Construct new 138-kV line from Twin Lakes to Spring Valley	2013	3	Revised load/model information
Install 1-16.32 MVAR capacitor bank at Burke 69-kV Substation	2014	3	Replaced by Yahara River transformer project
Replace the Colley Road 138/69-kV transformer	2015	3	Revised load/model information
Replace the Kilbourn Substation 47 MVA 138/69-kV transformer with a 100 MVA unit	2010	3	Revised line/equipment ratings
Construct new 69-kV line from South Lake Geneva to Lake Shore Substation	2013	3	Deferred to 2017 by several line uprate projects and capacitor bank project at South Lake Geneva Substation
Install a second 138/69-kV transformer at North Monroe Substation	2014	3	Deferred as a result of Bass Creek Substation transformer project
Replace the 300A current transformer at Sheboygan Falls 69-kV Substation	2013	4	Another project selected (driven by maintenance and protection)
Retap 400A primary CT at Edgewater Substation to 600A	2012	4	Updated rating information
Retap 48 MVA CT at South Sheboygan Falls 138/69-kV transformer	2010	4	Updated rating information
Replace 300 A metering CT at Edgewater 69-kV Substation	2013	4	Updated rating information
Replace 300 A metering CT at Riverside 69-kV Substation	2013	4	Updated rating information
Install a 12.2 MVAR capacitor bank at Hilltop 69-kV Substation	2016	1	Was 2012
Install 1-5.4 MVAR capacitor bank at Sawyer 69-kV Substation	TBD	2	Was 2006; best value planning process to determine scope

Table PR-23 (continued)

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

PROJECTS DEFERRED	New date	Planning Zone	Reason for Deferral
Convert Indian Lake-Hiawatha 69-kV line to double-circuit 138-kV operation, construct new Hiawatha 138-kV Substation	TBD	2	Was 2009; Eastern U.P. review in progress
Construct new Mackinac 138/69-kV Substation	TBD	2	Was 2009; Eastern U.P. review in progress
Install 1-5.4 MVAR capacitor bank at Munising 69-kV Substation	2008	2	Was 2006; revised load/model information
Relocate Cedar Substation (North Lake)	2008	2	Was 2007; construction timelines
Install 2-16.33 MVAR capacitor banks at South Monroe Substation	2008	3	Was 2007; resource constraints
Upgrade Brodhead-South Monroe 69-kV line	2007	3	Was 2006 and provisional; time and resource constraints
Install 2-8.16 MVAR capacitor banks at new Brewer 69-kV Substation	2009	3	Was Richland Center in 2008; revised load/model information
Convert Rock River to Bristol to Elkhorn 138-kV operation; rebuild Bristol with a new 138-kV bus	2009	3	Was 2008; regulatory application process.
Install 1-8.16 MVAR capacitor bank at Bosobel 69-kV Substation and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2013	3	Was 2010; revised load/model information
Construct a Lake Delton-Birchwood 138-kV line	2013	3	Was 2011; revised load/model information
Install a second 138/69-kV transformer at McCue Substation	2014	3	Was Janesville transformer in 2011; revised load/model information, better system performance by installing a second transformer at McCue versus Janesville
Construct a Horicon-East Beaver Dam 138-kV line	2014	3	Was 2013; revised load/model information
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva Substation	2016	3	Was 2010; deferred due to several line uprates and cap bank project at South Lake Geneva Substation
Construct new 138-kV line from South Lake Geneva to White River Substation	2016	3	Was 2010; deferred due to several line uprates and cap bank project at South Lake Geneva Substation
Upgrade the Royster to Sycamore 69-kV line to 115 MVA	2016	3	Was 2012; revised load/model information
Construct West Middleton-North Madison 345-kV line	2016	3	Was 2014; revised load/model information
Construct Evansville-Brooklyn 69-kV line	2016	3	Was 2011; deferred by Bass Creek Substation transformer project
Install 2-16.3 MVAR capacitor bank at Aviation Substation	2015	4	Was 2015
Construct a Northside-City Limits 138-kV line	2016	4	Was 2015

Table PR-23 (continued)

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

PROJECTS DEFERRED (continued)		New date	Planning Zone	Reason for Deferral
Rebuild/Convert Bayport-Suamico-Sobieski-Pioneer 69-kV line to 138 kV		2016	4	Was 2015
Construct a 345-kV bus at Bain Substation		2009	5	Was 2007
OTHER PROJECT CHANGES AND POSSIBLE CHANGES		Date	Planning Zone	Nature of Change or Update
Upgrade Mckenna 6.3 MVAR capacitor bank to 10.8 MVAR and install a second new 10.8 MVAR capacitor bank		2013	1	Was 1-10.8 capacitor bank in 2014
Install a second 138/69-kV transformer at Wautoma Substation		2015	1	Was transformer uprate only
Install 2-24.5 MVAR capacitor banks at Wautoma 138-kV Substation and one-16.33 MVAR capacitor bank at 69 kV		2007	1	Was proposed, now planned
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Berlin 69-kV Substation		2008	1	Was proposed, now planned
Construct Brandon-Fairwater 69-kV line		2008	1	Was provisional, now proposed
Install 1-5.4 MVAR capacitor bank at Roberts 69-kV Substation		2009	2	Was 2008; removal of Hiawatha-Engadine line
Install 2-5.4 MVAR capacitor banks at Osceola 69-kV Substation		TBD	2	Was proposed in 2008; revised load/model information
Uprate M38 138/69-kV transformer		TBD	2	Was 2012; revised load/model information
Install 2-8.16 MVAR capacitor banks at M38 69-kV Substation		TBD	2	Was proposed in 2012; revised load/model information
Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69-kV Substation		TBD	2	Was proposed in 2013; revised load/model information
Uprate Janesville-Parkview 69-kV line to 92 MVA		2007	3	Was McCue-Janesville (name change only)
Install 2-16.33 MVAR capacitor banks at Spring Green 69-kV Substation		2010	3	Was uprate existing 18-MVAR bank with a 50-MVAR bank
Construct West Middleton-Blount 138-kV line		2016	3	Was 2017
Uprate North Lake Geneva-Lake Geneva 69-kV line to 84 MVA		2007	3	Was provisional rebuild/uprate
Rebuild Brodhead to South Monroe 69-kV line		2008	3	Was provisional project in 2010

Table PR-23 (continued)

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

OTHER PROJECT CHANGES AND POSSIBLE CHANGES	Date	Planning Zone	Nature of Change or Update
Uprate Portage-Trienda 138-kV line to 339 MVA	2008	3	Was provisional project in 2010; now proposed in 2008
Uprate Darlington-Rock Branch 69-kV line	2008	3	Was provisional project in 2010; now proposed in 2008
Construct new Oak Ridge-Verona 138-kV line and install a 138/69-kV transformer at Verona Substation	2009	3	Was Montrose-Oak Ridge (name change only)
Install 2-16.33 MVAR 69 kV capacitor banks at Kilbourn Substation and install 2-24.5 MVAR 138-kV capacitor banks at Artesian Substation	2009	3	Was capacitors at Kilbourn Substation only
Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress Substation	2006	4	Was 2007
String a new Elinwood-Sunset Point 138-kV line on existing structures	2007	4	Was provisional, now planned
Install 200 MVAR capacitor bank at Bluemound Substation	2008	5	Was 2007
Replace CTs at Racine 345-kV Substation	2009	5	Was 2013
NEW PROJECTS	In-Service Date	Planning Zone	Reason for Project
Construct Fairwater-Mackford Prairie 69-kV line	2014	1	Replaces prior identified solution in the greater Berlin area
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	2014	1	Replaces prior identified solution in the greater Berlin area
Rebuild Hiawatha-Pine River 69-kV line ESE_6908	2009	2	Eastern U.P. reliability needs
Uprate overhead portions of Straits-McGulpin 138-kV circuits #1 & #3 to 230 F degree summer emergency ratings	TBD	2	Eastern U.P. studies identified these circuits as possible transfer capability limiters in 2010, date TBD
Uprate Empire-Forsyth 138-kV line terminal equipment	TBD	2	Eastern U.P. studies identified these circuits as possible transfer capability limiters in 2010, date TBD
Uprate Chandler-Cornell 69-kV line clearance from 120 to 167 deg F	TBD	2	Eastern U.P. studies identified these circuits as possible transfer capability limiters in 2010, date TBD
Uprate Rock River 138/69-kV transformer to 65 MVA and uprate Rock River-Turtle 69-kV line to 94 MVA	TBD	3	Improve reliability
Upgrade the 5.4 MVAR capacitor bank to 10.8 MVAR at New Glarus Substation	TBD	3	Improve reliability
Uprate Colley Road-Park Ave Tap 69-kV line to 95 MVA	2007	3	Improve reliability
Uprate Brick Church-Zenda 69-kV line to 115 MVA	2008	3	Improve reliability
Install 1-16.33 MVAR 69-kV capacitor bank at South Lake Geneva Substation	2008	3	Improve reliability

Table PR-23 (continued)

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

NEW PROJECTS (continued)	In-Service Date	Planning Zone	Reason for Project
Uprate Columbia 345/138-kV transformer T-22 to 527 MVA	2008	3	Improve reliability
Install 2-24.5 MVAR 138-kV capacitor banks at North Beaver Dam Substation	2009	3	Improve reliability
Uprate North Lake Geneva-Lake Geneva 69-kV line to 115 MVA	2009	3	Improve reliability
Uprate Walworth- North Lake Geneva 69-kV to 69 MVA	2009	3	Improve reliability
Construct second Paddock-Rockdale 345-kV line	2010	3	Improve reliability
Loop Nine Springs-Pflaum 69-kV line into Femrite Substation	2010	3	Improve reliability
Rebuild/reconductor Town Line Road-Bass Creek 138-kV line	2010	3	Improve reliability
Install the second 16.33 MVAR 69-kV capacitor bank at South Lake Geneva Substation	2010	3	Improve reliability
Uprate McCue-Milton Lawns 69-kV line	2011	3	Improve reliability
Uprate Brick Church-Walworth 69-kV line to 115 MVA	2012	3	Improve reliability
Construct North Lake Geneva-White River 138-kV line	2012	3	T-D interconnection
Uprate Sheepskin-Dana 69-kV line to 95 MVA	2013	3	Improve reliability
Install 2-16.33 MVAR 69-kV capacitor banks at Eden Substation	2014	3	Improve reliability
Install 2-16.33 MVAR 69-kV capacitor banks and 2-24.5 MVAR capacitor banks at Femrite Substation	2014	3	Improve reliability
Install 2-12.25 MVAR 69-kV capacitor banks at Mazomanie Substation	2014	3	Improve reliability
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	2014	3	Improve reliability
Uprate X-67 Portage-Trienda 138-kV line to 373 MVA	2014	3	Improve reliability
Install 2-16.33 MVAR capacitor banks at Montrose Substation	2014	3	Improve reliability
Install two 69-kV breakers at Beardsley Street Substation	2010	4	Improve reliability
Replace two existing 138/69-kV transformers at Glenview Substation with 100 MVA transformers	2014	4	Improve reliability
Replace two existing 138/69-kV transformers at Sunset Point Substation with 100 MVA transformers	2015	4	Improve reliability
Uprate Lakefront-Revere 69-kV line	2007	4	Improve reliability
Construct Shoto-Custer 138-kV line	2012	4	Improve reliability
Install 138/69-kV transformer at Custer Substation	2012	4	Improve reliability
Improve clearance on Kenosha-Lakeview 138-kV line KK9341	2006	5	Improve reliability
Construct a 138-kV bus at Hale Substation to permit third Brookdale distribution transformer interconnection	2009	5	T-D interconnection
Construct a 138-kV bus at Pleasant Valley Substation to permit second distribution transformer interconnection	2009	5	T-D interconnection

Table PR-23 (continued)

Summary of Cancellations, Deferrals, Changes, Possible Changes and New Projects for the 2006 10-Year Assessment

NEW PROJECTS (continued)	In-Service Date	Planning Zone	Reason for Project
A second distribution transformer at Somers Substation requires a rebuild of the Racine-Somers-Albers 138-kV line; extend Albers 138-kV bus to permit connecting the Racine-Somers-Albers radial line to the Albers 138-kV bus	2011	5	T-D interconnection

**Table PR-24
Maintenance, Operations or Protection Projects over \$0.5 Million (2007-2011)**

Project Description	System Need Year	In-Service Year	Initiated	Planning Zone	Need Category	Planned, Proposed or Provisional	Capital Cost Estimate (in Millions)
Chaffee Creek-Kilbourn (Y100) line	2006	2007	Maintenance	1	Poor condition	Planned	2.5
Castle Rock Substation breaker replacement	2007	2007	Maintenance	1	Poor condition	Planned	0.9
Harrison Substation upgrades	2007	2007	Protection	1	Improve reliability	Planned	0.8
Aspen new substation	2007	2007	Maintenance	2	Poor condition	Planned	4.8
Pine River Substation upgrades	2007	2007	Maintenance	2	Poor condition	Planned	4.7
Gwinn Substation upgrades	2006	2007	Protection	2	Improve protection	Planned	1.0
Brule Substation removal	2007	2007	Maintenance	2	Poor condition	Planned	0.6
Aspen Substation tap	2007	2007	Maintenance	2	Poor condition	Planned	0.6
Spring Green-Stagecoach (Y62) line rebid	2007	2007	Maintenance	3	Poor condition	Planned	3.9
Eden-Nelsen Dewey (X16) pole replace	2007	2007	Maintenance	3	Poor condition	Planned	2.9
Nelson Dewey Substation maintenance	2006	2007	Maintenance	3	Poor condition	Planned	0.7
North Monroe Substation upgrades	2007	2008	Protection	3	Improve protection	Planned	0.6
Deforest Substation upgrades	2007	2007	Protection	3	Improve protection	Planned	0.6
North Fond du Lac Substation upgrades	2007	2007	Protection	4	Improve protection	Planned	2.1
Eikhart-Fredonia (Blaw Knox)	2007	2007	Maintenance	4	Poor condition	Planned	1.8
Edgewater 69-kV Substation upgrades	2007	2007	Protection	4	Improve protection	Planned	1.0
Bluemound Substation upgrades	2007	2007	Protection	5	Improve protection	Planned	2.2
Cooney Substation upgrades	2007	2007	Protection	5	Improve protection	Planned	0.7
Rozelleville-Sigel (Y107) line rebuild	2008	2008	Maintenance	1	Poor condition	Planned	4.0
Whitcomb Substation relay upgrades	2006	2008	Operation	1	Improve reliability	Planned	1.5
Iola Substation breaker replacement	2008	2008	Maintenance	1	Poor condition	Proposed	0.7
Boscobel 69-kV Substation upgrades	2008	2008	Maintenance	3	Poor condition	Planned	1.1
Dam Height-Dane (Y8) line rebuild	2007	2008	Maintenance	3	Poor condition	Planned	1.0
Academy Substation breaker replacement	2008	2008	Maintenance	3	Poor condition	Planned	0.7
Caroline Substation upgrades	2007	2008	Operation	4	Improve reliability	Proposed	1.8
Montello-Wautoma (Y17) line rebuild	2007	2009	Maintenance	1	Poor condition	Planned	4.4
Chaffee Creek-Hancock (Y90) line rebid	2009	2009	Maintenance	1	Poor condition	Planned	3.2
Montello Substation 69-kV breakers	2009	2009	Maintenance	1	Poor condition	Planned	1.2
Straits Substation equipment removal	2009	2009	Maintenance	2	Poor condition	Planned	0.5
Mt Horeb-Rock Branch (Y135) line rebid	2007	2009	Maintenance	3	Poor condition	Planned	3.7
Fredonia-Saukville (Blaw Knox) line rebid	2009	2009	Maintenance	4	Poor condition	Planned	1.0
Colley Road Substation upgrades	2006	2010	Maintenance	3	Poor condition	Provisional	0.7

*Table PR-25
Projects In Design or Construction*

Project	Zone
Reconductor Stratford-McMillan 115-kV line (MEWD)	1
Expand Cranberry 115-kV Substation to accommodate New Eagle River Muni distribution transformer	1
Construct Gardner Park-Stone Lake 345-kV line	1
Construct Gardner Park-Central Wisconsin 345-kV line	1
Construct new Central Wisconsin 345-kV Substation	1
Construct Venus-Metonga 115-kV line	1
Construct Sprecher-Femrite 138-kV line	3
Construct North Beaver Dam-East Beaver Dam 138-kV line	3
Rebuild Stiles-Amberg double circuit 138-kV line	2 & 4
Construct a 345/138-kV switchyard at a new Werner West Substation; install a 345/138-kV transformer. Loop existing Rocky Run to North Appleton 345 kV and existing Werner to White Lake 138-kV lines into Werner West	4
Construct Morgan-Werner West 345-kV line	4
String a new 138-kV line from Clintonville-Werner West primarily on Morgan-Werner West 345-kV line structures	4

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

Project	Zone
Rebuild Weston-Sherman St. and Sherman St.-Hilltop 115-kV lines as double circuits with a new Gardner Park-Hilltop 115-kV line	1
Construct Jefferson-Lake Mills-Stony Brook 138-kV line	3
Construct new line from Southwest Delavan to Bristol at 138 kV and operate at 69 kV	3

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

Project	Zone
Rebuild Weston-Northpoint 115-kV line	1
Construct Cranberry-Conover 115-kV line and rebuild/convert Conover-Plains 69-kV to 138 kV	1 & 2
Construct a Rubicon-Hustisford 138-kV line and rebuild/convert Hustisford-Horicon 69 kV to 138-kV operation (Dodge County)	3
Construct North Madison-Huiskamp 138-kV line	3
Construct double circuit 138-kV line from Forest Junction/Howards Grove/Charter Steel to Plymouth #4 Substation	4
Reconductor Saukville-Pleasant Valley-St. Lawrence 138-kV line	5

*Table PR-28
Regulatory Projects to be filed in 2006*

Project	Anticipated Filing Date
Rebuild Crivitz-High Falls 69-kV double circuit line	October
Rebuild Fitchburg-Verona 69-kV line	November
Stone Lake Substation, Phase II	December
Convert Rock River to Bristol to Elkhorn 138-kV operation; rebuild Bristol with a new 138 kV bus	December

*Table PR-29
Former Generator Requests Now In-Service*

<u>Date</u>	<u>Requests on-line</u>	<u>Megawatts</u>
2000	IC006 (Eden/Little Badger)	31
2001	G074 (Combined Locks)	53
6/1/2003	G111 (Pulliam CT), G148 (Pettenwell/Big Pond)	105
3/19/2004	G165 & G383 (Kewaunee uprate)	43
6/1/2004	G225 (Kaukauna CT)	60
6/15/2004	G035 & G072 (Riverside)	655
5/1/2005	G096 & G160 (West Campus)	150
6/1/2005	G044 (Fox Energy)	602
6/2/2005	G103 (Sheboygan)	370
7/16/05	G014 & G093 (Port Washington)	600

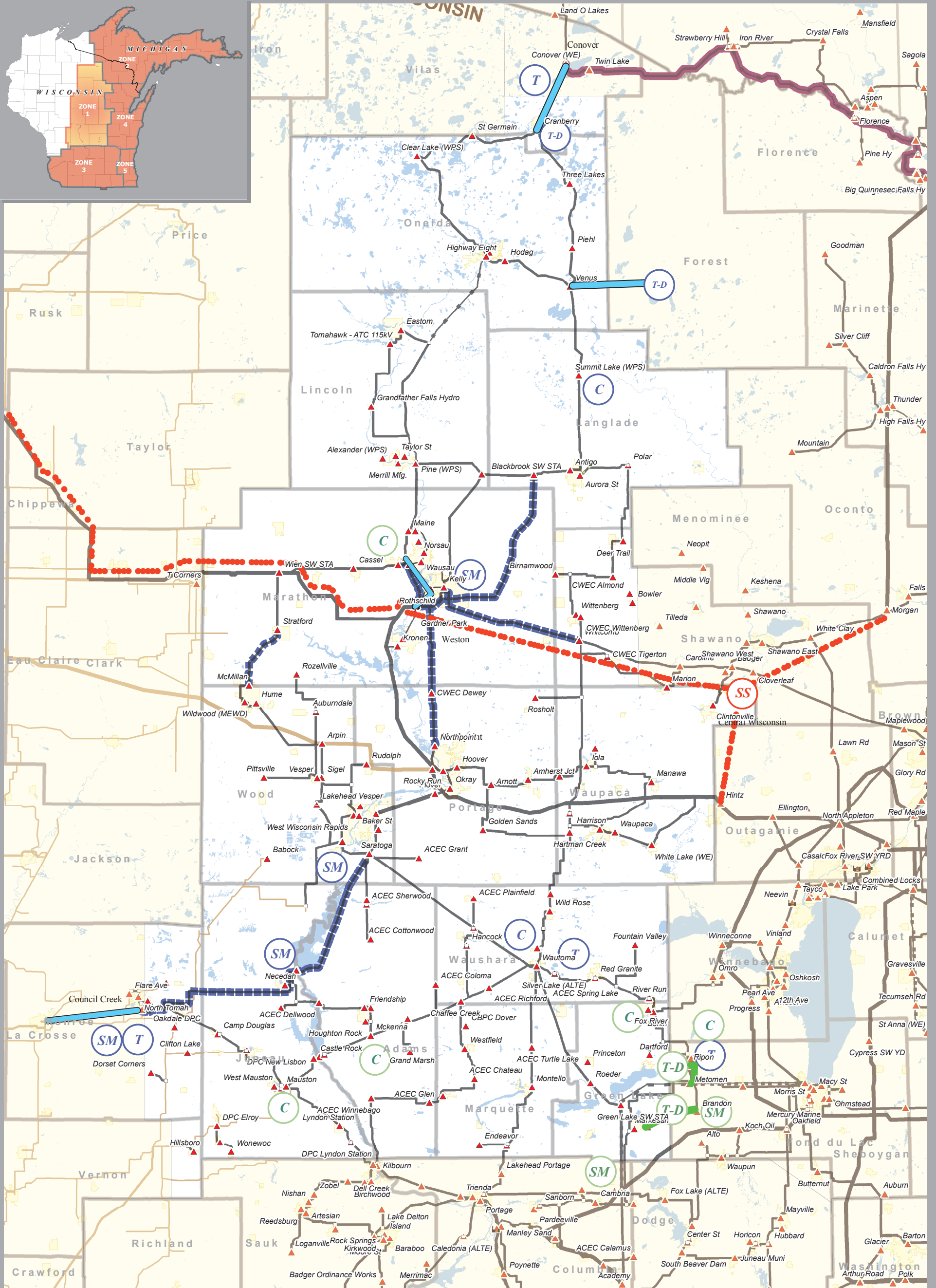
Table PR-30
Proposed Projects in the Generation Queue as of July 1, 2006

Zone	Queue #	County	Project capacity	Interconnection voltage	Generator technology and fuel	Developer projected in-service date
1	G144	Marathon	550 MW	345 kV	steam/coal	6/08
1	G588	Wood	65 MW	115 kV	simple cycle/gas	6/07
1	Total		615 MW			
<hr/>						
2	G567	Delta	165 MW	138 kV	steam/coal	1/11
2	G568	Delta	135 MW	138 kV	steam/coal	1/11
2	G583	Ontonagon	16 MW	69 kV	steam/biogas	6/08
2	Total		300 MW			
<hr/>						
3	G282	Lafayette	99 MW	138 kV	wind turbine	12/06
3	G338	Dodge	54 MW	138 kV	wind turbine	10/05
3	G366	Columbia	80 MW	138 kV	wind turbine	6/06
3	G483	Green	50 MW	69 kV	wind turbine	12/06
3	G546	Walworth	100 MW	138 kV	wind turbine	12/07
3	G550	Jefferson	24 MW	138 kV	simple cycle/gas	6/06
3	G553	Columbia	280 MW	345 kV	steam/coal	6/11
3	Total		687 MW			
<hr/>						
4	G240	Manitowoc	55 MW	69 kV	steam/coal	3/06
4	G353	Fond du Lac	80 MW	345 kV	wind turbine	5/06
4	G354	Fond du Lac	80 MW	345 kV	wind turbine	5/06
4	G368	Dodge/Fond du Lac	200 MW	138 kV	wind turbine	12/06
4	G376	Green Lake/Fond du Lac	160 MW	138 kV	wind turbine	12/06
4	G384	Manitowoc/Kewaunee	99 MW	138 kV	wind turbine	10/15/07
4	G427	Fond du Lac	98 MW	345 kV	wind turbine	6/06
4	G486	Manitowoc	10.5	345 kV	wind turbine	12/05
4	G507	Fond du Lac	98 MW	345 kV	wind turbine	12/06
4	G590	Calumet	95 MW	138 kV	wind turbine	12/07
4	G611	Calumet	99 MW	138 kV	wind turbine	8/08
4	Total		1074.5 MW			
<hr/>						
5	G014	Ozaukee	500 MW	138 kV	combined cycle/gas	6/08
5	G051	Milwaukee	1950 MW	345 kV /138 kV	steam/coal gasification	6/09, 6/10, 6/13
5	G093	Ozaukee	100 MW	138 kV	combined cycle/gas	6/08
5	G510	Ozaukee	90 MW	138 kV	combined cycle/gas	12/05, 6/08
5	Total		2640 MW			

*Table PR-31
 Requests Previously in the Generation Queue
 Which Have been Withdrawn/Removed between January 31, 2006
 and July 1, 2006*

Zone	Queue no.	County	Size	Voltage	Type	In-Service Date
1	G522	Portage	550 MW	345 kV	steam/coal	6/11
1	G523	Marathon	550 MW	345 kV	steam/coal	6/11
3	G527	Grant	280 MW	161 kV	steam/coal	6/11
3	G528	Columbia	550 MW	345 kV	steam/coal	6/11
4	G063	Manitowoc	90 MW	345 kV	nuclear	5/06, 5/06
4	G570	Kewaunee	125 MW	138 kV	wind turbine	12/07

Figure PR-1



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

PLANNING ZONE 1

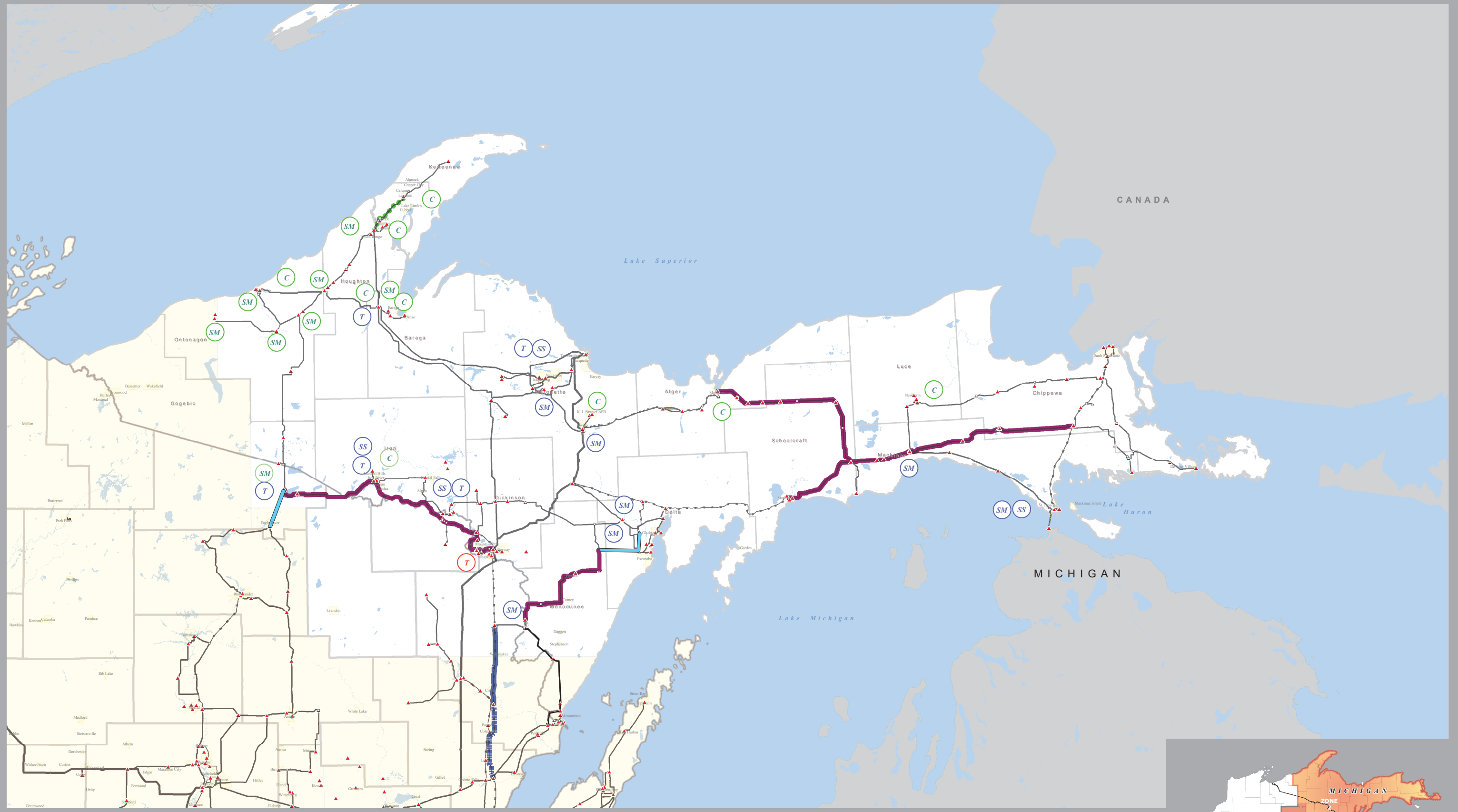


- (SS)** New Substation
- (SM)** Substation Modifications
- (T)** Transformer
- (C)** Capacitor Bank
- (T-D)** New T-D Interconnection

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

- Transmission Related Facilities**
- ▲ Substation, Switchyard or Terminal
 - ▲ ATC Office Location
 - 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.

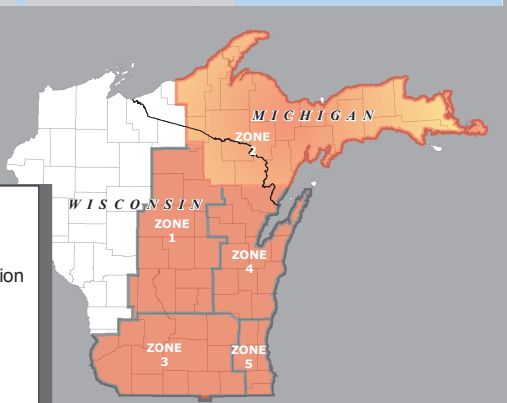


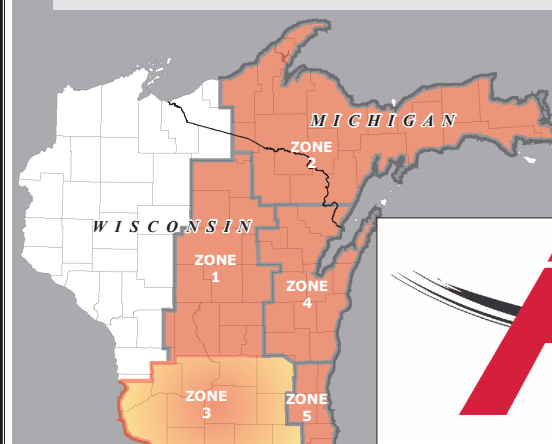
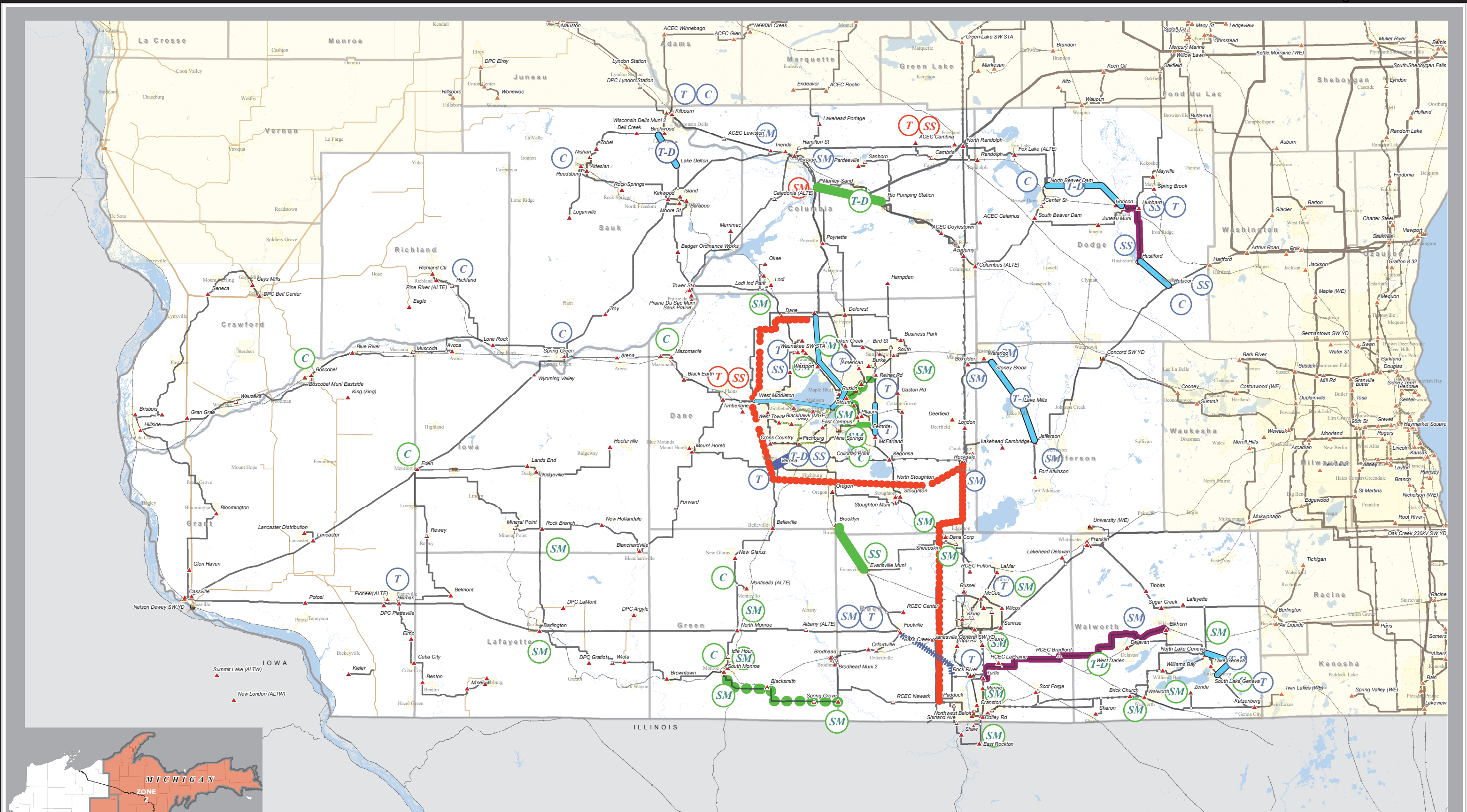
Transmission System Additions (May be Planned, Proposed or Provisional)
PLANNING ZONE 2

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

Transmission Related Facilities

- Substation, Switchyard or Terminal
- Proposed/Design/Construction
- ATC Office Location
- Generation
- Other Facility





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

PLANNING ZONE 3

<ul style="list-style-type: none"> SS New Substation SM Substation Modifications T Transformer 	<ul style="list-style-type: none"> C Capacitor Bank T-D New T-D Interconnection PS Phase Shifter 	<ul style="list-style-type: none"> ●●●● 345 kV Transmission Line 115 or 138 kV Transmission Line 115 or 138 kV Transmission Line Rebuild Transmission Line Voltage Conversion 	<ul style="list-style-type: none"> 69 kV Transmission Line 69 kV Transmission Line Rebuild
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Transmission Related Facilities

<ul style="list-style-type: none"> ▲ Substation, Switchyard or Terminal ■ Proposed/Design/Construction 	<ul style="list-style-type: none"> ● ATC Office Location ■ Generation ■ Other Facility
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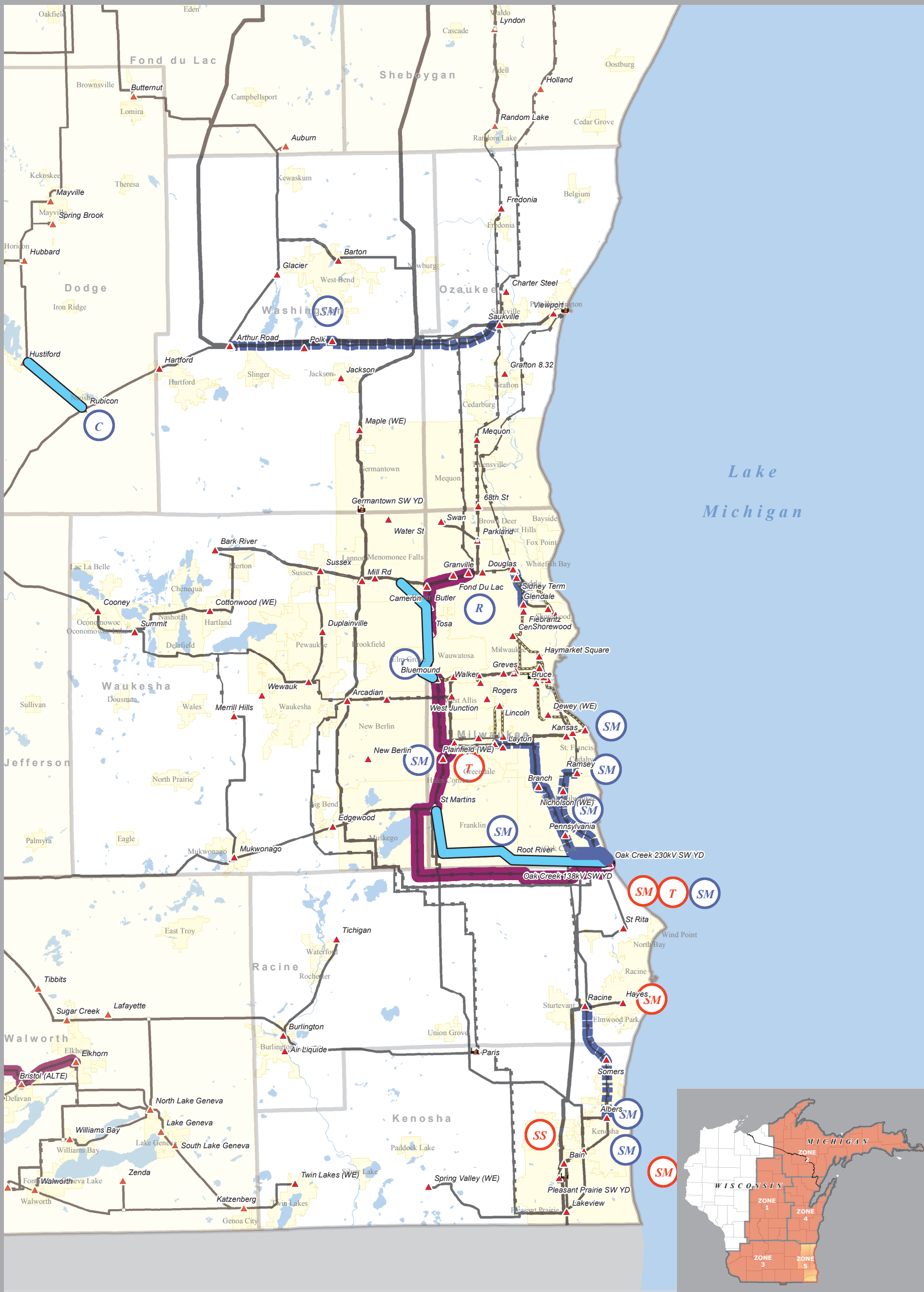
Transmission System Additions (May be Planned, Proposed or Provisional)

PLANNING ZONE 4

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

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

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



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

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

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

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

Figure PR-6
American Transmission Company - Number of Projects by Status
10-Year Assessments 2001-2006
Planned, Proposed and Provisional Projects

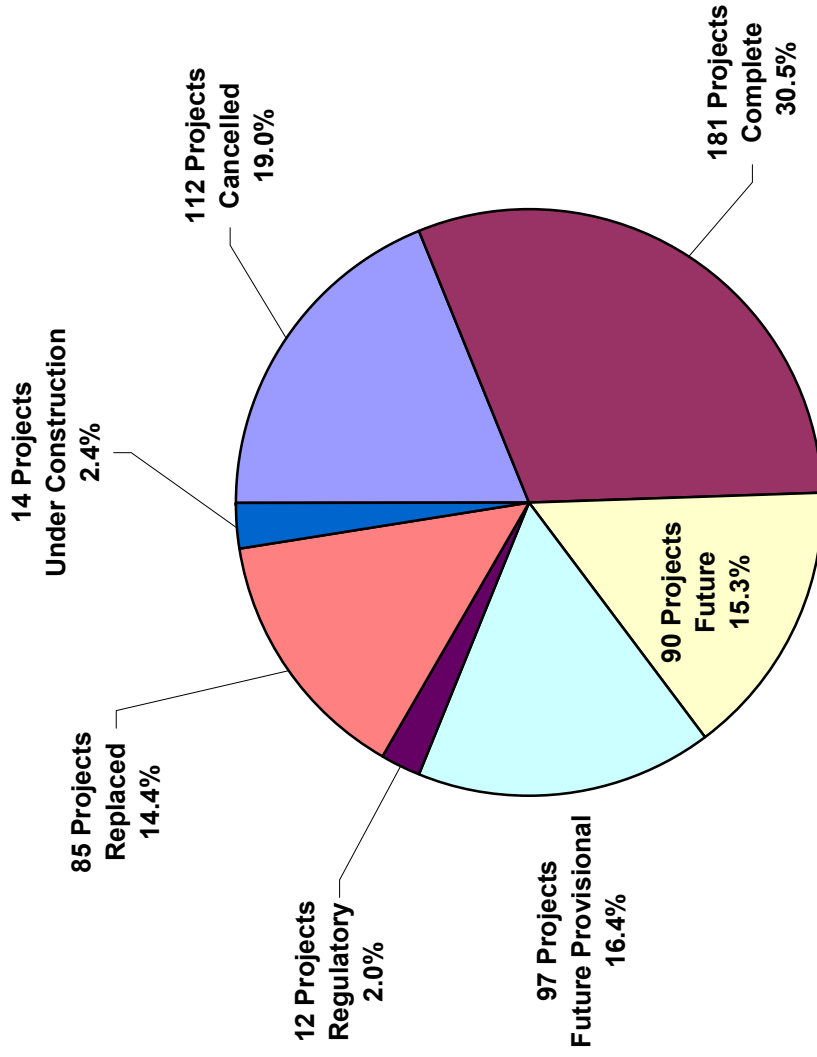


Figure PR-7
American Transmission Company - Cost of Projects by Status
10-Year Assessments 2001-2006
Planned, Proposed and Provisional Projects

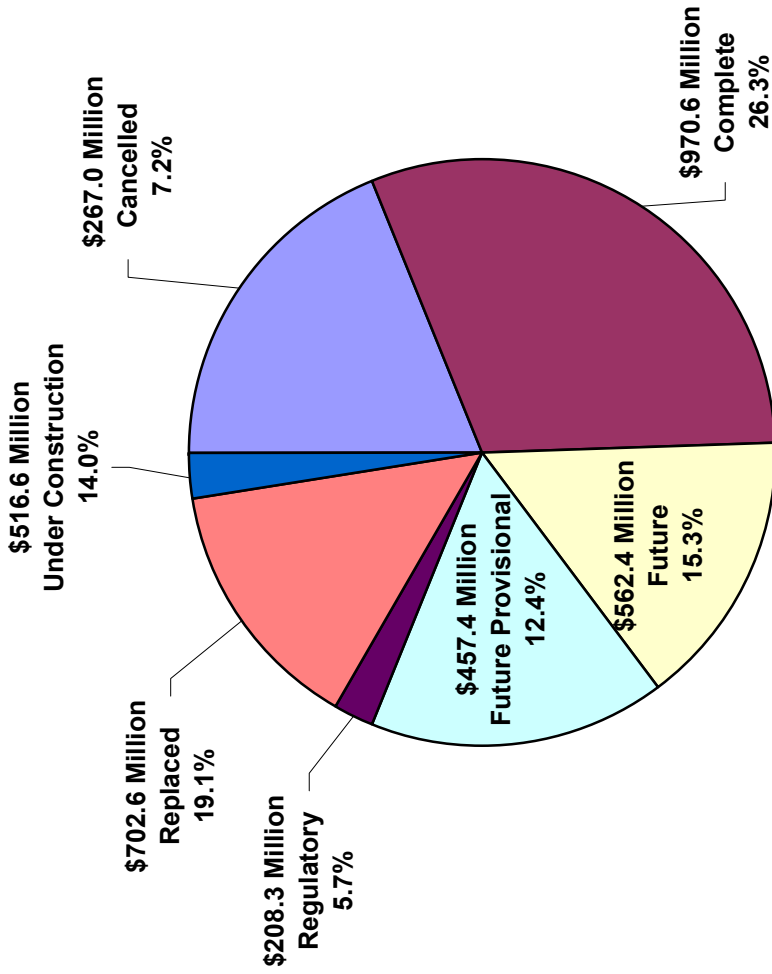
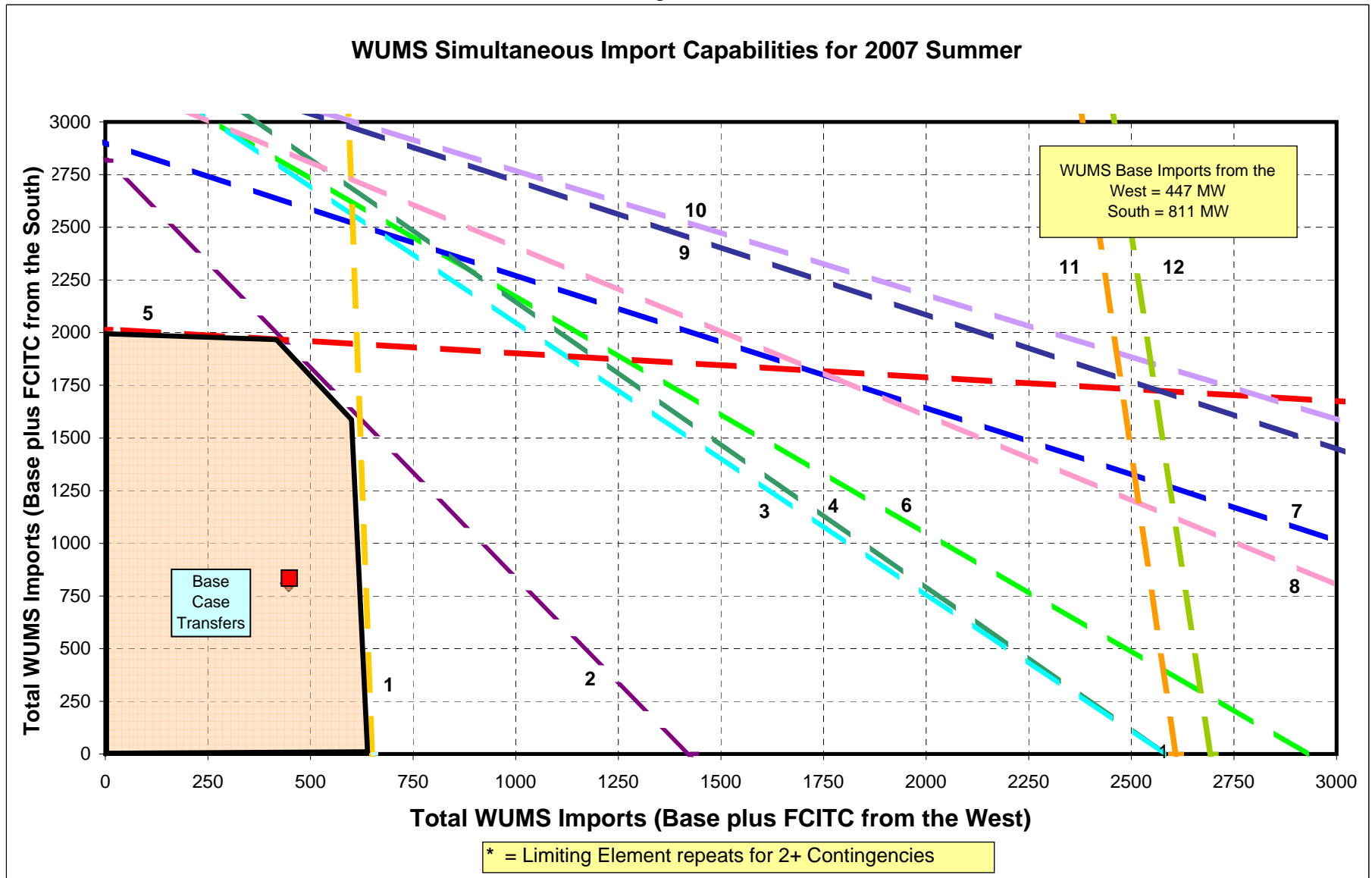
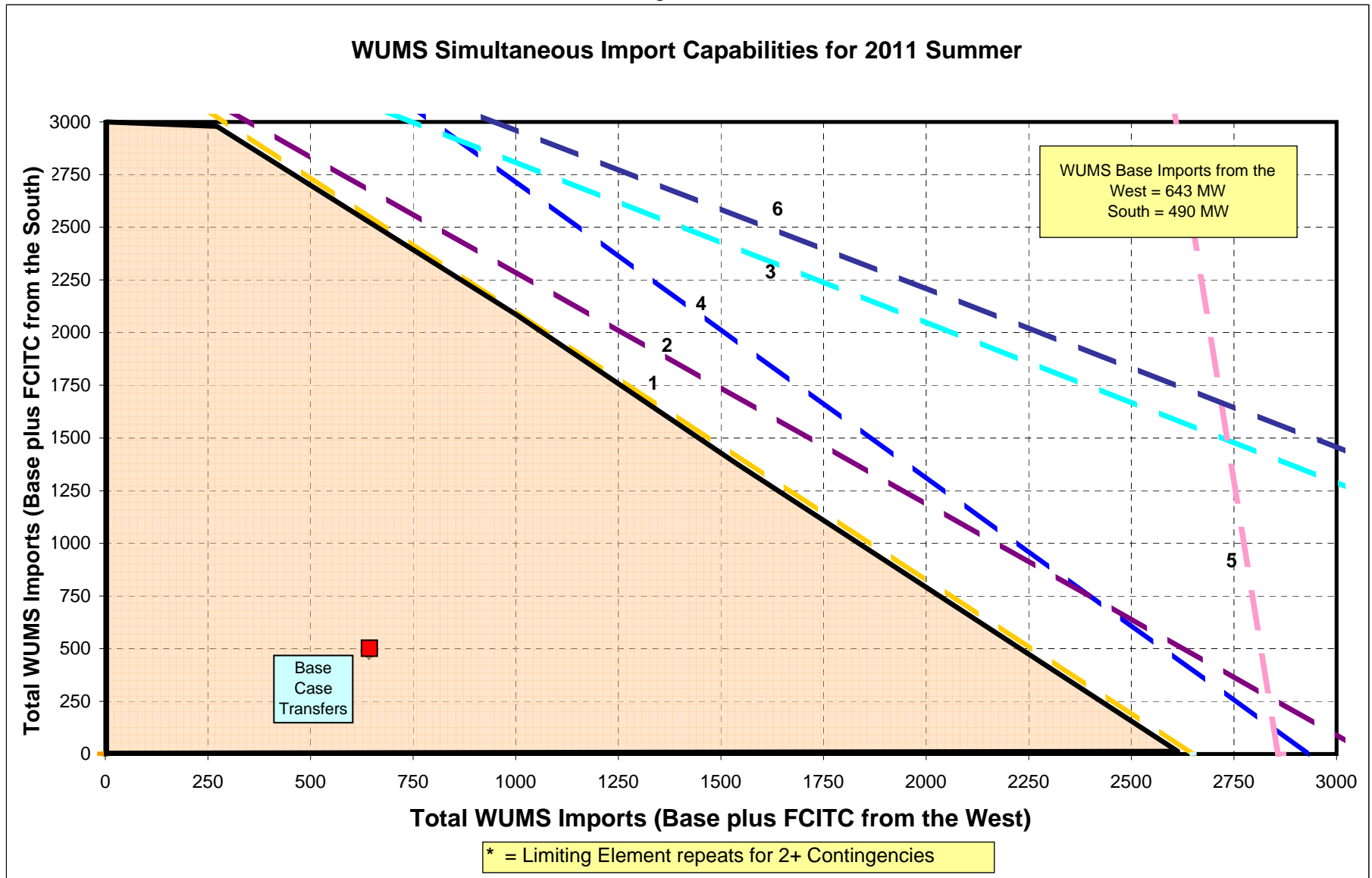


Figure PR-8



- | | | | |
|---|--|--|---|
| <p>1 Barron-Washington Co 161-kV*</p> <p>2 Washington Co-Stone Lake 161-kV*</p> <p>3 Turkey River-Cassville 161-kV*</p> <p>4 Cassville-Nelson Dewey 161-kV*</p> <p>5 Paris-Raymond-St Martins 138-kV</p> <p>6 Lore-Turkey River 161-kV*</p> | <p>for outage of Eau Claire-Arpin & Op Guide</p> <p>for outage of Eau Claire-Arpin & Op Guide</p> <p>for outage of Seneca-Genoa 161-kV</p> <p>for outage of Seneca-Genoa 161-kV</p> <p>for outage of Pleasant Prairie-Racine 345-kV</p> <p>for outage of Seneca-Genoa 161-kV</p> | <p>7 Pleasant Prairie-Racine 345-kV*</p> <p>8 Paddock 345/138-kV Tr</p> <p>9 Russel-Rockdale 138-kV</p> <p>10 Pleasant Prairie-Arcadian 345-kV</p> <p>11 Hazelton - Dundee 161-kV*</p> <p>12 Eau Claire - Arpin 345kV Flow Limit</p> | <p>for outage of Pleasant Prairie-Arcadian 345-kV</p> <p>for outage of Wempletown-Rockdale 345-kV</p> <p>for outage of Wempletown-Rockdale 345-kV</p> <p>for outage of Pleasant Prairie-Racine 345-kV</p> <p>for outage of Rock Creek-Quad Cities 345-kV</p> <p>for outage of N/A</p> |
|---|--|--|---|

Figure PR-9



- **1** Turkey River-Cassville 161-kV*
- **2** Lore-Turkey River 161-kV*
- **3** Wempletown-Paddock 345-kV

for outage of Seneca-Genoa 161-kV
for outage of Seneca-Genoa 161-kV
for outage of Wempletown-Rockdale 345-kV

- **4** Cassville-Nelson Dewey 161kV*
- **5** Hazelton-Dundee 161-kV*
- **6** Wempletown-Rockdale 345-kV

for outage of Seneca-Genoa 161-kV
for outage of King-Eau Claire-Arpin & Op Guide
for outage of Wempletown-Paddock 345-kV

Figure PR-10 Generation Interconnection Requests as of 7/1/06

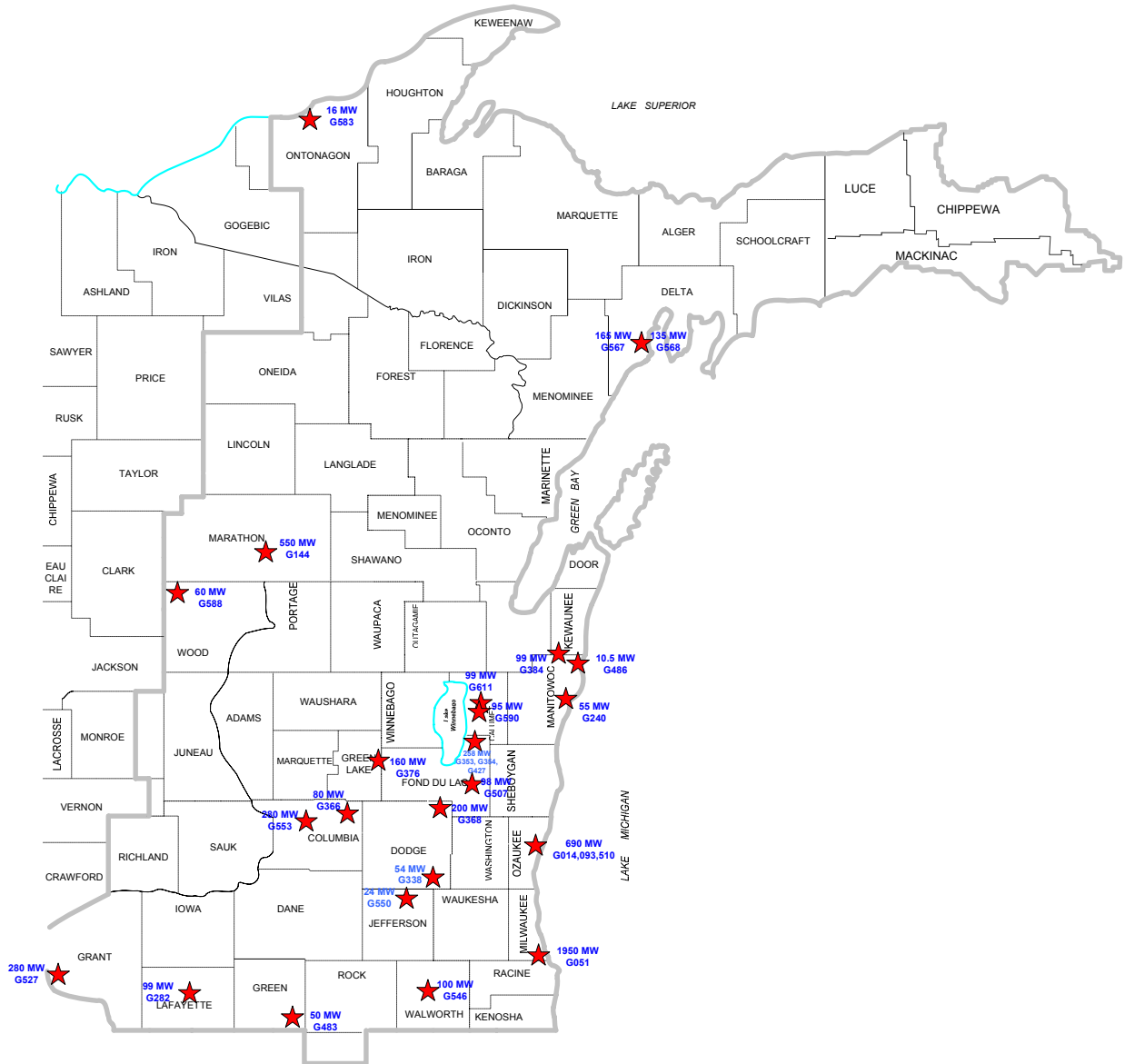
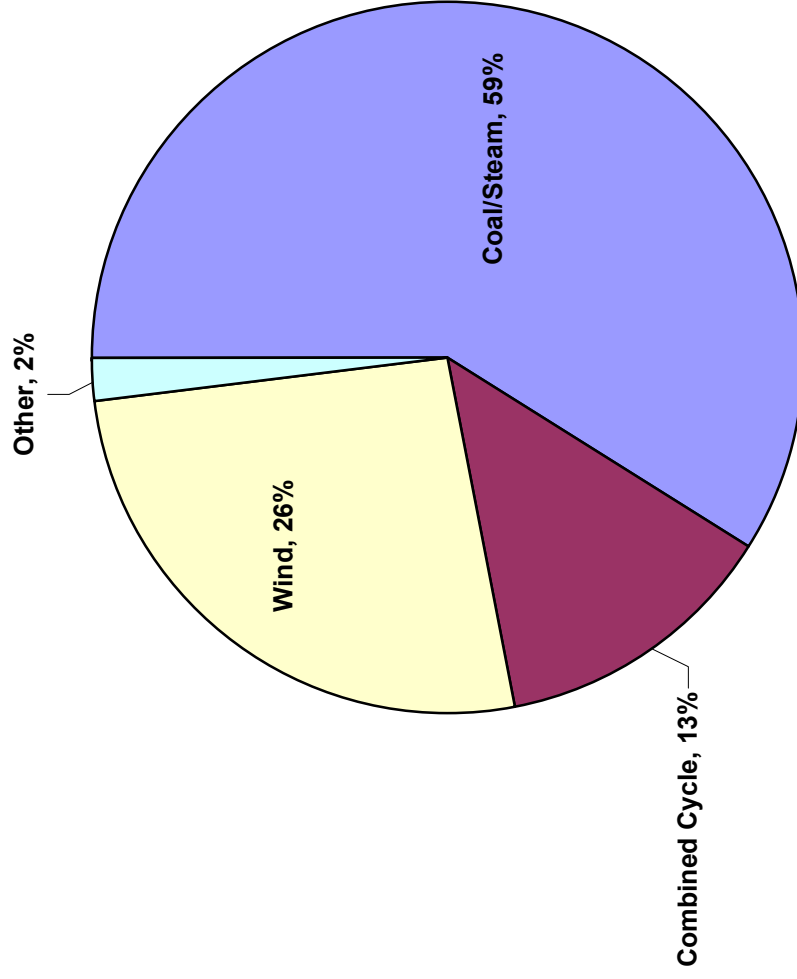
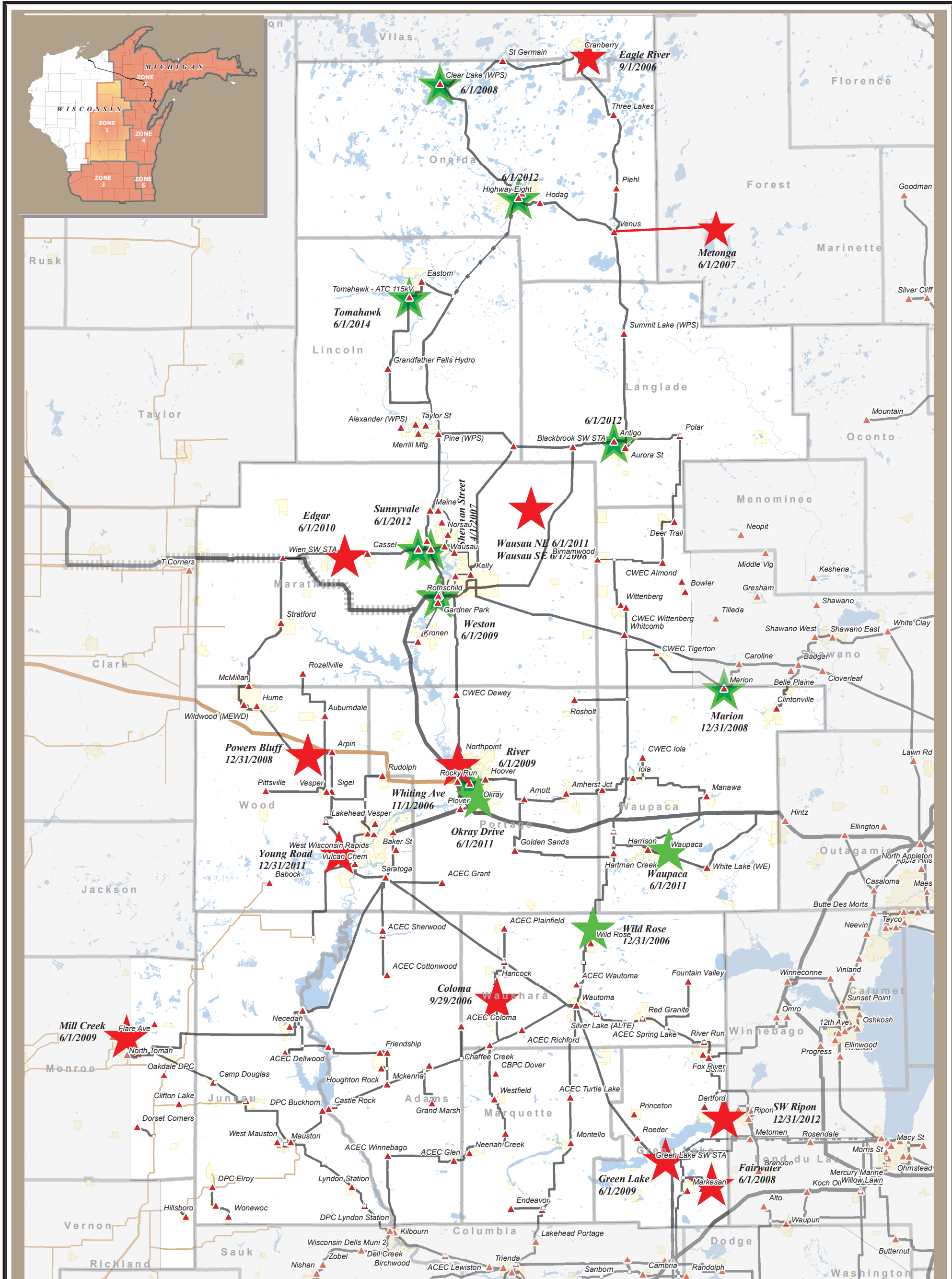


Figure PR-11
ATC New Generation Queue
Percentages of Megawatts by Technology
2006 10-Year Assessment





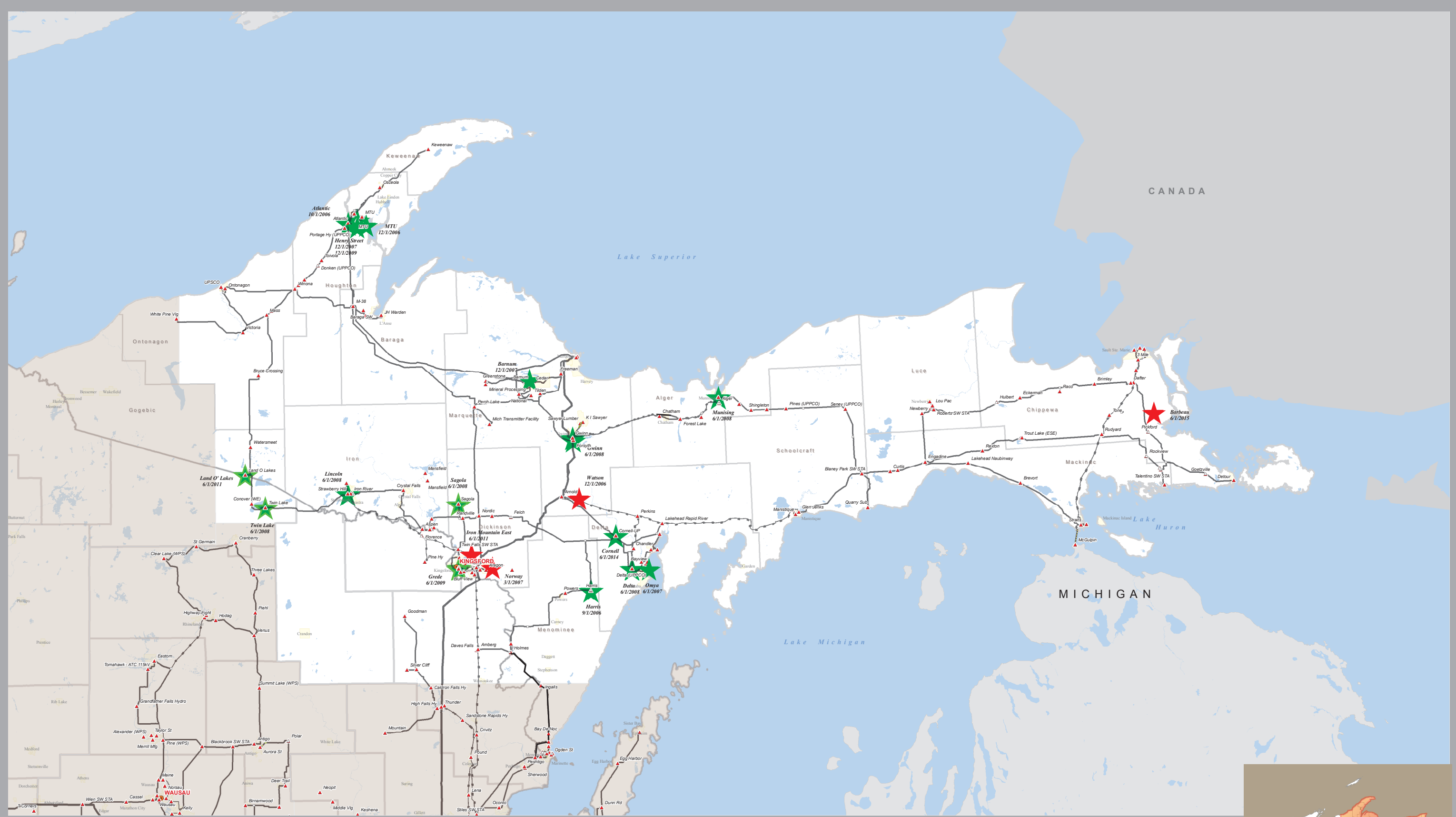
Transmission-Distribution Interconnection Requests PLANNING ZONE 1

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

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

- | | |
|--|--|
| <ul style="list-style-type: none"> ★ New Substation Interconnection Request ★ Transformer Addition/Replacement | <ul style="list-style-type: none"> ▲ 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:

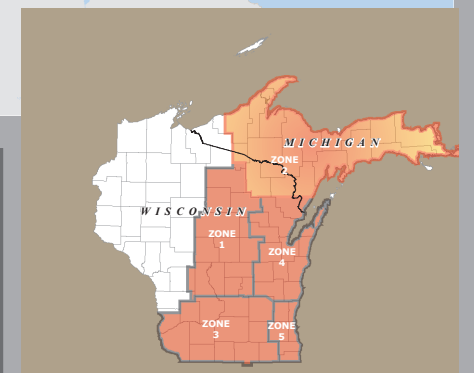
- * Approximately 8900 miles of transmission lines
- * 98 wholly owned substations
- * 358 jointly owned substations
- * ATC offices in Madison (2), Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, MI

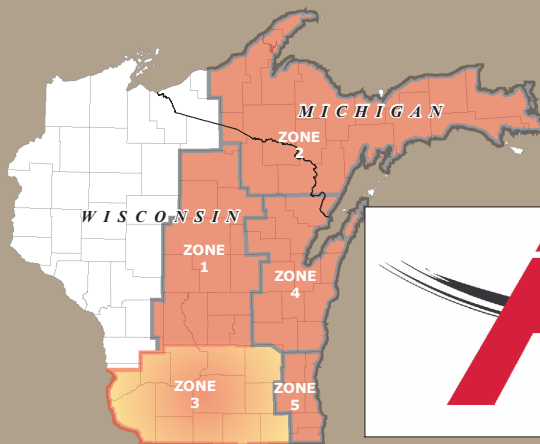
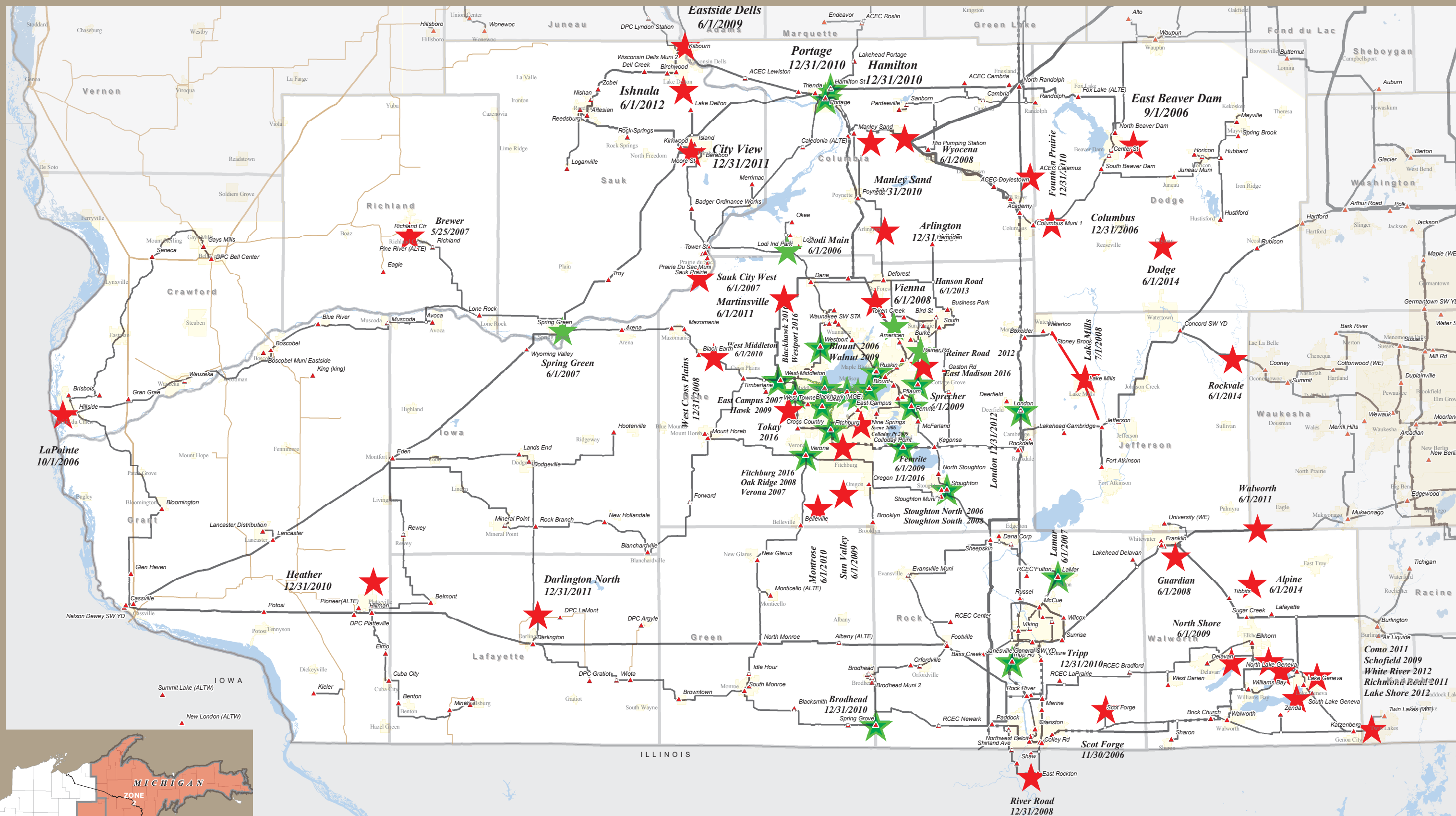
- ★ New Substation Interconnection Request
- ★ Transformer Addition/Replacement

Transmission Related Facilities

- ▲ Substation, Switchyard or Terminal
- ATC Office Location
- 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.

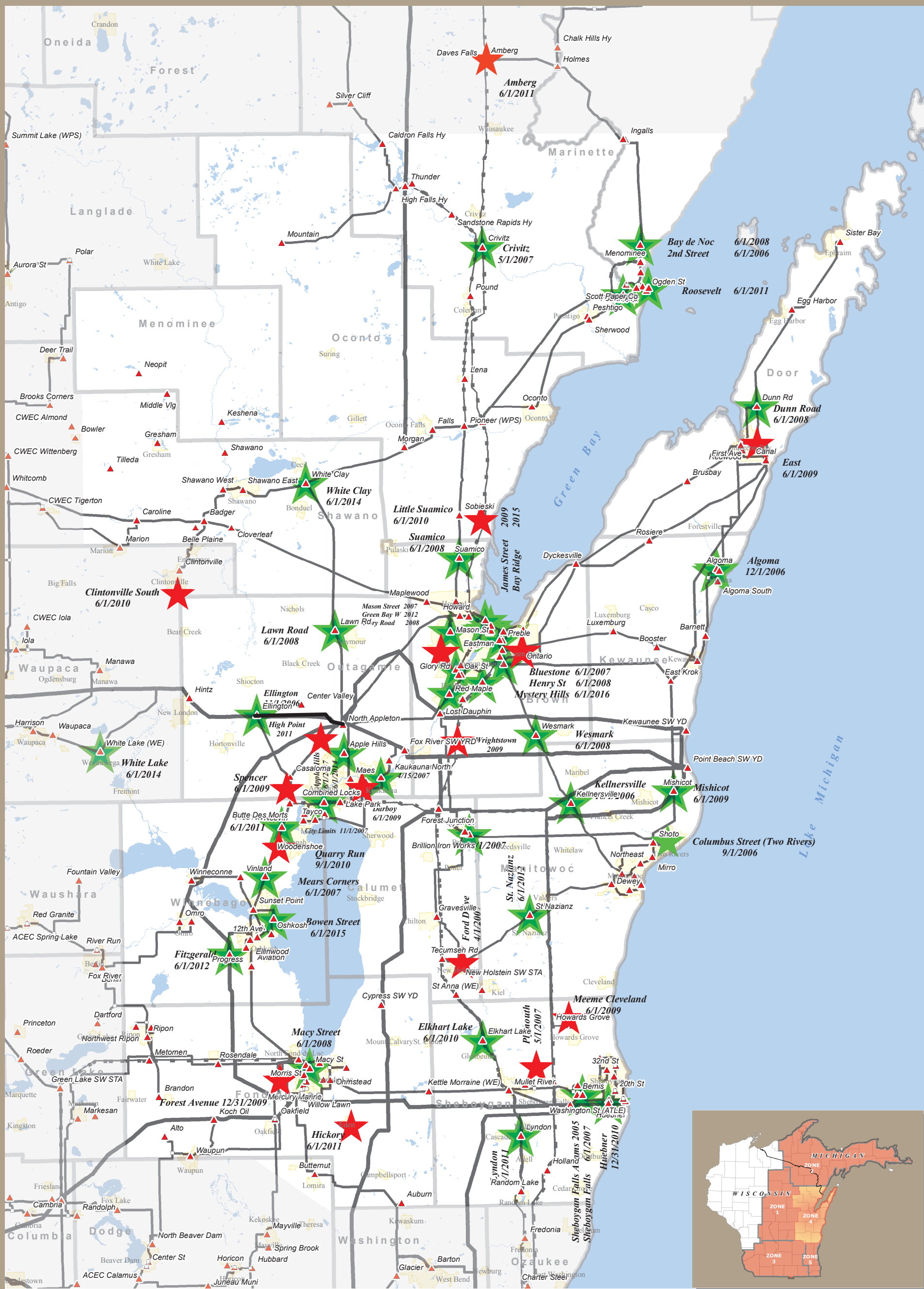




Transmission-Distribution Interconnection Requests
PLANNING ZONE 3

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
 - ATC Office Location
 - ★ New Substation Interconnection Request
 - ★ Transformer Addition/Replacement
 - Proposed/Design/Construction
 - Generation
 - Other Facility

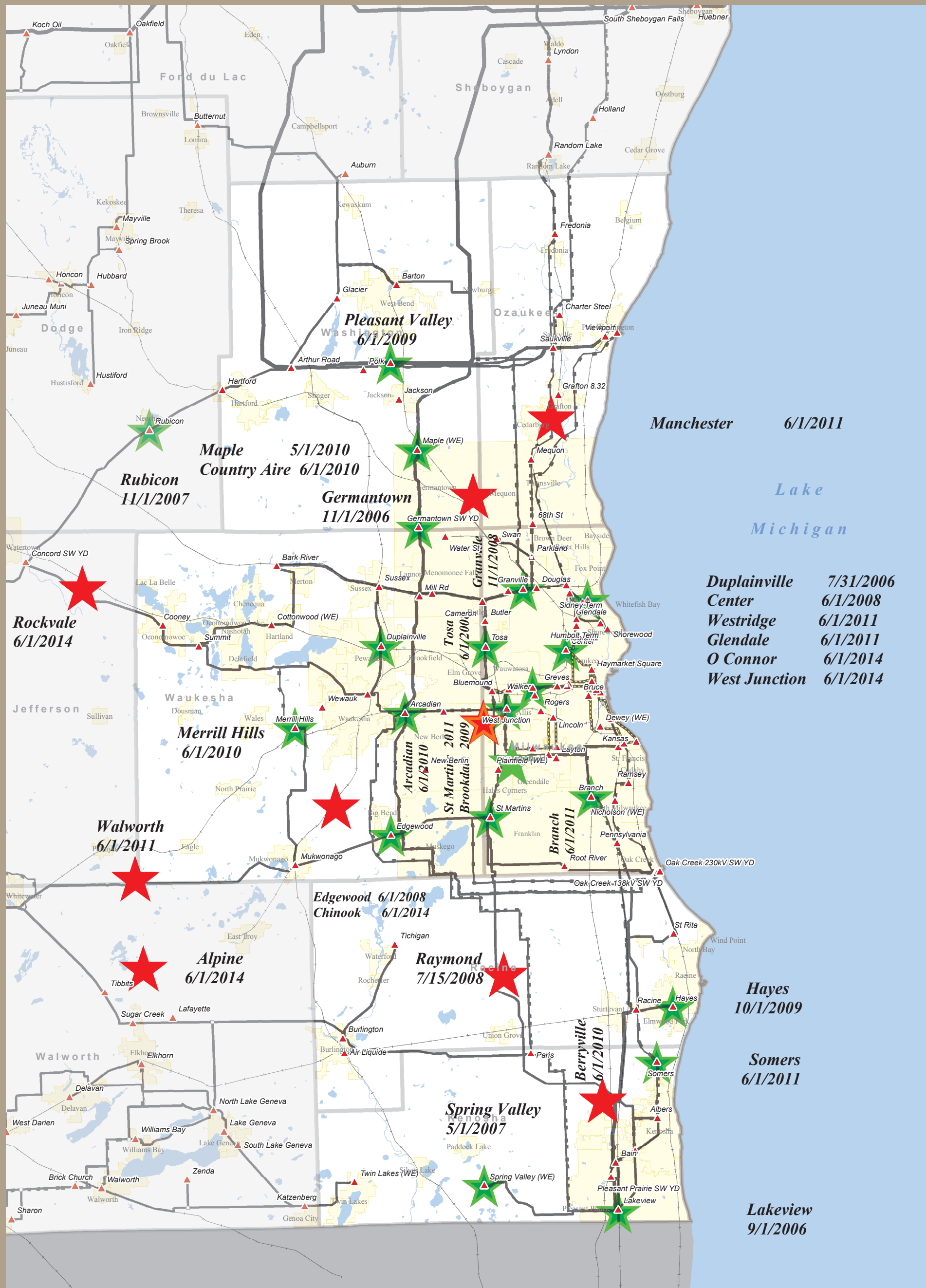


Transmission-Distribution Interconnection Requests
PLANNING ZONE 4

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

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

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



- Duplainville 7/31/2006
- Center 6/1/2008
- Westridge 6/1/2011
- Glendale 6/1/2011
- O Connor 6/1/2014
- West Junction 6/1/2014



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

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

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