PROJECTS > 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 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 2001-2005 10-Year Assessments and Updates, we identified or assumed responsibility for 524 projects that address system performance issues. Figure PR-6 illustrates the status of all Planned, Proposed, and Provisional projects from 2001-2005. Regarding Figure PR-6, it is worthwhile to note that:

- ATC has completed 151 projects and another 19 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.
- 58 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 69 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.
- 227 future projects are in various stages of evaluation or development (Planned, Proposed or Provisional).

Projects > Completed since 2004

Transmission projects significantly affecting system performance that have been completed since the 2004 Assessment Update was issued in March 2005 are listed in Table PR-1.

Most notable include:

- Rebuild Skanawan-Highway 8 115-kV line to double-circuit 115 kV
- Rebuild Plains-Amberg double-circuit 138-kV line
- Construct second Wempletown-Paddock 345-kV line; reconfigure existing Paddock-Rockdale 345-kV line
- Rebuild Morgan-Falls-Pioneer-Stiles 138-kV line
- Construct Waukesha-Duplainville-Sussex 138-kV line
- Rebuild Port Washington-Saukville 138-kV lines
- Construct Fox Energy-Forest Junction 345-kV line and
- Rebuild existing West Marinette-Menominee 69-kV to double-circuit 138/69 kV; convert Menominee-Rosebush 69-kV to 138 kV; rebuild/reconductor Rosebush-Amberg 138-kV line.

Table PR-1
Projects Placed In Service Since 2004 10-Year Assessment Update

Project	Zone
Rebuild Skanawan-Highway 8 115-kV line to double circuit 115 kV	1
Upgrade Bunker Hill-Pine 115-kV line terminal equipment at Pine	1
Replace 138/69-kV transformer at Sigel	1
Increase size of Council Creek 69-kV capacitor bank from 5.4 MVAR to 10.8 MVAR	1
Rebuild Plains-Amberg double-circuit 138-kV line	2 & 4
Uprate Lone Rock to Spring Green 69-kV line to 72 MVA	3
Construct 138-kV bus at Kegonsa and terminate both Christiana-Fitchburg circuits into Kegonsa	3
Uprate West Middleton-Pheasant Branch 69-kV line	3
Uprate North Beaver Dam to South Beaver Dam 69-kV line to 72 MVA	3
Construct second Wempletown-Paddock 345-kV circuit; reconfigure existing Paddock-Rockdale 345-kV circuit	3
Uprate Portage-Columbia double circuit 138-kV line terminal equipment	3
Replace an 800 A wave trap at White Clay 138-kV	4
Replace 345/138-kV transformer at Edgewater	4
Rebuild existing West Marinette-Menominee 69-kV line to double circuit 138/69 kV	4
Convert Menominee-Rosebush 69-kV line to 138 kV	4
Rebuild/reconductor Rosebush-Amberg 138-kV line	4
Construct a Fox Energy-Forest Junction 345-kV line	4
Improve line clearance on the Morgan-White Clay 138-kV line	4
Construct a tap to Belle Plain from the Badger-Caroline 115-kV line	4
Construct double-circuit 138-kV line from Forest Junction/Charter Steel to Howards Grove	4
Rebuild the Morgan-Falls-Pioneer-Stiles 138-kV line	4
Replace 200 A metering CT at Sheboygan Falls 69-kV	4
Rebuild the Port Washington 138-kV switchyard (ring bus) to accommodate IC027 generation	5
Reconductor Port Washington-Saukville double-circuit 138-kV line	5
Rebuild Paris-St. Martins 138-kV line	5
Construct a Waukesha-Duplainville-Sussex 138-kV line	5
Uprate Paris-Albers 138-kV line	5

Table PR-2
Transmission System Additions for 2005

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct new Eagle River Muni distribution Substation directly adjacent to the existing Cranberry 115-kV Substation	2005	2005	1	T-D interconnection	Planned	1.9
Uprate North Lake Geneva to Lake Geneva 69-kV line to 72 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Brick Church to Walworth 69-kV line to 48 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Brick Church to Katzenberg 69-kV line to 93 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Sun Prairie to Gaston Road 69-kV line to 48 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Colorado to Sun Prairie 69-kV line to 72 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Dane to Waunakee and Waunakee to Huiskamp 69-kV lines	2004	2005	3	reliability	Proposed	0.7
Uprate the North Appleton-Rocky Run 345-kV line	2005	2005	4	reliability	Planned	1
Construct a 138-kV substation at a new Forward Energy Center; loop existing Butternut-South Fond du Lac line into Forward Energy Center	2005	2005	4	new generation	Planned	3.2
Install 2-27 MVAR capacitor banks at Moorland 138 kV	2004	2005	5	reliability	Planned	1.1

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 2006

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install 2-8.16 MVAR capacitor banks at Council Creek 138 kV	2005	2006	1	reliability	Planned	2.3
Reconductor Wien-McMillan 115-kV line (ATC,MEWD)	2006	2006	1	reliability	Planned	3.4
Reconductor Weston-Northpoint 115-kV line	2005	2006	1	achieve transfer capability associated with Arrowhead-Gardner Park, reliability, new generation	Planned	5.5
Construct new Gardner Park 345/115-kV Substation	2006	2006	1	service limitation, reliability, import capability & Weston stability	Planned	Included in Arrowhead-Gardner Park estimate
Replace 345/115-kV 200 MVA transformer at Weston with two 500 MVA units at the Gardner Park Substation	2005	2006	1	service limitation, reliability, import capability & Weston stability	Planned	Included in Arrowhead-Gardner Park estimate
Construct Gardner Park-Stone Lake 345-kV line	1997	2006	1	service limitation, reliability, import capability & Weston stability	Planned	262.1
Install 3-50 MVAR capacitor banks at Gardner Park 115 kV	2006	2006	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	Included in Arrowhead-Gardner Park estimate
Install a 345/161-kV transformer at Stone Lake (temporary installation for construction outages)	2006	2006	1	reliability	Planned	Included in Arrowhead-Gardner Park estimate
Upgrade Weston-Kelly 115-kV line conductor clearances to 300F	2006	2006	1	new generation, reliability	Planned	1

Table PR-3
Transmission System Additions for 2006 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Increase size of existing Summit Lake 115-kV capacitor bank from 11.3 to 16.9 MVAR	2006	2006	1	reliability	Planned	1
Install 1-5.4 MVAR capacitor bank at Munising 69 kV	2006	2006	2	reliability	Proposed	0.4
Install 1-5.4 MVAR capacitor bank at Sawyer 69 kV	2006	2006	2	reliability	Proposed	0.9
Construct Hiawatha-Engadine 69-kV line	2003	2006	2	reliability	Planned	0
Rebuild and convert one Hiawatha-Indian Lake 69-kV circuit to double-circuit 138-kV standards, string two circuits initially and operate one at 69 kV	2004	2006	2	reliability, service limitation	Planned	44.2
Install 2-8.16 MVAR capacitor banks at Lincoln 69 kV	2006	2006	2	reliability	Proposed	1.1
Rebuild from Nordic to Randville Substation (5 miles) of single-circuit 69-kV line to double-circuit 69 kV	2005	2006	2	reliability, condition	Planned	5.2
Reconnect the 138/69-kV transformers at Kilbourn on separate breakers to operate individually	2006	2006	3	reliability	Provisional	0.3
Construct Butler Ridge 138-kV Substation	2006	2006	3	new generation	Planned	2.8
Install 36 MVAR capacitor bank at Hartford 138-kV Substation	2006	2006	3	reliability	Planned	1.2
Uprate Colley Road 138/69-kV transformer	2006	2006	3	reliability	Proposed	0.1
Uprate North Monroe 138/69-kV transformer	2006	2006	3	reliability	Proposed	0
Uprate Paddock-Shaw 69-kV line	2006	2006	3	reliability	Proposed	0
Uprate Brodhead-South Monroe 69-kV line	2006	2006	3	reliability	Provisional	0.1
Uprate McCue 138/69-kV transformer	2006	2006	3	reliability	Proposed	0.1

Table PR-3
Transmission System Additions for 2006 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct new 69-kV line from Columbia to Rio to feed the proposed Wyocena Substation	2004	2006	3	T-D interconnection, reliability	Planned	5
Rebuild Turtle-Bristol 69-kV line to 138 kV and operate at 69 kV	2004	2006	3	condition, reliability, new generation	Planned	5.9
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	2006	2006	3	reliability, new generation	Planned	17.7
Reconfigure 345-kV bus at Columbia	2006	2006	3	reliability, new generation	Planned	2.5
Convert Columbia-North Madison 138-kV line to 345 kV	2005	2006	3	reliability, new generation	Planned	6
Construct new line from West Darien to Southwest Delavan at 138 kV, operate at 69 kV	2006	2006	3	T-D interconnection	Planned	4
Install a 138-kV series reactor at Highway V	2005	2006	4	reliability, service limitation, T-D interconnection	Planned	1.4
Upgrade 48 MVA RTU and CT at Mullet River 138/69 kV	2006	2006	4	reliability	Proposed	0
Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress	2006	2006	4	new generation	Planned	5.1
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	14.3

Table PR-3
Transmission System Additions for 2006 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct a Martin Road-South Fond du Lac/Ohmstead 138-kV line	2006	2006	4	T-D interconnection	Planned	1.6
Construct North Appleton 345-kV double breaker ring bus configuration	2006	2006	4	operations, maintenance and stability	Planned	8.4
Install 2-27 MVAR capacitor banks at Burlington 138 kV	2005	2006	5	reliability	Proposed	1.6
Rebuild Stiles-Amberg double-circuit 138-kV line	1996	2006	2 & 4	reliability, service limitation, condition	Planned	45.8

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 2007

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Uprate Metomen-North Fond du Lac 69-kV line terminal equipment	2006	2007	1	reliability	Planned	0.2
Install 2-16.3 MVAR capacitor banks at Wautoma 138 kV	2007	2007	1	reliability	Proposed	1.2
Construct Venus-Metonga 115-kV line	2007	2007	1	T-D interconnection	Planned	8
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	Proposed	7.3
Construct Brandon-Fairwater 69-kV line	2007	2007	1	T-D interconnection	Provisional	0.6
Construct Mackinac 138-kV Substation (new Straits Substation)	2005	2007	2	reliability, service limitation	Proposed	5.8
Relocate Cedar Substation (North Lake)	2005	2007	2	reliability, condition	Proposed	7.3
Relocate Brule Substation (Aspen)	2007	2007	2	reliability, condition	Proposed	5.7
Install 2-8.16 MVAR capacitor banks at Ontonagon 138 kV	2007	2007	2	reliability	Proposed	1.2
Uprate McCue-Janesville 69-kV line	2007	2007	3	reliability	Proposed	0
Rebuild the Verona to Oregon 69-kV line Y119	2006	2007	3	reliability	Proposed	3.8
Uprate Rockdale to Jefferson 138-kV line	2007	2007	3	reliability, service limitation	Planned	0.2
Uprate Rockdale to Boxelder 138-kV line	2007	2007	3	reliability, service limitation	Planned	0.2
Uprate Boxelder to Stonybrook 138-kV line	2007	2007	3	reliability, service limitation	Planned	0.2
Construct a Jefferson-Lake Mills-Stony Brook 138-kV line	2006	2007	3	reliability, T-D interconnection	Proposed	19.7
Convert Kegonsa-McFarland-Femrite 69-kV line to 138 kV	2007	2007	3	reliability, new generation	Proposed	3.4
Construct Sprecher-Femrite 138-kV line	2007	2007	3	reliability, new generation	Proposed	8.1
Install 138/69-kV transformer at Femrite	2007	2007	3	reliability, new generation	Proposed	3.4

Table PR-4
Transmission System Additions for 2007 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install 138/69-kV transformer at Reiner	2007	2007	3	reliability, new generation	Proposed	3.4
Convert Sycamore-Reiner-Sprecher from 69-kV to 138 kV	2007	2007	3	reliability	Proposed	2.5
Install/upgrade capacitor bank at South Monroe 69 kV to 32 MVAR	2007	2007	3	reliability	Proposed	1.1
Construct new line from Southwest Delavan to Delavan or Bristol at 138 kV, operate at 69 kV	2007	2007	3	T-D interconnection	Proposed	4.3
String a new Ellinwood-Sunset Point 138-kV line on existing structures	2007	2007	4	reliability	Provisional	2.5
Install 2-16.3 MVAR capacitor bank at Canal 69 kV	2007	2007	4	reliability	Planned	1.8
Replace the 1200 A breaker at Edgewater T22 345/138 kV	2007	2007	4	reliability	Proposed	0.3
Construct double-circuit 138-kV line from Forest Junction/Howards Grove/Charter Steel to Plymouth #4	2007	2007	4	T-D interconnection	Proposed	2.5
Uprate North Appleton-Lawn Road-White Clay 138-kV line	2007	2007	4	reliability	Planned	0.6
Construct a 345-kV bus at Bain	2005	2007	5	reliability	Provisional	2.1
Install 200 MVAR capacitor bank at Bluemound	2007	2007	5	reliability	Provisional	3.3
Install series reactor at Cornell	2007	2007	5	reliability	Proposed	0.8

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 2008

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2008	2008	1	T-D interconnection	Provisional	0.6
Upgrade Kelly-Whitcomb 115-kV line conductor clearances to 300F	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	1.9
Construct Stone Lake-Arrowhead 345-kV line	1997	2008	1	service limitation, reliability, import capability & Weston stability	Planned	158.2
Install 2-75 MVAR capacitor banks at Arrowhead 345 kV	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	Included in Arrowhead-Gardner Park estimate
Install 1-75 MVAR capacitor bank and 1-45 MVAR inductor at Stone Lake 345 kV	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	Included in Arrowhead-Gardner Park estimate
Install 1-50 MVAR capacitor bank at Arpin	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	Included in Arrowhead-Gardner Park estimate
Construct the new permanent Stone Lake 345/161-kV Substation	2008	2008	1	reliability, import capability & Weston stability	Planned	8
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Berlin 69 kV	2008	2008	1	reliability	Proposed	0.5
Rebuild Atlantic-Osceola 69-kV line (Laurium #1)	2006	2008	2	reliability, condition	Planned	9.2
Increase ground clearance of Atlantic-Osceola (Laurium #2) 69-kV line from 120 to 167 degrees F	2008	2008	2	reliability	Proposed	2.1

Table PR-5
Transmission System Additions for 2008 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install second 345/138-kV transformer at Plains	2008	2008	2	reliability	Provisional	5.4
Install 1-5.4 MVAR capacitor bank at L'Anse 69 kV	2008	2008	2	reliability	Provisional	0.5
Install 2-8.16 MVAR capacitor banks at M38 69 kV	2008	2008	2	reliability	Proposed	1.8
Install 2-5.4 MVAR capacitor banks at Osceola 69 kV	2008	2008	2	reliability	Proposed	1.3
Uprate Atlantic 138/69-kV transformer	2008	2008	2	reliability	Proposed	1.4
Construct a Rubicon-Hustisford 138-kV line	2008	2008	3	reliability	Proposed	4.8
Rebuild Hustisford-Horicon 69 kV to 138 kV	2008	2008	3	reliability	Proposed	2.4
Construct 138/69-kV substation at a site near Horicon and install a 138/69-kV transformer	2008	2008	3	reliability	Proposed	8.8
Convert Rock River to Bristol to Elkhorn 138 kV operation; rebuild Bristol with a new 138-kV bus	2008	2008	3	reliability	Proposed	5.1
Construct a new 138-kV line from North Madison to Waunakee	2005	2008	3	reliability	Proposed	10.1
Construct a new 138/69-kV substation near Waunakee and install a 100 MVA 138/69-kV transformer	2005	2008	3	reliability	Proposed	1
Install 1-8.16 MVAR capacitor bank at Richland Center 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2008	2008	3	reliability	Provisional	1.1
Construct 138-kV line from Canal to Dunn Road	2008	2008	4	reliability	Proposed	4.2

Table PR-5
Transmission System Additions for 2008 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install 60 MVA 138/69-kV transformer at Dunn Road	2008	2008	4	reliability	Proposed	2.2
Rebuild/Convert Pulliam-New Suamico 69-kV line to 138 kV	2008	2008	4	reliability, condition, T-D interconnection	Provisional	12.9
Uprate North Appleton-Mason Street 138-kV line	2008	2008	4	reliability, service limitation	Proposed	1.7
Uprate North Appleton-Lost Dauphin 138-kV line	2008	2008	4	reliability, service limitation	Proposed	1.6
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	2
Install 138/69-kV transformer at the expanded Menominee Substation	2008	2008	4	reliability	Provisional	2.1
Rebuild Crivitz-High Falls 69-kV double-circuit line	2008	2008	4	reliability	Provisional	7.8
Construct a new Mill Road Substation at intersection of Granville-Arcadian 345-kV, Forest Junction-Arcadian 345-kV, Sussex-Tamarack 138-kV and Sussex-Germantown 138-kV lines; install a 345/138-kV transformer	2008	2008	5	reliability	Proposed	29.2
Reconductor Pleasant Valley-Saukville 138-kV line	2008	2008	5	new generation	Proposed	3
Reconductor Pleasant Valley-St. Lawrence 138-kV line	2008	2008	5	new generation	Proposed	3.1

Table PR-5
Transmission System Additions for 2008 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Reconductor Cornell-Range Line 138-kV line	2008	2008	5	new generation	Proposed	6
Construct Cranberry-Conover 115-kV line	2008	2008	1 & 2	reliability, transfer capability	Proposed	17.1
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2008	2008	1 & 2	reliability, transfer capability	Proposed	69.1
Construct 138-kV bus and install 138/115-kV 150 MVA and 138/69-kV 60 MVA transformers at Conover	2008	2008	1 & 2	reliability, transfer capability	Proposed	18.5
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Iron Grove	2008	2008	1 & 2	reliability, transfer capability	Proposed	2.9
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Aspen	2008	2008	1 & 2	reliability	Proposed	2.9
Relocate Iron River Substation (Iron Grove)	2008	2008	1 & 2	reliability	Proposed	5.9

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 2009

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Uprate Rocky Run-Plover 115-kV line terminal equipment	2009	2009	1	new generation	Proposed	0
Construct Gardner Park-Central Wisconsin 345-kV line	2009	2009	1	service limitation, reliability, import capability and Weston stability	Planned	90.2
Construct new Central Wisconsin 345-kV Substation	2009	2009	1	service limitation, reliability, import capability and Weston stability	Planned	12.2
Relocate 69-kV Rexton tap to 69-kV Hiawatha-Pine River line (6909)	2009	2009	2	condition	Provisional	0.3
Relocate 69-kV Trout Lake tap to 69-kV Hiawatha-Pine River line (6909)	2009	2009	2	condition	Provisional	0.3
Construct Mackinac 138-kV Substation additions (portions may be earlier for maintenance issues)	2009	2009	2	reliability, service limitation	Provisional	5.8
Rebuild Hiawatha-Pine River-Mackinac 69 kV to 138 kV	2009	2009	2	reliability, condition	Provisional	57.4
Construct 138-kV bus and install one 138/69-kV, 50 MVA transformer at Pine River	2009	2009	2	reliability	Provisional	10
Convert rebuilt Hiawatha-Indian Lake circuit (operated at 69 kV) to 138 kV	2009	2009	2	reliability, service limitation	Planned	0.2
Construct 138-kV ring bus at Hiawatha Substation	2009	2009	2	reliability, service limitation	Planned	3.3
Install 138-kV substation modifications at Indian Lake Substation	2009	2009	2	reliability, service limitation	Planned	1.9
Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69 kV	2009	2009	2	reliability	Proposed	0.6
Install 1-5.4 MVAR capacitor bank at Roberts 69 kV	2009	2009	2	reliability	Proposed	0.6

Table PR-6
Transmission System Additions for 2009 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install 4-25 MVAR capacitor banks at Portage 138 kV	2009	2009	3	reliability	Provisional	2.2
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva	2009	2009	3	reliability	Provisional	6
Construct new 138-kV line from South Lake Geneva to White River	2009	2009	3	reliability, T-D interconnection	Provisional	2.5
Construct new 138-kV bus and 138/69-kV 100 MVA transformer at Montrose Substation	2009	2009	3	reliability	Proposed	1.4
Construct new Montrose-Sun Valley-Oak Ridge 138-kV line	2009	2009	3	reliability	Proposed	5.1
Uprate Colley Road to Brick Church 69-kV line to 72 MVA	2008	2009	3	reliability	Proposed	0.5
Install a second 138/69-kV transformer at Hillman	2009	2009	3	reliability	Proposed	3.9
Install a 69-kV 16.32 MVAR capacitor bank at Kilbourn Substation	2009	2009	3	reliability	Provisional	0.4
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2009	2009	4	reliability	Proposed	1
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	included in Morgan-Werner estimate
Construct Morgan-Werner West 345-kV line	2004	2009	4	reliability, service limitation	Planned	113.8
Reconductor Oak Creek-Ramsey 138-kV line	2009	2009	5	new generation	Proposed	0.4
Reconductor Oak Creek-Allerton 138-kV line	2009	2009	5	new generation	Proposed	2

Table PR-6
Transmission System Additions for 2009 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Replace relaying on 230-kV circuits at Oak Creek	2009	2009	5	new generation	Proposed	3
Replace two 345-kV circuit breakers at Pleasant Prairie on the Racine and Zion lines with IPO breakers and upgrade relaying	2009	2009	5	new generation	Proposed	2.1
Expand Oak Creek 345-kV switchyard to interconnect one new generator	2009	2009	5	new generation	Proposed	10.8
Loop Ramsey5-Harbor 138-kV line into Norwich and Kansas to form a new line from Ramsey-Norwich and Harbor-Kansas 138-kV lines	2009	2009	5	new generation	Provisional	4.1
Construct Rockdale-Concord 345-kV line in parallel with existing 138-kV on existing double-width right-of-way	2009	2009	3 & 5	reliability, service limitation	Proposed	22.2
Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Concord	2009	2009	3 & 5	reliability	Proposed	12.9

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Table PR-7
Transmission System Additions for 2010

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Uprate Wautoma-Berlin 69-kV line terminal equipment at Wautoma	2010	2010	1	reliability	Provisional	0
Replace 138/69-kV transformer at Metomen	2010	2010	1	reliability	Provisional	2
Construct Monroe County-Council Creek 161-kV line	2010	2010	1	access initiative, reliability	Provisional	16.7
Install a 161/138-kV transformer at Council Creek	2010	2010	1	access initiative, reliability	Provisional	2.5
Uprate Council Creek-Petenwell 138-kV line	2010	2010	1	access initiative, reliability	Provisional	0.2
Rebuild/reconductor Petenwell-Saratoga 138-kV line	2010	2010	1	access initiative, reliability	Provisional	14.8
Install a 69-kV bus and 138/69-kV 100 MVA transformer at Northwest Beloit	2010	2010	3	reliability	Provisional	2
Reroute Paddock to Shirland Avenue 69-kV line into and out of Northwest Beloit	2010	2010	3	reliability	Provisional	0.5
Loop the Femrite to Royster 69-kV line into AGA Gas	2010	2010	3	reliability	Provisional	1.6
Convert Hillman to Eden 69-kV line to 138 kV	2010	2010	3	reliability	Proposed	16.5
Install 1-8.16 MVAR capacitor bank at Boscobel 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2010	2010	3	reliability	Provisional	1.2
Rebuild Brodhead to South Monroe 69-kV line using 477 ACSR	2010	2010	3	reliability	Provisional	4
Convert Waunakee-Blount 69-kV line to 138 kV	2010	2010	3	reliability	Proposed	20

Table PR-7
Transmission System Additions for 2010 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Uprate Darlington-Rock Branch 69-kV line	2010	2010	3	reliability	Provisional	0.1
Uprate existing 18 MVAR capacitor bank at Spring Green 138 kV with a 50 MVAR bank	2010	2010	3	reliability	Provisional	1.2
Retap 48 MVA CT at South Sheboygan Falls 138/69-kV transformer	2010	2010	4	reliability	Proposed	0
Rebuild/convert New Holstein-St. Nazianz-Custer-Lakefront 69-kV line to 138 kV (1225 Amps minimum)	2010	2010	4	access initiative	Provisional	7.7
Rebuild Tecumseh Road-New Holstein to double-circuit 138/69 kV, where 69 kV will serve Gravesville via New Holstein	2010	2010	4	access initiative	Provisional	2.4
Install 47 MVA 138/69-kV transformer at Custer	2010	2010	4	access initiative	Provisional	3.1
Install 100 MVA 138/69-kV transformer at Lakefront	2010	2010	4	access initiative	Provisional	2.5
Construct a second Dunn Road-Egg Harbor 69-kV line	2010	2010	4	reliability	Proposed	6.2
Uprate Kansas-Ramsey6 138-kV line	2009	2010	5	new generation	Proposed	0.1
Install second 500 MVA 345/138-kV transformer at Oak Creek	2010	2010	5	new generation	Proposed	6.6
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Proposed	10.8
Uprate Oak Creek-Root River 138-kV line	2010	2010	5	new generation	Proposed	0.6
Uprate Oak Creek-Nicholson 138-kV line	2010	2010	5	new generation	Proposed	1.2
Convert Bark River-Mill Road 138-kV line to 345 kV	2010	2010	3 & 5	reliability, new generation	Proposed	0.8

Table PR-7
Transmission System Additions for 2010 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct a Concord-Bark River 345-kV line	2010	2010	3 & 5	reliability, new generation	Proposed	50.3
Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Bark River	2010	2010	3 & 5	reliability, new generation	Proposed	8.4

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Table PR-8
Transmission System Additions for 2011

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69 kV	2011	2011	1	reliability	Provisional	0.5
Uprate Yahara-Token Creek 69-kV line	2011	2011	3	reliability	Provisional	0.1
Construct Evansville-Brooklyn 69-kV line	2011	2011	3	reliability	Provisional	7.9
Construct 345-kV line from Rockdale to West Middleton	2011	2011	3	reliability	Proposed	49
Construct a 345-kV bus and install a 345/138-kV 500 MVA transformer at West Middleton	2011	2011	3	reliability	Proposed	12
Install a 138/69-kV transformer and 69-kV bus at Yahara River Substation	2011	2011	3	reliability	Provisional	1.3
Loop the Deforest to Token Creek 69-kV line into the Yahara River Substation	2011	2011	3	reliability	Provisional	1.2
Constuct a Lake Delton-Birchwood 138-kV line	2011	2011	3	reliability	Provisional	3
Install a second 138/69-kV transformer at Janesville Substation	2011	2011	3	reliability	Provisional	2
Uprate Northgate-20th Street 138-kV line	2011	2011	4	reliability	Provisional	0.1
Replace the 400 amp metering CT at North Mullet River 69 kV	2011	2011	4	reliability	Provisional	0.2

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Table PR-9
Transmission System Additions for 2012

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Uprate Gardner Park-Black Brook 115-kV line - scope TBD	2012	2012	1	reliability	Provisional	0.6
Install a 12.2 MVAR capacitor bank at Hilltop 69 kV	2012	2012	1	reliability	Provisional	1.3
Uprate M38 138/69-kV transformer	2012	2012	2	reliability	Provisional	1.4
Rebuild Blaney Park-Munising 69 kV to 138 kV	2012	2012	2	reliability, condition	Provisional	53.7
Uprate Sun Prairie-Bird Street 69-kV line	2012	2012	3	reliability	Proposed	0.1
Uprate North Monroe-Idle Hour 69-kV line	2012	2012	3	reliability	Provisional	0.1
Install 138/69-kV transformer at Bass Creek	2012	2012	3	reliability	Provisional	4.5
Rebuild and convert West Middleton-Spring Green 69-kV line to 138 kV	2012	2012	3	reliability	Provisional	22.7
Construct West Middleton-Stagecoach double-circuit 138/69-kV line	2012	2012	3	reliability	Provisional	6.9
Construct 69-kV line Eden through Muscoda to Richland Center	2012	2012	3	reliability	Provisional	23.4
Move Lone Rock 69-kV phase shifter to Richland Center	2012	2012	3	reliability	Provisional	0.5
Retap 400A primary CT at Edgewater to 600A	2012	2012	4	reliability	Provisional	0

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Table PR-10
Transmission System Additions for 2013

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Replace 300 A metering CT at Edgewater 69 kV	2013	2013	4	reliability	Proposed	0
Replace 300 A metering CT at Riverside 69 kV	2013	2013	4	reliability	Proposed	0
Uprate Port Edwards-Saratoga 138-kV line - Scope TBD	2013	2013	1	reliability	Provisional	0.1
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	2013	3	access initiative	Provisional	343.9
Rebuild/convert Chalk Hills-Chandler 69 kV to 138 kV operation	2013	2013	2 & 4	reliability	Provisional	25.1
Expand 345 kV to 6 positions at Paddock	2013	2013	3	access initiative	Provisional	0.6
Expand 138 kV to 7 positions at Paddock	2013	2013	3	access initiative	Provisional	0.5
Install second 345/138-kV transformer at Paddock (500 MVA normal/625 MVA emergency)	2013	2013	3	access initiative	Provisional	1.9
Rebuild Paddock-Town Line Road 138 kV to double-circuit 1600 Amps minimum summer emergency each	2013	2013	3	access initiative	Provisional	5
Reconductor Town Line Road-Russell 138 kV to 1600 Amps minimum summer emergency	2013	2013	3	access initiative	Provisional	1.3
Construct new 69-kV line from South Lake Geneva to Lake Shore Substation	2013	2013	3	T-D interconnection	Provisional	2.4

Table PR-10
Transmission System Additions for 2013 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Convert South Lake Geneva to Twin Lakes 69-kV line to 138 kV	2013	2013	3	reliability	Provisional	3
Construct new 138-kV line from Twin Lakes to Spring Valley	2013	2013	3	reliability	Provisional	27
Construct a Horicon-East Beaver Dam 138-kV line	2013	2013	3	reliability	Provisional	6
Replace the 300A current transformer at Sheboygan Falls 69 kV	2013	2013	4	reliability	Provisional	0
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	15
Construct a 345/138-kV switchyard at Hale (Brookdale) to accommodate two 345-kV lines, a 500 MVA 345/138-kV transformer and four 138-kV lines plus two 138/26.2 kV transformers	2013	2013	5	new generation	Provisional	19.6
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	15.2
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	40.7
Construct Oak Creek-St Martins 138-kV circuit #2 installing 16.6 mi. conductor on existing towers	2013	2013	5	new generation	Provisional	10.7

Table PR-10
Transmission System Additions for 2013 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct a Hale (Brookdale)-Granville 345-kV line converting/reconductoring 5.6 miles of 138 kV, rebuilding 7 miles of 138-kV double-circuit tower line and converting/reconductoring 3 miles of 138 kV on existing 345-kV structures	2013	2013	5	new generation	Provisional	41.9
Restring Bluemound-Butler 138-kV line (KK5051) on new 345-kV structures installed with Hale (Brookdale)-Granville line	2013	2013	5	new generation	Provisional	0.7
String Butler-Tamarack (Carmen) 138-kV line on new 345-kV structures installed with Hale (Brookdale)-Granville line	2013	2013	5	new generation	Provisional	0.9
Replace CTs at Racine 345-kV Substation	2013	2013	5	new generation	Provisional	0

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Table PR-11
Transmission System Additions for 2014

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Increase McKenna 69-kV capacitor bank from 6.3 to 10.8 MVAR	2014	2014	1	reliability	Provisional	0.3
Uprate Metomen-Ripon 69-kV line - scope TBD	2014	2014	1	reliability	Provisional	2.2
Install a second 138/69-kV transformer at North Monroe	2014	2014	3	reliability	Provisional	2.3
Construct West Middleton-Blount 138-kV line	2014	2014	3	reliability	Provisional	11
Construct West Middleton-North Madison 345-kV line	2014	2014	3	reliability, access initiative	Proposed	46.7
Install 1-16.32 MVAR capacitor bank at Burke 69 kV	2014	2014	3	reliability	Provisional	0.1
Install a second Femrite 138/69-kV transformer	2014	2014	3	reliability	Provisional	2.4
Replace the Kilbourn 47 MVA 138/69-kV transformer with a 100 MVA unit	2014	2014	3	reliability	Provisional	0.2
Uprate Colley Road to Park Street Tap 69-kV line to 114 MVA	2014	2014	3	reliability	Provisional	0.1
Replace the existing 46.7 MVA 138/69-kV transformer at South Sheboygan Falls with 100 MVA transformer	2014	2014	4	reliability	Provisional	1.3
Uprate the Melissa-Tayco to 229 MVA (300F)	2014	2014	4	reliability	Provisional	0.1

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New to this 10-Year Assessment

Table PR-12
Transmission System Additions for 2015

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Replace 138/69-kV transformer at Wautoma	2015	2015	1	reliability	Provisional	1.4
Construct Fitzgerald-Omro Industrial 69-kV line	2015	2015	1	reliability	Provisional	5.3
Install additional 13.6 MVAR capacitor bank at Clear Lake 115 kV	2015	2015	1	reliability	Provisional	0.5
Install 2-5.4 MVAR capacitor banks at M-38 69 kV	2015	2015	2	reliability	Provisional	0.3
Replace the Colley Road 138/69-kV transformer	2015	2015	3	reliability	Provisional	1.4
Install 28.8 MVAR capacitor bank at Butternut 138 kV	2015	2015	4	reliability	Provisional	1
Construct a Northside-City Limits 138-kV line	2015	2015	4	reliability	Provisional	5
Reconductor Pulliam-Danz 69-kV line	2015	2015	4	reliability	Provisional	2.2
Reconductor Danz-Henry Street 69-kV line	2015	2015	4	reliability	Provisional	0.1
Reconductor Pulliam-Van Buren 69-kV line	2015	2015	4	reliability	Provisional	0.1
Rebuild/Convert New Suamico-Pioneer 69-kV line to 138 kV	2015	2015	4	reliability, condition	Provisional	13.3

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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
Construct new Eagle River Muni distribution Substation directly adjacent to the existing Cranberry 115-kV Substation	2005	2005	1	T-D interconnection	Planned
Install 2-8.16 MVAR capacitor banks at Council Creek 138 kV	2005	2006	1	reliability	Planned
Reconductor Wien-McMillan 115-kV line (ATC,MEWD)	2006	2006	1	reliability	Planned
Reconductor Weston-Northpoint 115-kV line	2005	2006	1	achieve transfer capability associated with Arrowhead-Gardner Park, reliability, new generation	Planned
Construct new Gardner Park 345/115-kV Substation	2006	2006	1	service limitation, reliability, import capability & Weston stability	Planned
Replace 345/115-kV 200 MVA transformer at Weston with two 500 MVA units at the Gardner Park Substation	2005	2006	1	service limitation, reliability, import capability & Weston stability	Planned
Construct Gardner Park-Stone Lake 345-kV line	1997	2006	1	service limitation, reliability, import capability & Weston stability	Planned
Install 3-50 MVAR capacitor banks at Gardner Park 115 kV	2006	2006	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned
Install a 345/161-kV transformer at Stone Lake (temporary installation for construction outages)	2006	2006	1	reliability	Planned
Upgrade Weston-Kelly 115-kV line conductor clearances to 300F	2006	2006	1	new generation, reliability	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
Increase size of existing Summit Lake 115-kV capacitor bank from 11.3 to 16.9 MVAR	2006	2006	1	reliability	Planned
Uprate Metomen-North Fond du Lac 69-kV line terminal equipment	2006	2007	1	reliability	Planned
Install 2-16.3 MVAR capacitor banks at Wautoma 138 kV	2007	2007	1	reliability	Proposed
Construct Venus-Metonga 115-kV line	2007	2007	1	T-D interconnection	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	Proposed
Construct Brandon-Fairwater 69-kV line	2007	2007	1	T-D interconnection	Provisional
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2008	2008	1	T-D interconnection	Provisional
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
Install 2-75 MVAR capacitor banks at Arrowhead 345 kV	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned
Install 1-75 MVAR capacitor bank and 1-45 MVAR inductor at Stone Lake 345 kV	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned
Install 1-50 MVAR capacitor bank at Arpin	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 the new permanent Stone Lake 345/161-kV Substation	2008	2008	1	reliability, import capability & Weston stability	Planned
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Berlin 69 kV	2008	2008	1	Reliability	Proposed
Construct Cranberry-Conover 115-kV line	2008	2008	1 & 2	reliability, transfer capability	Proposed
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2008	2008	1 & 2	reliability, transfer capability	Proposed
Construct 138-kV bus and install 138/115-kV 150 MVA and 138/69-kV 60 MVA transformers at Conover	2008	2008	1 & 2	reliability, transfer capability	Proposed
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Iron Grove	2008	2008	1 & 2	reliability, transfer capability	Proposed
Construct 138-kV bus and install 138/69-kV, 60 MVA transformer at Aspen	2008	2008	1 & 2	reliability	Proposed
Relocate Iron River Substation (Iron Grove)	2008	2008	1 & 2	reliability	Proposed
Uprate Rocky Run-Plover 115-kV line terminal equipment	2009	2009	1	new generation	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
Uprate Wautoma-Berlin 69-kV line terminal equipment at Wautoma	2010	2010	1	reliability	Provisional
Replace 138/69-kV transformer at Metomen	2010	2010	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
Construct Monroe County-Council Creek 161-kV line	2010	2010	1	access initiative, reliability	Provisional
Install a 161/138-kV transformer at Council Creek	2010	2010	1	access initiative, reliability	Provisional
Uprate 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
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69 kV	2011	2011	1	reliability	Provisional
Uprate Gardner Park-Black Brook 115-kV line - scope TBD	2012	2012	1	reliability	Provisional
Install a 12.2 MVAR capacitor bank at Hilltop 69 kV	2012	2012	1	reliability	Provisional
Uprate Port Edwards-Saratoga 138-kV line - Scope TBD	2013	2013	1	reliability	Provisional
Increase McKenna 69-kV capacitor bank from 6.3 to 10.8 MVAR	2014	2014	1	reliability	Provisional
Uprate Metomen-Ripon 69-kV line - scope TBD	2014	2014	1	reliability	Provisional
Replace 138/69-kV transformer at Wautoma	2015	2015	1	reliability	Provisional
Construct Fitzgerald-Omro Industrial 69-kV line	2015	2015	1	reliability	Provisional
Install additional 13.6 MVAR capacitor bank at Clear Lake 115 kV	2015	2015	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
Install 1-5.4 MVAR capacitor bank at Munising 69 kV	2006	2006	2	reliability	Proposed
Install 1-5.4 MVAR capacitor bank at Sawyer 69 kV	2006	2006	2	reliability	Proposed
Construct Hiawatha-Engadine 69-kV line	2003	2006	2	reliability	Planned
Rebuild and convert one Hiawatha-Indian Lake 69-kV circuit to double-circuit 138-kV standards, string two circuits initially and operate one at 69 kV	2004	2006	2	reliability, service limitation	Planned
Install 2-8.16 MVAR capacitor banks at Lincoln 69 kV	2006	2006	2	reliability	Proposed
Rebuild from Nordic to Randville Substation (5 miles) of single circuit 69-kV line to double-circuit 69 kV	2005	2006	2	reliability, condition	Planned
Rebuild Stiles-Amberg double-circuit 138-kV line	1996	2006	2 & 4	reliability, service limitation, condition	Planned
Construct Mackinac 138-kV Substation (new Straits Substation)	2005	2007	2	reliability, service limitation	Proposed
Relocate Cedar Substation (North Lake)	2005	2007	2	reliability, condition	Proposed
Relocate Brule Substation (Aspen)	2007	2007	2	reliability, condition	Proposed
Install 2-8.16 MVAR capacitor banks at Ontonagon 138 kV	2007	2007	2	reliability	Proposed
Rebuild Atlantic-Osceola 69-kV line (Laurium #1)	2006	2008	2	reliability, condition	Planned
Increase ground clearance of Atlantic-Osceola (Laurium #2) 69-kV line from 120 to 167 degrees F	2008	2008	2	reliability	Proposed
Install second 345/138-kV transformer at Plains	2008	2008	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 1-5.4 MVAR capacitor bank at L'Anse 69 kV	2008	2008	2	reliability	Provisional
Install 2-8.16 MVAR capacitor banks at M38 69 kV	2008	2008	2	reliability	Proposed
Install 2-5.4 MVAR capacitor banks at Osceola 69 kV	2008	2008	2	reliability	Proposed
Uprate Atlantic 138/69-kV transformer	2008	2008	2	reliability	Proposed
Construct Cranberry-Conover 115-kV line	2008	2008	1 & 2	reliability, transfer capability	Proposed
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2008	2008	1 & 2	reliability, transfer capability	Proposed
Construct 138-kV bus and install 138/115-kV 150 MVA and 138/69-kV 60 MVA transformers at Conover	2008	2008	1 & 2	reliability, transfer capability	Proposed
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Iron Grove	2008	2008	1 & 2	reliability, transfer capability	Proposed
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Aspen	2008	2008	1 & 2	reliability	Proposed
Relocate Iron River Substation (Iron Grove)	2008	2008	1 & 2	reliability	Proposed
Relocate 69-kV Rexton tap to 69-kV Hiawatha-Pine River line (6909)	2009	2009	2	condition	Provisional
Relocate 69-kV Trout Lake tap to 69-kV Hiawatha-Pine River line (6909)	2009	2009	2	condition	Provisional
Construct Mackinac 138-kV Substation additions (portions may be earlier for maintenance issues)	2009	2009	2	reliability, service limitation	Provisional
Rebuild Hiawatha-Pine River-Mackinac 69 kV to 138 kV	2009	2009	2	reliability, condition	Provisional
Construct 138-kV bus and install one 138/69-kV, 50 MVA transformer at Pine River	2009	2009	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
Convert rebuilt Hiawatha-Indian Lake circuit (operated at 69 kV) to 138 kV	2009	2009	2	reliability, service limitation	Planned
Construct 138-kV ring bus at Hiawatha Substation	2009	2009	2	reliability, service limitation	Planned
Install 138-kV substation modifications at Indian Lake Substation	2009	2009	2	reliability, service limitation	Planned
Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69 kV	2009	2009	2	reliability	Proposed
Install 1-5.4 MVAR capacitor bank at Roberts 69 kV	2009	2009	2	reliability	Proposed
Uprate M38 138/69-kV transformer	2012	2012	2	reliability	Provisional
Rebuild Blaney Park-Munising 69 kV to 138 kV	2012	2012	2	reliability, condition	Provisional
Rebuild/convert Chalk Hills-Chandler 69 kV to 138 kV operation	2013	2013	2 & 4	reliability	Provisional
Install 2-5.4 MVAR capacitor banks at M-38 69 kV	2015	2015	2	reliability	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
Uprate North Lake Geneva to Lake Geneva 69-kV line to 72 MVA	2004	2005	3	reliability	Proposed
Uprate Brick Church to Walworth 69-kV line to 48 MVA	2004	2005	3	reliability	Proposed
Uprate Brick Church to Katzenberg 69-kV line to 93 MVA	2004	2005	3	reliability	Proposed
Uprate Sun Prairie to Gaston Road 69-kV line to 48 MVA	2004	2005	3	reliability	Proposed
Uprate Colorado to Sun Prairie 69-kV line to 72 MVA	2004	2005	3	reliability	Proposed
Uprate Dane to Waunakee and Waunakee to Huiskamp 69-kV lines	2004	2005	3	reliability	Proposed
Reconnect the 138/69-kV transformers at Kilbourn on separate breakers to operate individually	2006	2006	3	reliability	Provisional
Construct Butler Ridge 138-kV Substation	2006	2006	3	new generation	Planned
Install 36 MVAR capacitor bank at Hartford 138-kV Substation	2006	2006	3	reliability	Planned
Uprate Colley Road 138/69-kV transformer	2006	2006	3	reliability	Proposed
Uprate North Monroe 138/69-kV transformer	2006	2006	3	reliability	Proposed
Uprate Paddock-Shaw 69-kV line	2006	2006	3	reliability	Proposed
Uprate Brodhead-South Monroe 69-kV line	2006	2006	3	reliability	Provisional
Uprate McCue 138/69-kV transformer	2006	2006	3	reliability	Proposed
Construct new 69-kV line from Columbia to Rio to feed the proposed Wyocena Substation	2004	2006	3	T-D interconnection, reliability	Planned
Rebuild Turtle-Bristol 69-kV line to 138 kV and operate at 69 kV	2004	2006	3	condition, reliability, new generation	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
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	2006	2006	3	reliability, new generation	Planned
Reconfigure 345-kV bus at Columbia	2006	2006	3	reliability, new generation	Planned
Convert Columbia-North Madison 138-kV line to 345 kV	2005	2006	3	reliability, new generation	Planned
Construct new line from West Darien to Southwest Delavan at 138 kV, operate at 69 kV	2006	2006	3	T-D interconnection	Planned
Uprate McCue-Janesville 69-kV line	2007	2007	3	reliability	Proposed
Rebuild the Verona to Oregon 69-kV line Y119	2006	2007	3	reliability	Proposed
Uprate Rockdale to Jefferson 138-kV line	2007	2007	3	reliability, service limitation	Planned
Uprate Rockdale to Boxelder 138-kV line	2007	2007	3	reliability, service limitation	Planned
Uprate Boxelder to Stonybrook 138-kV line	2007	2007	3	reliability, service limitation	Planned
Construct a Jefferson-Lake Mills-Stony Brook 138-kV line	2006	2007	3	reliability, T-D interconnection	Proposed
Convert Kegonsa-McFarland-Femrite 69-kV line to 138 kV	2007	2007	3	reliability, new generation	Proposed
Construct Sprecher-Femrite 138-kV line	2007	2007	3	reliability, new generation	Proposed
Install 138/69-kV transformer at Femrite	2007	2007	3	reliability, new generation	Proposed
Install 138/69-kV transformer at Reiner	2007	2007	3	reliability, new generation	Proposed
Convert Sycamore-Reiner-Sprecher from 69 kV to 138 kV	2007	2007	3	reliability	Proposed
Install/upgrade capacitor bank at South Monroe 69 kV to 32 MVAR	2007	2007	3	reliability	Proposed
Construct new line from Southwest Delavan to Delavan or Bristol at 138 kV, operate at 69 kV	2007	2007	3	T-D interconnection	Proposed
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

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 138/69-kV substation at a site near Horicon and install a 138/69-kV transformer	2008	2008	3	reliability	Proposed
Convert Rock River to Bristol to Elkhorn 138 kV operation; rebuild Bristol with a new 138-kV bus	2008	2008	3	reliability	Proposed
Construct a new 138-kV line from North Madison to Waunakee	2005	2008	3	reliability	Proposed
Construct a new 138/69-kV substation near Waunakee and install a 100 MVA 138/69-kV transformer	2005	2008	3	reliability	Proposed
Install 1-8.16 MVAR capacitor bank at Richland Center 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2008	2008	3	reliability	Provisional
Install 4-25 MVAR capacitor banks at Portage 138 kV	2009	2009	3	reliability	Provisional
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva	2009	2009	3	reliability	Provisional
Construct new 138-kV line from South Lake Geneva to White River	2009	2009	3	reliability, T-D interconnection	Provisional
Construct new 138-kV bus and 138/69-kV 100 MVA transformer at Montrose Substation	2009	2009	3	reliability	Proposed
Construct new Montrose-Sun Valley-Oak Ridge 138-kV line	2009	2009	3	reliability	Proposed
Uprate Colley Road to Brick Church 69-kV line to 72 MVA	2008	2009	3	reliability	Proposed
Install a second 138/69-kV transformer at Hillman	2009	2009	3	reliability	Proposed
Install a 69-kV 16.32 MVAR capacitor bank at Kilbourn Substation	2009	2009	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 Rockdale-Concord 345-kV line in parallel with existing 138 kV on existing double-width right-of-way	2007	2009	3 & 5	reliability, service limitation	Proposed
Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Concord	2007	2009	3 & 5	reliability	Proposed
Install a 69-kV bus and 138/69-kV 100 MVA transformer at Northwest Beloit	2010	2010	3	reliability	Provisional
Reroute Paddock to Shirland Avenue 69-kV line into and out of Northwest Beloit	2010	2010	3	reliability	Provisional
Loop the Femrite to Royster 69-kV line into AGA Gas	2010	2010	3	reliability	Provisional
Convert Hillman to Eden 69-kV line to 138 kV	2010	2010	3	reliability	Proposed
Install 1-8.16 MVAR capacitor bank at Boscobel 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2010	2010	3	reliability	Provisional
Rebuild Brodhead to South Monroe 69-kV line using 477 ACSR	2010	2010	3	reliability	Provisional
Convert Waunakee-Blount 69-kV line to 138 kV	2010	2010	3	reliability	Proposed
Uprate Darlington-Rock Branch 69-kV line	2010	2010	3	reliability	Provisional
Uprate existing 18 MVAR capacitor bank at Spring Green 138 kV with a 50 MVAR bank	2010	2010	3	reliability	Provisional
Convert Bark River-Mill Road 138-kV line to 345 kV	2009	2010	3 & 5	reliability, new generation	Proposed
Construct a Concord-Bark River 345-kV line	2009	2010	3 & 5	reliability, new generation	Proposed
Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Bark River	2009	2010	3 & 5	reliability, new generation	Proposed
Uprate Yahara-Token Creek 69-kV line	2011	2011	3	reliability	Provisional
Construct Evansville-Brooklyn 69-kV line	2011	2011	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 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	2011	2011	3	reliability	Proposed
Install a 138/69-kV transformer and 69-kV bus at Yahara River Substation	2011	2011	3	reliability	Provisional
Loop the Deforest to Token Creek 69-kV line into the Yahara River Substation	2011	2011	3	reliability	Provisional
Constuct a Lake Delton-Birchwood 138-kV line	2011	2011	3	reliability	Provisional
Install a second 138/69-kV transformer at Janesville Substation	2011	2011	3	reliability	Provisional
Uprate Sun Prairie-Bird Street 69-kV line	2012	2012	3	reliability	Proposed
Uprate North Monroe-Idle Hour 69-kV line	2012	2012	3	reliability	Provisional
Install 138/69-kV transformer at Bass Creek	2012	2012	3	reliability	Provisional
Rebuild and convert West Middleton-Spring Green 69-kV line to 138 kV	2012	2012	3	reliability	Provisional
Construct West Middleton-Stagecoach double-circuit 138/69-kV line	2012	2012	3	reliability	Provisional
Construct 69-kV line Eden through Muscoda to Richland Center	2012	2012	3	reliability	Provisional
Move Lone Rock 69-kV phase shifter to Richland Center	2012	2012	3	reliability	Provisional
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	2013	3	access initiative	Provisional
Expand 345 kV to 6 positions at Paddock	2013	2013	3	access initiative	Provisional
Expand 138 kV to 7 positions at Paddock	2013	2013	3	access initiative	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
Install second 345/138-kV transformer at Paddock (500 MVA normal/625 MVA emergency)	2013	2013	3	access initiative	Provisional
Rebuild Paddock-Town Line Road 138 kV to double-circuit 1600 Amps minimum summer emergency each	2013	2013	3	access initiative	Provisional
Reconductor Town Line Road-Russell 138 kV to 1600 Amps minimum summer emergency	2013	2013	3	access initiative	Provisional
Construct new 69-kV line from South Lake Geneva to Lake Shore Substation	2013	2013	3	T-D interconnection	Provisional
Convert South Lake Geneva to Twin Lakes 69-kV line to 138 kV	2013	2013	3	reliability	Provisional
Construct new 138-kV line from Twin Lakes to Spring Valley	2013	2013	3	reliability	Provisional
Construct a Horicon-East Beaver Dam 138-kV line	2013	2013	3	reliability	Provisional
Install a second 138/69-kV transformer at North Monroe	2014	2014	3	reliability	Provisional
Construct West Middleton-Blount 138-kV line	2014	2014	3	reliability	Provisional
Construct West Middleton-North Madison 345-kV line	2014	2014	3	reliability, access initiative	Proposed
Install 1-16.32 MVAR capacitor bank at Burke 69 kV	2014	2014	3	reliability	Provisional
Install a second Femrite 138/69-kV transformer	2014	2014	3	reliability	Provisional
Replace the Kilbourn 47 MVA 138/69-kV transformer with a 100 MVA unit	2014	2014	3	reliability	Provisional
Uprate Colley Road to Park Street Tap 69-kV line to 114 MVA	2014	2014	3	reliability	Provisional
Replace the Colley Road 138/69-kV transformer	2015	2015	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
Uprate the North Appleton-Rocky Run 345-kV line	2005	2005	4	reliability	Planned
Construct a 138-kV substation at a new Forward Energy Center; loop existing Butternut-South Fond du Lac line into Forward Energy Center	2005	2005	4	new generation	Planned
Install a 138-kV series reactor at Highway V	2005	2006	4	reliability, service limitation, T-D interconnection	Planned
Upgrade 48 MVA RTU and CT at Mullet River 138/69 kV	2006	2006	4	reliability	Proposed
Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress	2006	2006	4	new generation	Planned
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 Martin Road-South Fond du Lac/Ohmstead 138-kV line	2006	2006	4	T-D interconnection	Planned
Construct North Appleton 345-kV double breaker ring bus configuration	2006	2006	4	operations, maintenance and stability	Planned
Rebuild Stiles-Amberg double-circuit 138-kV line	1996	2006	2 & 4	reliability, service limitation, condition	Planned
String a new Ellinwood-Sunset Point 138-kV line on existing structures	2007	2007	4	reliability	Provisional
Install 2-16.3 MVAR capacitor bank at Canal 69 kV	2007	2007	4	reliability	Planned
Replace the 1200 A breaker at Edgewater T22 345/138 kV	2007	2007	4	reliability	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
Construct double-circuit 138-kV line from Forest Junction/Howards Grove/Charter Steel to Plymouth #4	2007	2007	4	T-D interconnection	Proposed
Uprate North Appleton-Lawn Road-White Clay 138-kV line	2007	2007	4	reliability	Planned
Construct 138-kV line from Canal to Dunn Road	2008	2008	4	reliability	Proposed
Install 60 MVA 138/69-kV transformer at Dunn Road	2008	2008	4	reliability	Proposed
Rebuild/Convert Pulliam-New Suamico 69-kV line to 138 kV	2008	2008	4	reliability, condition, T-D interconnection	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
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
Rebuild Crivitz-High Falls 69-kV double-circuit line	2008	2008	4	reliability	Provisional
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2009	2009	4	reliability	Proposed
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
Retap 48 MVA CT at South Sheboygan Falls 138/69-kV transformer	2010	2010	4	reliability	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
Rebuild/convert New Holstein-St Nazianz-Custer-Lakefront 69-kV line to 138 kV (1225 Amps minimum)	2010	2010	4	access initiative	Provisional
Rebuild Tecumseh Road-New Holstein to double-circuit 138/69 kV, where 69 kV will serve Gravesville via New Holstein	2010	2010	4	access initiative	Provisional
Install 47 MVA 138/69-kV transformer at Custer	2010	2010	4	access initiative	Provisional
Install 100 MVA 138/69-kV transformer at Lakefront	2010	2010	4	access initiative	Provisional
Construct a second Dunn Road-Egg Harbor 69-kV line	2010	2010	4	reliability	Proposed
Uprate Northgate-20th Street 138-kV line	2011	2011	4	reliability	Provisional
Replace the 400 amp metering CT at North Mullet River 69 kV	2011	2011	4	reliability	Provisional
Retap 400A primary CT at Edgewater to 600A	2012	2012	4	reliability	Provisional
Replace 300 A metering CT at Edgewater 69 kV	2013	2013	4	reliability	Proposed
Rebuild/convert Chalk Hills-Chandler 69 kV to 138 kV operation	2013	2013	2 & 4	reliability	Provisional
Replace 300 A metering CT at Riverside 69 kV	2013	2013	4	reliability	Proposed
Replace the 300A current transformer at Sheboygan Falls 69 kV	2013	2013	4	reliability	Provisional
Replace the existing 46.7 MVA 138/69-kV transformer at South Sheboygan Falls with 100 MVA transformer	2014	2014	4	reliability	Provisional
Uprate the Melissa-Tayco to 229 MVA (300F)	2014	2014	4	reliability	Provisional
Install 28.8 MVAR capacitor bank at Butternut 138 kV	2015	2015	4	reliability	Provisional
Construct a Northside-City Limits 138-kV line	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
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
Rebuild/Convert New Suamico-Pioneer 69-kV line to 138 kV	2015	2015	4	reliability, condition	Provisional

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
Install 2-27 MVAR capacitor banks at Moorland 138 kV	2004	2005	5	reliability	Planned
Install 2-27 MVAR capacitor banks at Burlington 138 kV	2005	2006	5	reliability	Proposed
Install series reactor at Cornell	2007	2007	5	reliability	Proposed
Construct a 345-kV bus at Bain	2005	2007	5	reliability	Provisional
Install 200 MVAR capacitor bank at Bluemound	2007	2007	5	reliability	Provisional
Construct a new Mill Road Substation at intersection of Granville-Arcadian 345-kV, Forest Junction-Arcadian 345-kV, Sussex-Tamarack 138-kV and Sussex-Germantown 138-kV lines; install a 345/138-kV, 500 MVA transformer	2007	2008	5	reliability	Proposed
Reconductor Pleasant Valley-Saukville 138-kV line	2008	2008	5	new generation	Proposed
Reconductor Pleasant Valley-St. Lawrence 138-kV line	2008	2008	5	new generation	Proposed
Reconductor Cornell-Range Line 138-kV line	2008	2008	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
Replace relaying on 230-kV circuits at Oak Creek	2009	2009	5	new generation	Proposed
Replace two 345-kV circuit breakers at Pleasant Prairie 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

Table PR-17
Transmission System Additions for Zone 5 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Loop Ramsey5-Harbor 138-kV line into Norwich and Kansas to form a new line from Ramsey-Norwich and Harbor-Kansas 138-kV lines	2009	2009	5	new generation	Provisional
Construct Rockdale-Concord 345-kV line in parallel with existing 138 kV on existing double-width right-of-way	2009	2009	3 & 5	reliability, service limitation	Proposed
Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Concord	2009	2009	3 & 5	reliability	Proposed
Uprate Kansas-Ramsey6 138-kV line	2010	2010	5	new generation	Proposed
Install second 500 MVA 345/138-kV transformer at Oak Creek	2010	2010	5	new generation	Proposed
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Proposed
Uprate Oak Creek-Root River 138-kV line	2010	2010	5	new generation	Proposed
Uprate Oak Creek-Nicholson 138-kV line	2010	2010	5	new generation	Proposed
Convert Bark River-Mill Road 138-kV line to 345 kV	2010	2010	3 & 5	reliability, new generation	Proposed
Construct a Concord-Bark River 345-kV line	2010	2010	3 & 5	reliability, new generation	Proposed
Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Bark River	2010	2010	3 & 5	reliability, new generation	Proposed
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 two 138/26.2 kV transformers	2013	2013	5	new generation	Provisional

Table PR-17
Transmission System Additions for Zone 5 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or 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/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
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 (Carmen) 138-kV line on new 345-kV structures installed with Hale (Brookdale)-Granville line	2013	2013	5	new generation	Provisional
Replace CTs at Racine 345-kV Substation	2013	2013	5	new generation	Provisional

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
Relieve overloads or low voltages under contingency, replace aging facilities	Rebuild from Nordic to Randville Substation (5 miles) of single circuit 69-kV line to double-circuit 69 kV	5	1	2005	2006	2
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	2006	3
T-D interconnection request	Construct new line from West Darien to Southwest Delavan at 138 kV, operate at 69 kV	3	3	2006	2006	3
T-D interconnection request	Construct Venus-Metonga 115-kV line	12.5	11.5	2007	2007	1
T-D interconnection request	Construct Brandon-Fairwater 69-kV line	4	4	2007	2007	1
Relieve overloads or low voltages under contingency, T-D interconnection request	Construct a Jefferson-Lake Mills-Stony Brook 138-kV line	12	12	2006	2007	3
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	Construct new line from Southwest Delavan to Delavan or Bristol at 138 kV, 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	1.25	1.25	2007	2007	4

Table PR-18

Identified Needs and Transmission Lines Requiring New Right-of-Way (continued)

Identified need	Potential solutions	Approx. line mileage		System need year	Projected in-service year	Planning zone
		Total	New ROW			
T-D interconnection request	Construct a 69-kV line from Southwest Ripon to the Ripon-Metomen 69-kV line	1.5	1.5	2008	2008	1
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	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 Waunakee	5	5	2005	2008	3
Relieve overloads or low voltages under contingency, transfer capability	Construct Cranberry-Conover 115-kV line	14	14	2008	2008	1 & 2
Relieve overloads or low voltages under contingency, T-D interconnection request	Construct new 138-kV line from South Lake Geneva to White River	3	3	2009	2009	3
Relieve overloads or low voltages under contingency	Construct new Montrose-Sun Valley-Oak Ridge 138-kV line	9	3	2009	2009	3
Relieve overloads or low voltages under contingency, reduce service limitations	String a new 138-kV line from Clintonville-Werner West primarily on Morgan-Werner West 345-kV line structures	16	2	2004	2009	4
Relieve overloads or low voltages under contingency, reduce service limitations	Construct Morgan-Werner West 345-kV line	47	47	2004	2009	4
Relieve overloads or low voltages under contingency	Reroute Paddock to Shirland Avenue 69-kV line into and out of Northwest Beloit	1	0.5	2010	2010	3
Relieve overloads or low voltages under contingency	Loop the Femrite to Royster 69-kV line into AGA Gas	0.3	0.3	2010	2010	3

Table PR-18

Identified Needs and Transmission Lines Requiring New Right-of-Way (continued)

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	2010	2010	4
Relieve overloads or low voltages under contingency, accommodate new generation	Construct a Concord-Bark River 345-kV line	19	10	2009	2010	3 & 5
Relieve overloads or low voltages under contingency	Construct Evansville-Brooklyn 69-kV line	8	8	2011	2011	3
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
Relieve overloads or low voltages under contingency	Constuct a Lake Delton-Birchwood 138-kV line	5	5	2011	2011	3
Relieve overloads or low voltages under contingency	Construct 69-kV line Eden through Muscoda to Richland Center	35	35	2012	2012	3
Access initiative	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	114	114	2013	2013	3
Relieve overloads or low voltages under contingency	Rebuild/convert Chalk Hills-Chandler 69 kV to 138 kV operation	54	14	2013	2013	2 & 4
T-D interconnection request	Construct new 69-kV line from South Lake Geneva to Lake Shore Substation	3.2	3.2	2013	2013	3
Relieve overloads or low voltages under contingency	Construct new 138-kV line from Twin Lakes to Spring Valley	9	9	2013	2013	3
Relieve overloads or low voltages under contingency	Construct a Horicon-East Beaver Dam 138-kV line	9	9	2013	2013	3

Table PR-18

Identified Needs and Transmission Lines Requiring New Right-of-Way (continued)

Identified need	Potential solutions	Approx. line mileage		System need year	Projected in-service year	Planning zone
		Total	New ROW			
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	2010	2013	5
Relieve overloads or low voltages under contingency, access initiative	Construct West Middleton-North Madison 345-kV line	20	20	2014	2014	3
Relieve overloads or low voltages under contingency	Construct Fitzgerald-Omro Industrial 69-kV line	7	7	2015	2015	1

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

Identified need	Lines to be rebuilt/reconductored on existing ROW	Approx. mileage of rebuilt, reconductored or uprated lines	System need year	Projected in-service year	Planning zone
Relieve overloads or low voltages under contingency	Reconductor Wien-McMillan 115-kV line (ATC, MEWD)	20	2006	2006	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	2005	2006	1
Relieve overloads or low voltages under contingency	Construct Hiawatha-Engadine 69-kV line	0.2	2003	2006	2
Relieve overloads or low voltages under contingency, reduce service limitations	Rebuild and convert one Hiawatha-Indian Lake 69-kV circuit to double-circuit 138-kV standards, string two circuits initially and operate one at 69 kV	40	2004	2006	2
Replace aging facilities, relieve overloads or low voltages under contingency, accommodate new generation	Rebuild Turtle-Bristol 69-kV line to 138 kV and operate at 69 kV	29	2004	2006	3
Relieve overloads or low voltages under contingency, accommodate new generation	Convert Columbia-North Madison 138-kV line to 345 kV	17.41	2005	2006	3
T-D interconnection request	Construct a Martin Road-South Fond du Lac/Ohmstead 138-kV line	0.5	2006	2006	4
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

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

Identified need	Lines to be rebuilt/reconductored on existing ROW	Approx. mileage of rebuilt, reconductored or uprated lines	System need year	Projected in-service year	Planning zone
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
Relieve overloads or low voltages under contingency	Rebuild the Verona to Oregon 69-kV line Y119	11	2006	2007	3
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	Rebuild Hustisford-Horicon 69 kV to 138 kV	8	2008	2008	3
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	2008	3
Relieve overloads or low voltages under contingency	Construct 138-kV line from Canal to Dunn Road	7.64	2008	2008	4

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

Identified need	Lines to be rebuilt/reconductored on existing ROW	Approx. mileage of rebuilt, reconductored or uprated lines	System need year	Projected in-service year	Planning zone
Relieve overloads or low voltages under contingency, replace aging facilities, T-D interconnection request	Rebuild/Convert Pulliam-New Suamico 69-kV line to 138 kV	8.4	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
Relieve overloads or low voltages under contingency	Rebuild Crivitz-High Falls 69-kV double-circuit line	14.5	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
Accommodate new generation	Reconductor Cornell-Range Line 138-kV line	2.43	2008	2008	5
Relieve overloads or low voltages under contingency, transfer capability	Rebuild/convert Conover-Plains 69-kV line to 138 kV	73	2008	2008	1 & 2
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
Replace aging facilities	Relocate 69-kV Rexton tap to 69-kV Hiawatha-Pine River line (6909)	0	2009	2009	2
Replace aging facilities	Relocate 69-kV Trout Lake tap to 69-kV Hiawatha-Pine River line (6909)	0	2009	2009	2

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

Identified need	Lines to be rebuilt/reconductored on existing ROW	Approx. mileage of rebuilt, reconductored or uprated lines	System need year	Projected in-service year	Planning zone
Relieve overloads or low voltages under contingency, replace aging facilities	Rebuild Hiawatha-Pine River-Mackinac 69 kV to 138 kV	75	2009	2009	2
Relieve overloads or low voltages under contingency, reduce service limitations	Convert rebuilt Hiawatha-Indian Lake circuit (operated at 69 kV) to 138 kV	40	2009	2009	2
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
Accommodate new generation	Loop Ramsey5-Harbor 138-kV line into Norwich and Kansas to form a new line from Ramsey-Norwich and Harbor-Kansas 138-kV lines	5.72	2009	2009	5
Relieve overloads or low voltages under contingency, reduce service limitations	Construct Rockdale-Concord 345-kV line in parallel with existing 138 kV on existing double-width right-of-way	22.6	2009	2009	3 & 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 Hillman to Eden 69-kV line to 138 kV	28.13	2010	2010	3
Relieve overloads or low voltages under contingency	Rebuild Brodhead to South Monroe 69-kV line using 477 ACSR	18	2010	2010	3

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

Identified need	Lines to be rebuilt/reconductored on existing ROW	Approx. mileage of rebuilt, reconductored or uprated lines	System need year	Projected in-service year	Planning zone
Relieve overloads or low voltages under contingency	Convert Waunakee-Blount 69-kV line to 138 kV	5	2010	2010	3
Access initiative	Rebuild/convert New Holstein-St Nazianz-Custer-Lakefront 69-kV line to 138 kV (1225 Amps minimum)	20	2010	2010	4
Access initiative	Rebuild Tecumseh Road-New Holstein to double-circuit 138/69 kV, where 69 kV will serve Gravesville via New Holstein	2.5	2010	2010	4
Accommodate new generation	Uprate Kansas-Ramsey6 138-kV line	5.72	2010	2010	5
Accommodate new generation	Uprate Oak Creek-Nicholson 138-kV line	6.8	2010	2010	5
Relieve overloads or low voltages under contingency, accommodate new generation	Convert Bark River-Mill Road 138-kV line to 345 kV	11	2010	2010	3 & 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	Rebuild and convert West Middleton-Spring Green 69-kV line to 138 kV	5.71	2012	2012	3
Relieve overloads or low voltages under contingency	Construct West Middleton-Stagecoach double-circuit 138/69-kV line	6	2012	2012	3
Access initiative	Rebuild Paddock-Town Line Road 138 kV to double-circuit 1600 Amps minimum summer emergency each	7	2013	2013	3
Access initiative	Reconductor Town Line Road-Russell 138 kV to 1600 Amps minimum summer emergency	8.3	2013	2013	3
Relieve overloads or low voltages under contingency	Convert South Lake Geneva to Twin Lakes 69-kV line to 138 kV	11.5	2013	2013	3

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

Identified need	Lines to be rebuilt/reconductored on existing ROW	Approx. mileage of rebuilt, reconductored or uprated lines	System need year	Projected in-service year	Planning zone
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
Accommodate new generation	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	15.6	2013	2013	5
Accommodate new generation	Restring Bluemound-Butler 138-kV line (KK5051) on new 345-kV structures installed with Hale (Brookdale)-Granville line	5.41	2010	2013	5
Accommodate new generation	String Butler-Tamarack (Carmen) 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	Construct West Middleton-Blount 138-kV line	5	2014	2014	3
Relieve overloads or low voltages under contingency	Construct a Northside-City Limits 138-kV line	3.16	2015	2015	4
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, replace aging facilities	Rebuild/Convert New Suamico-Pioneer 69-kV line to 138 kV	13.1	2015	2015	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 138-kV substation at a new Forward Energy Center; loop existing Butternut-South Fond du Lac line into Forward Energy Center	N/A	N/A	2005	2005	4
Reduce service limitations, relieve overloads under contingency, improve transfer capability & Weston stability	Construct new Gardner Park 345/115-kV Substation	N/A	N/A	2006	2006	1
Reduce service limitations, relieve overloads under contingency, improve transfer capability & Weston stability	Replace 345/115-kV 200 MVA transformer at Weston with two 500 MVA units at the Gardner Park Substation	1000	200	2006	2006	1
Relieve overloads under contingency	Install a 345/161-kV transformer at Stone Lake (temporary installation for construction outages)	300	0	2006	2006	1
Accommodate new generation	Construct Butler Ridge 138-kV Substation	N/A	N/A	2006	2006	3
Relieve overloads under contingency	Uprate Colley Road 138/69-kV transformer	120	96	2006	2006	3
Relieve overloads under contingency	Uprate North Monroe 138/69-kV transformer	130	93	2006	2006	3
Relieve overloads under contingency	Uprate McCue 138/69-kV transformer	143	116	2006	2006	3
Relieve overloads under contingency, accommodate new generation	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	1000	510	2006	2006	3
Accommodate new generation	Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress	N/A	N/A	2006	2006	4
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

Table PR-20

New Substations, Transformer Additions and Replacements (continued)

Identified need	Potential additions or replacements	Transformer capacity (MVA)		System need year	Projected in-service year	Planning zone
		Install	Replace			
Relieve overloads under contingency, reduce service limitations	Construct Mackinac 138-kV Substation (new Straits Substation)	N/A	N/A	2005	2007	2
Relieve overloads under contingency, replace aging facilities	Relocate Cedar Substation (North Lake)	N/A	N/A	2005	2007	2
Relieve overloads under contingency, replace aging facilities	Relocate Brule Substation (Aspen)	N/A	N/A	2007	2007	2
Relieve overloads under contingency, accommodate new generation	Install 138/69-kV transformer at Femrite	100	0	2007	2007	3
Relieve overloads under contingency, accommodate new generation	Install 138/69-kV transformer at Reiner	100	0	2007	2007	3
Relieve overloads under contingency	Construct a 345-kV bus at Bain	N/A	N/A	2005	2007	5
Relieve overloads under contingency, improve transfer capability & Weston stability	Construct the new permanent Stone Lake 345/161-kV Substation	N/A	N/A	2008	2008	1
Relieve overloads under contingency	Install second 345/138-kV transformer at Plains	500	0	2008	2008	2
Relieve overloads under contingency	Uprate Atlantic 138/69-kV transformer	64	47	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 Waunakee and install a 100 MVA 138/69-kV transformer	100	0	2008	2008	3
Relieve overloads under contingency	Install 60 MVA 138/69-kV transformer at Dunn Road	60	0	2008	2008	4
Relieve overloads under contingency	Install 138/69-kV transformer at the expanded Menominee Substation	100	0	2008	2008	4

Table PR-20

New Substations, Transformer Additions and Replacements (continued)

Identified need	Potential additions or replacements	Transformer capacity (MVA)		System need year	Projected in-service year	Planning zone
		Install	Replace			
Relieve overloads under contingency	Construct a new Mill Road Substation at intersection of Granville-Arcadian 345-kV, Forest Junction-Arcadian 345-kV, Sussex-Tamarack 138-kV and Sussex-Germantown 138-kV lines; install a 345/138-kV, 500 MVA transformer	500	0	2008	2008	5
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	210	0	2008	2008	1 & 2
Relieve overloads under contingency, transfer capability	Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Iron Grove	60	0	2008	2008	1 & 2
Relieve overloads under contingency	Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Aspen	60	0	2008	2008	1 & 2
Relieve overloads under contingency	Relocate Iron River Substation (Iron Grove)	N/A	N/A	2008	2008	1 & 2
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	Construct 138-kV bus and install one 138/69-kV, 50 MVA transformer at Pine River	50	0	2009	2009	2
Relieve overloads under contingency	Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva	100	0	2009	2009	3
Relieve overloads under contingency	Construct new 138-kV bus and 138/69-kV 100 MVA transformer at Montrose Substation	100	0	2009	2009	3
Relieve overloads under contingency	Install a second 138/69-kV transformer at Hillman	47	0	2009	2009	3

Table PR-20

New Substations, Transformer Additions and Replacements (continued)

Identified need	Potential additions or replacements	Transformer capacity (MVA)		System need year	Projected in-service year	Planning zone
		Install	Replace			
Relieve overloads under contingency	Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Concord	500	0	2009	2009	3 & 5
Relieve overloads under contingency	Replace 138/69-kV transformer at Metomen	100	47	2010	2010	1
Access initiative, relieve overloads under contingency	Install a 161/138-kV transformer at Council Creek	100	0	2010	2010	1
Relieve overloads under contingency	Install a 69-kV bus and 138/69-kV 100 MVA transformer at Northwest Beloit	100	0	2010	2010	3
Access initiative	Install 47 MVA 138/69-kV transformer at Custer	47	0	2010	2010	4
Access initiative	Install 100 MVA 138/69-kV transformer at Lakefront	100	0	2010	2010	4
Accommodate new generation	Install second 500 MVA 345/138-kV transformer at Oak Creek	500	0	2010	2010	5
Relieve overloads under contingency, accommodate new generation	Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Bark River	500	0	2010	2010	3 & 5
Relieve overloads under contingency	Construct a 345-kV bus and install a 345/138-kV 500 MVA transformer at West Middleton	500	0	2011	2011	3
Relieve overloads under contingency	Install a 138/69-kV transformer and 69-kV bus at Yahara River Substation	100	0	2011	2011	3
Relieve overloads under contingency	Install a second 138/69-kV transformer at Janesville Substation	100	0	2011	2011	3
Relieve overloads under contingency	Uprate M38 138/69-kV transformer	64	47	2012	2012	2
Relieve overloads under contingency	Install 138/69-kV transformer at Bass Creek	100	0	2012	2012	3
Access initiative	Install second 345/138-kV transformer at Paddock (500 MVA normal/625 MVA emergency)	500	0	2013	2013	3

Table PR-20

New Substations, Transformer Additions and Replacements (continued)

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 two 138/26.2 kV transformers	500	0	2013	2013	5
Relieve overloads under contingency	Install a second 138/69-kV transformer at North Monroe	100	0	2014	2014	3
Relieve overloads under contingency	Install a second Femrite 138/69-kV transformer	100	0	2014	2014	3
Relieve overloads under contingency	Replace the Kilbourn 47 MVA 138/69-kV transformer with a 100 MVA unit	100	47	2014	2014	3
Relieve overloads under contingency	Replace the existing 46.7 MVA 138/69-kV transformer at South Sheboygan Falls with 100 MVA transformer	100	46.7	2014	2014	4
Relieve overloads under contingency	Replace 138/69-kV transformer at Wautoma	100	47	2015	2015	1
Relieve overloads under contingency	Replace the Colley Road 138/69-kV transformer	187	100	2015	2015	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	2005	2005	1
Relieve overloads or low voltages under contingency	Uprate North Lake Geneva to Lake Geneva 69-kV line to 72 MVA	N/A	2005	2005	3
Relieve overloads or low voltages under contingency	Uprate Brick Church to Walworth 69-kV line to 48 MVA	N/A	2005	2005	3
Relieve overloads or low voltages under contingency	Uprate Brick Church to Katzenberg 69-kV line to 93 MVA	N/A	2005	2005	3
Relieve overloads or low voltages under contingency	Uprate Sun Prairie to Gaston Road 69-kV line to 48 MVA	N/A	2005	2005	3
Relieve overloads or low voltages under contingency	Uprate Colorado to Sun Prairie 69-kV line to 72 MVA	N/A	2005	2005	3
Relieve overloads or low voltages under contingency	Uprate Dane to Waunakee and Waunakee to Huiskamp 69-kV lines	N/A	2005	2005	3
Relieve overloads or low voltages under contingency	Uprate the North Appleton-Rocky Run 345-kV line	N/A	2005	2005	4
Relieve overloads or low voltages under contingency	Install 2-27 MVAR capacitor banks at Moorland 138 kV	54	2004	2005	5
Relieve overloads or low voltages under contingency	Install 2-8.16 MVAR capacitor banks at Council Creek 138 kV	16.3	2005	2006	1
Achieve transfer capability associated with Arrowhead-Gardner Park	Install 3-50 MVAR capacitor banks at Gardner Park 115 kV	150	2006	2006	1
Accommodate new generation, relieve overloads or low voltages under contingency	Upgrade Weston-Kelly 115-kV line conductor clearances to 300F	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 Munising 69 kV	5.4	2006	2006	2

Table PR-21

Substation Equipment Additions and Replacements (continued)

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 Sawyer 69 kV	5.4	2006	2006	2
Relieve overloads or low voltages under contingency	Install 2-8.16 MVAR capacitor banks at Lincoln 69 kV	16.32	2006	2006	2
Relieve overloads or low voltages under contingency	Reconnect the 138/69-kV transformers at Kilbourn on separate breakers to operate individually	N/A	2006	2006	3
Relieve overloads or low voltages under contingency	Install 36 MVAR capacitor bank at Hartford 138-kV Substation	36	2006	2006	3
Relieve overloads or low voltages under contingency	Uprate Paddock-Shaw 69-kV line	N/A	2006	2006	3
Relieve overloads or low voltages under contingency	Uprate Brodhead-South Monroe 69-kV line	N/A	2006	2006	3
Relieve overloads or low voltages under contingency, accommodate new generation	Reconfigure 345-kV bus at Columbia	N/A	2006	2006	3
Relieve overloads or low voltages under contingency, reduce service limitations, T-D interconnection request	Install a 138-kV series reactor at Highway V	N/A	2005	2006	4
Relieve overloads or low voltages under contingency	Upgrade 48 MVA RTU and CT at Mullet River 138/69 kV	N/A	2006	2006	4
Operations, maintenance and stability	Construct North Appleton 345-kV double breaker ring bus configuration	N/A	2006	2006	4
Relieve overloads or low voltages under contingency	Install 2-27 MVAR capacitor banks at Burlington 138 kV	54	2005	2006	5
Relieve overloads or low voltages under contingency	Install series reactor at Cornell	N/A	2007	2007	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 2-16.3 MVAR capacitor banks at Wautoma 138 kV	32.6	2007	2007	1

Table PR-21

Substation Equipment Additions and Replacements (continued)

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 2-8.16 MVAR capacitor banks at Ontonagon 138 kV	16.32	2007	2007	2
Relieve overloads or low voltages under contingency	Uprate McCue-Janesville 69-kV line	N/A	2007	2007	3
Relieve overloads or low voltages under contingency, reduce service limitations	Uprate Rockdale to Jefferson 138-kV line	N/A	2007	2007	3
Relieve overloads or low voltages under contingency, reduce service limitations	Uprate Rockdale to Boxelder 138-kV line	N/A	2007	2007	3
Relieve overloads or low voltages under contingency, reduce service limitations	Uprate Boxelder to Stonybrook 138-kV line	N/A	2007	2007	3
Relieve overloads or low voltages under contingency	Install/upgrade capacitor bank at South Monroe 69 kV to 32 MVAR	32	2007	2007	3
Relieve overloads or low voltages under contingency	Install 2-16.3 MVAR capacitor bank at Canal 69 kV	32.6	2007	2007	4
Relieve overloads or low voltages under contingency	Replace the 1200 A breaker at Edgewater T22 345/138 kV	N/A	2007	2007	4
Relieve overloads or low voltages under contingency	Install 200 MVAR capacitor bank at Bluemound	200	2007	2007	5
Achieve transfer capability associated with Arrowhead-Gardner Park	Install 2-75 MVAR capacitor banks at Arrowhead 345 kV	150	2008	2008	1
Achieve transfer capability associated with Arrowhead-Gardner Park	Install 1-75 MVAR capacitor bank and 1-45 MVAR inductor at Stone Lake 345 kV	75	2008	2008	1
Achieve transfer capability associated with Arrowhead-Gardner Park	Install 1-50 MVAR capacitor bank at Arpin	50	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	12.3	2008	2008	1
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 (continued)

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	5.4	2008	2008	2
Relieve overloads or low voltages under contingency	Install 2-8.16 MVAR capacitor banks at M38 69 kV	16.32	2008	2008	2
Relieve overloads or low voltages under contingency	Install 2-5.4 MVAR capacitor banks at Osceola 69 kV	10.8	2008	2008	2
Relieve overloads or low voltages under contingency	Install 1-8.16 MVAR capacitor bank at Richland Center 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	10.8	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
Accommodate new generation	Uprate Rocky Run-Plover 115-kV line terminal equipment	N/A	2009	2009	1
Relieve overloads or low voltages under contingency, reduce service limitations	Construct Mackinac 138-kV Substation additions (portions may be earlier for maintenance issues)	N/A	2009	2009	2
Relieve overloads or low voltages under contingency, reduce service limitations	Construct 138-kV ring bus at Hiawatha Substation	N/A	2009	2009	2
Relieve overloads or low voltages under contingency, reduce service limitations	Install 138-kV substation modifications at Indian Lake Substation	N/A	2009	2009	2
Relieve overloads or low voltages under contingency	Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69 kV	5.4	2009	2009	2
Relieve overloads or low voltages under contingency	Install 1-5.4 MVAR capacitor bank at Roberts 69 kV	5.4	2009	2009	2
Relieve overloads or low voltages under contingency	Install 4-25 MVAR capacitor banks at Portage 138 kV	100	2009	2009	3
Relieve overloads or low voltages under contingency	Uprate Colley Road to Brick Church 69-kV line to 72 MVA	N/A	2009	2009	3

Table PR-21

Substation Equipment Additions and Replacements (continued)

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 a 69-kV 16.32 MVAR capacitor bank at Kilbourn Substation	16.32	2009	2009	3
Accommodate new generation	Replace relaying on 230-kV circuits at Oak Creek	N/A	2009	2009	5
Accommodate new generation	Replace two 345-kV circuit breakers at Pleasant Prairie on the Racine and Zion lines with IPO breakers and upgrade relaying	N/A	2009	2009	5
Accommodate new generation	Expand Oak Creek 345-kV switchyard to interconnect one new generator	N/A	2009	2009	5
Relieve overloads or low voltages under contingency	Uprate Wautoma-Berlin 69-kV line terminal equipment at Wautoma	N/A	2010	2010	1
Relieve overloads or low voltages under contingency	Install 1-8.16 MVAR capacitor bank at Boscobel 69-kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	10.8	2010	2010	3
Relieve overloads or low voltages under contingency	Uprate Darlington-Rock Branch 69-kV line	N/A	2010	2010	3
Relieve overloads or low voltages under contingency	Uprate existing 18 MVAR capacitor bank at Spring Green 138 kV with a 50 MVAR bank	32	2010	2010	3
Relieve overloads or low voltages under contingency	Retap 48 MVA CT at South Sheboygan Falls 138/69-kV transformer	N/A	2010	2010	4
Accommodate new generation	Expand 345-kV switchyard at Oak Creek to interconnect one new generator	N/A	2010	2010	5
Accommodate new generation	Uprate Oak Creek-Root River 138-kV line	N/A	2010	2010	5
Relieve overloads or low voltages under contingency	Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69 kV	12.3	2011	2011	1
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	Uprate Northgate-20th Street 138-kV line	N/A	2011	2011	4

Table PR-21

Substation Equipment Additions and Replacements (continued)

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	Replace the 400 amp metering CT at North Mullet River 69 kV	N/A	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 a 12.2 MVAR capacitor bank at Hilltop 69 kV	12.2	2012	2012	1
Relieve overloads or low voltages under contingency	Uprate Sun Prairie-Bird Street 69-kV line	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	Move Lone Rock 69-kV phase shifter to Richland Center	N/A	2012	2012	3
Relieve overloads or low voltages under contingency	Retap 400A primary CT at Edgewater to 600A	N/A	2012	2012	4
Relieve overloads or low voltages under contingency	Replace 300 A metering CT at Edgewater 69 kV	N/A	2013	2013	4
Relieve overloads or low voltages under contingency	Replace 300 A metering CT at Riverside 69 kV	N/A	2013	2013	4
Relieve overloads or low voltages under contingency	Uprate Port Edwards-Saratoga 138-kV line - Scope TBD	N/A	2013	2013	1
Access initiative	Expand 345 kV to 6 positions at Paddock	N/A	2013	2013	3
Access initiative	Expand 138 kV to 7 positions at Paddock	N/A	2013	2013	3
Relieve overloads or low voltages under contingency	Replace the 300A current transformer at Sheboygan Falls 69 kV	N/A	2013	2013	4
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
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

Table PR-21

Substation Equipment Additions and Replacements (continued)

Identified need	Potential additions or replacements	Capacitor bank capacity (MVAR)	System need year	Projected in-service year	Planning zone
Accommodate new generation	Replace CTs at Racine 345-kV Substation	N/A	2013	2013	5
Relieve overloads or low voltages under contingency	Increase McKenna 69-kV capacitor bank from 6.3 to 10.8 MVAR	4.5	2014	2014	1
Relieve overloads or low voltages under contingency	Uprate Metomen-Ripon 69-kV line - scope TBD	N/A	2014	2014	1
Relieve overloads or low voltages under contingency	Install 1-16.32 MVAR capacitor bank at Burke 69 kV	16.32	2014	2014	3
Relieve overloads or low voltages under contingency	Uprate Colley Road to Park Street Tap 69-kV line to 114 MVA	N/A	2014	2014	3
Relieve overloads or low voltages under contingency	Uprate the Melissa-Tayco line to 229 MVA (300F)	N/A	2014	2014	4
Relieve overloads or low voltages under contingency	Install additional 13.6 MVAR capacitor bank at Clear Lake 115 kV	13.6	2015	2015	1
Relieve overloads or low voltages under contingency	Install 2-5.4 MVAR capacitor banks at M-38 69 kV	10.8	2015	2015	2
Relieve overloads or low voltages under contingency	Install 28.8 MVAR capacitor bank at Butternut 138 kV	28.8	2015	2015	4

Table PR-22
Alternative Solutions to Proposed Additions

Primary solution(s)	Alternate solution(s)	Projected in-service year	Planning zone
New Cranberry-Conover 115-kV line and Convert Conover-Iron River-Plains 69-kV to 138 kV	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 Rhinelander Loop 7.) Park Falls-Clear Lake 115-kV line 8.) Convert Whitcomb-Aurora Street 69 kV to 115 kV 9.) Gogebic-Watersmeet-Conover-Cranberry 138-kV line	2008	1
Berlin area reinforcements: New Omro Industrial-Fitzgerald 69-kV line, install capacitor banks at Ripon and Berlin	1.) Reconfigure N. Randolph-Ripon 69-kV line to N. Randolph-Metomen and Metomen-Ripon 69-kV lines. Cap bank installations at Berlin, Ripon and Winneconne and second 138/69-kV transformer at Metomen 2.) Convert Metomen-Ripon-Berlin 69-kV line to 138 kV with a new 138/69-kV transformer at Berlin 3.) Rebuild the Metomen-Ripon-Berlin 69-kV line to a 138/69-kV double-circuit line with new 138/69-kV transformer at Berlin	2005 - 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	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
Uprate Weston-Kelly 115-kV line	1.) Convert WPS's 46-kV system from Weston-Rothschild-Kelly to 115 kV 2.) Reroute/Reterminate Weston end of line to new Gardner Park 345/115-kV Substation 3.) New 115-kV substation at the intersection of Weston-Blackbrook and Kelly-Whitcomb 115-kV lines 4.) Rebuild the Weston-Kelly 115-kV line	2006	1

Table PR-22
Alternative Solutions to Proposed Additions (continued)

Primary solution(s)	Alternate solution(s)	Projected in-service year	Planning zone
Construct second Hiawatha-Pine River-Mackinac (Straits) 138-kV line	Rebuild Hiawatha-Pine River 69-kV line, Install a Phase Shifter at Mackinac to limit flows and add 138-kV capacitors at Brevort or Lakehead	2009	2
Install a 138/69-kV transformer at Yahara River Substation and loop the Token Creek 69-kV line into and out of Yahara River	1.) Reconfigure Sun Prairie 69-kV system, install second 138/69-kV transformer at North Madison 2.) Convert North Madison 69-kV line through Sun Prairie to Reiner to 138 kV	2011	3
Construct a new 345-kV line from Rockdale to West Middleton	1.) Construct a new 345-kV line from North Madison to West Middleton 2.) Rockdale to Sprecher/Femrite 138-kV double-circuit line 3) Numerous 138-kV and 69-kV capacitor banks, reconductor Kegonsa to Christiana, reconductor Fitchburg to Christiana, add a second 138/69-kV transformer at North Madison, add a third 345/138-kV transformer at North Madison, reconductor or uprate North Madison to Sycamore 138-kV line, install a second 138/69-kV transformer at Kegonsa, reconductor all three East Campus to Blount 69-kV lines, reconductor Blount to Gateway 69-kV line.	2011	3
Convert 69-kV line from West Middleton to Spring Green to 138 kV and Construct a new 345-kV line from Rockdale to West Middleton	Install several capacitor banks on 69-kV buses and on 138-kV buses	2012	3
Construct a new 138-kV line from North Madison to Waunakee and a new substation with a 138/69-kV transformer near Waunakee	1.) Install parallel transformers at Portage and North Madison 2.) Install line between Spring Green and Prairie du Sac to offload this line	2008	3
Construct a Canal-Dunn Road 138-kV line and add a 138/69-kV transformer at Dunn Road	1.) Add a third 138/69-kV transformer at Canal 2.) Add generation to the 69-kV system in Northern Door County 3.) Replace Canal 138/69-kV transformers 1 and 2	2008	4

Table PR-22
Alternative Solutions to Proposed Additions (continued)

Primary solution(s)	Alternate solution(s)	Projected in-service year	Planning zone
Add two 16.3 MVAR capacitor bank at Canal 69 kV	1.) Rebuild Pulliam-Brusbay-Sawyer-Canal 69-kV line for 138 kV 2.) Construct a 138-kV line from Egg Harbor to Menominee under the bay of Green Bay and operate at 69 kV 3.) Construct a 138-kV line from Sister Bay to Escanaba under the bay of Green Bay and operate at 69 kV 4.) Add generation to the 69-kV system in Door County	2007	4
Add 138-kV conductor for Ellinwood-Sunset Point 138-kV on existing structures	1.) Replace Ellinwood 138/69-kV transformer 2.) Add a third Ellinwood 138/69-kV transformer	2007	4
Construct the Morgan-Werner West 345-kV line and construct a 345/138-kV switchyard at a new Werner West; 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	1.) Construct a 345-kV line from Morgan to North Appleton, add a fourth 345/138-kV transformer at North Appleton, uprate the Kaukauna Central Tap-Melissa-Tayco 138-kV line, uprate Butte des Morts 138-kV bus tie, uprate Casaloma-Ellington-North Appleton 138-kV line. 2.) Add a fourth 345/138-kV transformer at North Appleton, uprate the Kaukauna Central Tap-Melissa-Tayco 138-kV line, uprate Butte des Morts 138-kV bus, uprate Casaloma-Ellington-North Appleton 138-kV line, uprate Ellington 138-kV bus, uprate Morgan-White Clay 138-kV line, and add a 14.4 MVAR capacitor bank at Casaloma 138-kV 3) Construct a new Morgan-North Appleton 345/138-kV double-circuit line 4) Add a fourth 345/138-kV transformer at North Appleton, construct Werner West-Clintonville 138-kV line, rebuild various 138-kV lines, replace terminal equipments at various 138-kV substations	2006, 2009	4
Construct a second Dunn Road-Egg Harbor 69-kV line	1.) Construct a new 138-kV line from Dunn Road to Egg Harbor 2.) Add generation to the 69-kV system in northern Door County	2010	4
Rebuild Crivitz-High Falls 69-kV double-circuit line	1.) Construct a new 138-kV line from Amberg to Goodman 3.) Construct a new Metonga-Goodman 115-kV line 4.) Construct a new 69-kV line from Pine to Goodman	2008	4
Replace South Sheboygan Falls 138/69-kV transformer with a minimum of 125 MVA unit	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 3.) Construct 2.5 miles of 138-kV line from Lodestar to Sheboygan Falls 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	2014	4

Table PR-22
Alternative Solutions to Proposed Additions (continued)

Primary solution(s)	Alternate solution(s)	Projected in-service year	Planning zone
Construct a 345-kV bus at Bain Substation	Reconfigure 345-kV bus at Pleasant Prairie	2007	5
Install two 345-kV series breakers at Pleasant Prairie on lines to Racine (L631) and Zion (L2221)	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.	2009	5
Construct Rockdale-Concord-Bark River-Mill Road 345-kV line with 345/138-kV transformers at Concord, Bark River and Mill Road (Lannon Junction)	1.) Construct a 345-kV line from Rockdale-Concord-St. Lawrence 2.) Add a 345/138-kV transformer at St. Lawrence 3.) Add a 345/138-kV transformer at Concord 4.) Install a 4-position 345-kV ring bus and a 345/138-kV transformer at Germantown	2008/10	3 & 5
Construct Rockdale-Concord-Bark River-Mill Road 345-kV line with 345/138-kV transformers at Concord, Bark River and Mill Road (Lannon Junction)	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 5.) Uprate Stonybrook-Boxelder 138-kV 6.) Install 32 MVAR capacitor bank at Summit and 75 MVAR at Hartford 138 kV	2008/10	3 & 5

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment

Projects cancelled	Former in-service date	Planning zone	Reason for removal
Install 2-5.4 MVAR capacitor banks at Iron River 69 kV	2006	2	Capacitors moved to Lincoln
Uprate Lewiston to Kilbourn 138-kV line to 286 MVA	2004	3	Updated rating information
Uprate South Beaver Dam to Juneau 69-kV line to 72 MVA	2004	3	Updated rating information
Uprate Saratoga-Baker 115-kV line terminal equipment at Saratoga	2009	1	Updated rating information
Install 2-16.3 MVAR capacitor bank at Apple Hills 138 kV	2015	4	Updated load/model information
Uprate Whitcomb-Deer Trail 69-kV line terminal equipment at Whitcomb	2012	1	Updated rating information
Reconfigure 345-kV bus at Pleasant Prairie	2006	5	Another alternative selected (Bain)
Install two 345-kV series breakers at Pleasant Prairie on lines to Racine (L631) and Zion (L2221)	2009	5	Oak Creek restudy results
Replace seven 138-kV overdutied breakers at Bluemound	2009	5	Oak Creek restudy results
Expand 345-kV switchyard at Bain and string Bain-Racine 345-kV circuit	2012	5	Oak Creek restudy results
Replace twenty-two 138-kV overdutied breakers at Harbor, Everett and Haymarket Substations	2014	5	Oak Creek restudy results
Remove Niagara Tap from 138-kV Plains-Amberg line and connect to new 138-kV line from Plains	2005	2	Improved reliability from line rebuild
Install two additional 5.4 MVAR capacitor banks at Iron River 69 kV	2013	2	Another alternative selected
Replace the two existing 33 MVA 138/69-kV transformers at Edgewater with two 60 MVA transformers	2006	4	Updated rating information
Replace the existing 46.7 MVA 138/69-kV transformer at Mullet River with 100 MVA transformer	2006	4	Updated rating information

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

Projects deferred	New date	Planning zone	Previous in-service year and reason for deferral
Install 2-8.16 MVAR capacitor banks at Council Creek 138 kV	2006	1	Originally 2005, budget considerations
Construct Hiawatha-Engadine 69-kV line	2006	2	Originally 2005, construction outage scheduling
Rebuild and convert one Hiawatha-Indian Lake 69-kV circuit to double-circuit 138-kV standards, string two circuits initially and operate one at 69 kV	2006	2	Originally 2005, construction outage scheduling
Construct Butler Ridge 138-kV Substation	2006	3	Originally 2005, additional design issues to be resolved
Install 36 MVAR capacitor bank at Hartford 138-kV Substation	2006	3	Originally 2005; was at Butler Ridge, additional design issues to be resolved
Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress	2006	4	Originally 2005, updated information from customer
Install series reactor at Cornell	2007	5	Originally 2006, budget considerations
Uprate Metomen-North Fond du Lac 69-kV line terminal equipment	2007	1	Originally 2006; updated load/model information and budget considerations
Construct Mackinac 138-kV Substation (new Straits Substation)	2007	2	Originally 2006, budget considerations
Construct new line from Southwest Delavan to Delavan or Bristol at 138 kV, operate at 69 kV	2007	3	Originally 2006, budget considerations
Install 2-16.3 MVAR capacitor bank at Canal 69 kV	2007	4	Originally 2006, budget considerations and updated load/model information
Install 200 MVAR capacitor bank at Bluemound	2007	5	Originally 2006, budget considerations
Rebuild Atlantic-Osceola 69-kV line (Laurium #1)	2008	2	Originally 2006, budget considerations
Construct 138-kV line from Canal to Dunn Road	2008	4	Originally 2007 and was previously on new right-of-way, updated load/model information

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

Projects deferred (continued)	New date	Planning zone	Previous in-service year and reason for deferral
Install 60 MVA 138/69-kV transformer at Dunn Road	2008	4	Originally 2007, updated load/model information
Construct a new Mill Road Substation at intersection of Granville-Arcadian 345-kV, Forest Junction-Arcadian 345-kV, Sussex-Tamarack 138-kV and Sussex-Germantown 138-kV lines; install a 345/138-kV, 500 MVA transformer	2008	5	Originally 2007; name change (was Lannon Junction), budget considerations
Uprate Colley Road to Brick Church 69-kV line to 72 MVA	2009	3	Originally 2005, updated load/model information
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2009	4	Originally 2007, updated load/model information
Replace 138/69-kV transformer at Metomen	2010	1	Originally 2009, updated load/model information
Construct Monroe County-Council Creek 161-kV line	2010	1	Originally 2009, updated load/model information
Install a 161/138-kV transformer at Council Creek	2010	1	Originally 2009, updated load/model information
Uprate Council Creek-Petenwell 138-kV line	2010	1	Originally 2009, updated load/model information
Rebuild/reconductor Petenwell-Saratoga 138-kV line	2010	1	Originally 2009, updated load/model information
Install 1-8.16 MVAR capacitor bank at Boscobel 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2010	3	Was Muscoda; originally 2008, updated load/model information
Uprate Gardner Park-Black Brook 115-kV line - scope TBD	2012	1	Originally 2011, updated load/model information
Expand 345 kV to 6 positions at Paddock	2013	3	Originally 2010, updated load/model information

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

Projects deferred (continued)	New date	Planning zone	Previous in-service year and reason for deferral
Expand 138 kV to 7 positions at Paddock	2013	3	Originally 2010, updated load/model information
Install second 345/138-kV transformer at Paddock (500 MVA normal/625 MVA emergency)	2013	3	Originally 2010, updated load/model information
Rebuild Paddock-Town Line Road 138 kV to double-circuit 1600 Amps minimum summer emergency each	2013	3	Originally 2010, updated load/model information
Reconductor Town Line Road-Russell 138 kV to 1600 Amps minimum summer emergency	2013	3	Originally 2010, updated load/model information
Install a second 138/69-kV transformer at North Monroe	2014	3	Originally 2010, updated load/model information
Replace the existing 46.7 MVA 138/69-kV transformer at South Sheboygan Falls with 100 MVA transformer	2014	4	Originally 2006, updated load/model information and updated rating information
Replace 138/69-kV transformer at Wautoma	2015	1	Originally 2013, updated load/model information
Install 2-5.4 MVAR capacitor banks at M-38 69 kV	2015	2	Originally 2013, updated load/model information
Install 28.8 MVAR capacitor bank at Butternut 138 kV	2015	4	Originally 2009, updated load/model information
Construct a Northside-City Limits 138-kV line	2015	4	Originally 2014, updated load/model information
Reconductor Pulliam-Danz 69-kV line	2015	4	Originally 2008, updated load/model information
Reconductor Danz-Henry Street 69-kV line	2015	4	Originally 2008, updated load/model information
Reconductor Pulliam-Van Buren 69-kV line	2015	4	Originally 2008, updated load/model information

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

Other project changes	Date	Planning zone	Reason for change or update
Construct new Eagle River Muni distribution Substation directly adjacent to the existing Cranberry 115-kV Substation	2005	1	Was new transformer at Cranberry
Rebuild and convert one Hiawatha-Indian Lake 69-kV circuit to double-circuit 138-kV standards, string two circuits initially and operate one at 69 kV	2006	2	in-service year, was 2005; previously: string one circuit initially and operate at 69 kV
Install 2-8.16 MVAR capacitor banks at Lincoln 69 kV	2006	2	Capacitors moved from Iron River
Install 36 MVAR capacitor bank at Hartford 138-kV Substation	2006	3	in-service year, was 2005; capacitors were previously at Butler Ridge
Relocate Brule Substation (Aspen)	2007	2	Previously: construct new Brule
Install/upgrade capacitor bank at South Monroe 69 kV to 32 MVAR	2007	3	in-service year, was 2008, previously: 24 MVAR capacitor bank
Install 2-75 MVAR capacitor banks at Arrowhead 345 kV	2008	1	Voltage changed from 230 to 345
Rebuild/Convert Pulliam-New Suamico 69-kV line to 138 kV	2008	4	This project was broken out separately from previous Pulliam-Pioneer project
Construct a new Mill Road Substation at intersection of Granville-Arcadian 345-kV, Forest Junction-Arcadian 345-kV, Sussex-Tamarack 138-kV and Sussex-Germantown 138-kV lines; install a 345/138-kV, 500 MVA transformer	2008	5	in-service year, was 2007; previously named Lannon Junction

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

Other project changes (continued)	Date	Planning zone	Reason for change or update
Construct Cranberry-Conover 115-kV line	2008	1 & 2	Previously a 138-kV line
Construct 138-kV bus and install 138/115-kV 150 MVA and 138/69-kV 60 MVA transformers at Conover	2008	1 & 2	150 MVA transformer was at Cranberry
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Iron Grove	2008	1 & 2	Previously named Iron River
Construct 138-kV bus and install one 138/69-kV, 50 MVA transformer at Pine River	2009	2	Was 2-50 MVA transformers at Pine River
Construct new 138-kV bus and 138/69-kV 100 MVA transformer at Montrose Substation	2009	3	Renamed, was Sugar River
Construct new Montrose-Sun Valley-Oak Ridge 138-kV line	2009	3	Renamed, was Sugar River-Lincoln-SE Fitchburg
Install 1-8.16 MVAR capacitor bank at Boscobel 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2010	3	in-service year, was 2008, was Muscoda
Construct a second Dunn Road-Egg Harbor 69-kV line	2010	4	in-service year, was 2011; previously under existing right-of-way
Install a second 138/69-kV transformer at Janesville Substation	2011	3	Previously at McCue
Rebuild/Convert New Suamico-Pioneer 69-kV line to 138 kV	2015	4	Broken out separately from previous Pulliam-Pioneer project

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

New projects	In-service date	Planning zone	Need for project
Install 1-5.4 MVAR capacitor bank at Munising 69 kV	2006	2	Improve voltage profile
Install 1-5.4 MVAR capacitor bank at Sawyer 69 kV	2006	2	Improve voltage profile
Uprate Colley Road 138/69-kV transformer	2006	3	Improve reliability
Uprate North Monroe 138/69-kV transformer	2006	3	Improve reliability
Uprate Paddock-Shaw 69-kV line	2006	3	Improve reliability
Uprate Brodhead-South Monroe 69-kV line	2006	3	Improve reliability
Uprate McCue 138/69-kV transformer	2006	3	Improve reliability
Upgrade 48 MVA RTU and CT at Mullet River 138/69-kV	2006	4	Improve reliability
Construct Brandon-Fairwater 69-kV line	2007	1	T-D interconnection request
Install 2-8.16 MVAR capacitor banks at Ontonagon 138 kV	2007	2	Improve voltage profile
Uprate McCue-Janesville 69-kV line	2007	3	Improve reliability
Uprate Boxelder to Stonybrook 138-kV line	2007	3	T-D interconnection request
Replace the 1200 A breaker at Edgewater T22 345/138 kV	2007	4	Improve reliability
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2008	1	T-D interconnection request
Increase ground clearance of Atlantic-Osceola (Laurium #2) 69-kV line from 120 to 167 degrees F	2008	2	Improve reliability
Install 1-5.4 MVAR capacitor bank at L'Anse 69 kV	2008	2	Improve voltage profile
Install 2-8.16 MVAR capacitor banks at M38 69 kV	2008	2	Improve voltage profile
Install 2-5.4 MVAR capacitor banks at Osceola 69 kV	2008	2	Improve voltage profile
Uprate Atlantic 138/69-kV transformer	2008	2	Improve reliability

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

New projects (continued)	In-service Date	Planning zone	Need for project
Uprate North Appleton-Mason Street 138-kV line	2008	4	Accommodate new generation
Uprate North Appleton-Lost Dauphin 138-kV line	2008	4	Accommodate new generation
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Aspen	2008	1 & 2	Improve reliability
Relocate Iron River Substation (Iron Grove)	2008	1 & 2	Improve reliability
Uprate Rocky Run-Plover 115-kV line terminal equipment	2009	1	Improve reliability
Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69 kV	2009	2	Improve voltage profile
Install 1-5.4 MVAR capacitor bank at Roberts 69 kV	2009	2	Improve voltage profile
Install 4-25 MVAR capacitor banks at Portage 138 kV	2009	3	Improve voltage profile
Uprate Darlington-Rock Branch 69-kV line	2010	3	Improve reliability
Uprate existing 18 MVAR capacitor bank at Spring Green 138 kV with a 50 MVAR bank	2010	3	Improve voltage profile
Retap 48 MVA CT at South Sheboygan Falls 138/69-kV transformer	2010	4	Improve reliability
Uprate Yahara-Token Creek 69-kV line	2011	3	Improve reliability
Construct Evansville-Brooklyn 69-kV line	2011	3	Improve reliability
Uprate Northgate-20th Street 138-kV line	2011	4	Improve reliability
Replace the 400 amp metering CT at North Mullet River 69 kV	2011	4	Improve reliability
Install a 12.2 MVAR capacitor bank at Hilltop 69 kV	2012	1	Improve voltage profile
Uprate M38 138/69-kV transformer	2012	2	Improve reliability
Uprate Sun Prairie-Bird Street 69-kV line	2012	3	Improve reliability
Uprate North Monroe-Idle Hour 69-kV line	2012	3	Improve reliability
Install 138/69-kV transformer at Bass Creek	2012	3	Improve reliability

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

New projects (continued)	In-service Date	Planning zone	Need for project
Retap 400A primary CT at Edgewater to 600A	2012	4	Improve reliability
Uprate Port Edwards-Saratoga 138-kV line - Scope TBD	2013	1	Improve reliability
Replace the 300A current transformer at Sheboygan Falls 69 kV	2013	4	Improve reliability
Replace CTs at Racine 345-kV Substation	2013	5	Accommodate new generation
Increase McKenna 69-kV capacitor bank from 6.3 to 10.8 MVAR	2014	1	Improve voltage profile
Install 1-16.32 MVAR capacitor bank at Burke 69 kV	2014	3	Improve voltage profile
Install a second Femrite 138/69-kV transformer	2014	3	Improve reliability
Replace the Kilbourn 47 MVA 138/69-kV transformer with a 100 MVA unit	2014	3	Improve reliability
Uprate Colley Road to Park Street Tap 69-kV line to 114 MVA	2014	3	Improve reliability
Uprate the Melissa-Tayco line to 229 MVA (300F)	2014	4	Improve reliability
Replace the Colley Road 138/69-kV transformer	2015	3	Improve reliability

Table PR-24
Maintenance, Operations or Protection Projects over $0.5 Million (2006-2010)

Project description	System need year	In-service year	Initiated	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Wautoma breaker replacement	2006	2006	Maintenance	1	Poor condition	Planned	2.1
Whitcomb relay upgrades	2006	2006	Operation	1	Improve reliability	Planned	1.3
Port Edwards substation upgrades	2006	2006	Maintenance	1	Poor condition	Planned	1.2
Endeavor tap on Y17	2006	2006	Maintenance	1	Poor condition	Planned	1.0
Chaffee Creek-Kilbourn (Y100) lline	2006	2006	Maintenance	1	Poor condition	Planned	0.6
Nordic-Sagola line rebuild	2006	2006	Maintenance	2	Reliability, cascading, update	Planned	1.7
Nordic-Felch line rebuild	2006	2006	Maintenance	2	Reliability, cascading, update	Planned	1.5
Wood Structures – Zone 2 blanket	2006	2006	Maintenance	2	Poor condition	Provisional	1.0
Straits equipment removal	2006	2006	Maintenance	2	Poor condition	Planned	0.5
Empire relay replacement	2006	2006	Protection	2	Improve protection	Planned	0.6
Hillman-Nelson Dewey (X15) line repair	2006	2006	Maintenance	3	Equipment damage	Planned	2.2
Eden-Spring Green (X17) pole replacement	2006	2006	Maintenance	3	Poor condition	Planned	1.9
Eden-Nelsen Dewey (X16) pole replacement	2006	2006	Maintenance	3	Poor condition	Planned	1.8
Kirkwood-Spring Green (X18) line maintenance	2006	2006	Maintenance	3	Poor condition	Planned	1.0
Eden-Rock Branch (Y106) line rebuild	2006	2006	Maintenance	3	Poor condition	Planned	0.9
Colley Road substation upgrades	2006	2006	Maintenance	3	Poor condition	Provisional	0.6
Caroline substation upgrade	2006	2006	Operation	4	Improve reliability	Provisional	1.6
Tecumseh-Elkhart Lake line update	2006	2006	Maintenance	4	Poor condition	Planned	0.6
Crivitz - RTU	2006	2006	Protection	4	Improve reliability	Provisional	0.6
Bluemound breaker replacement	2006	2006	Maintenance	5	Poor condition	Proposed	0.7
Enbridge-Portage (Y17) line rebuild	2006	2006	Maintenance	1-3	Poor condition	Planned	1.4
Y17 double circuit construct	2006	2006	Maintenance	1-3	Poor condition	Planned	1.7
Spare 138/69-kV transformer	2006	2006	Maintenance	-	Improve availability	Planned	0.9
Montello-Wautoma (Y17) line rebuild	2007	2007	Maintenance	1	Poor condition	Planned	3.9
Rozelleville-Sigel (Y107) line rebuild	2007	2007	Maintenance	1	Poor condition	Planned	3.5
RTU -Zone 1 blanket	2007	2007	Protection	1	Improve reliability	Provisional	1.8

Table PR-24
Maintenance, Operations or Protection Projects over $0.5 Million (2006-2010)

Project description	System need year	In-service year	Initiated	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Relay improvements - Zone 1 blanket	2007	2007	Maintenance	1	Improve protection	Provisional	1.0
Montello breaker replacement	2007	2007	Maintenance	1	Poor condition	Planned	0.6
Iola breaker replacement	2007	2007	Maintenance	1	Poor condition	Provisional	0.6
Laurium-Franklin 69-kV line rebuild	2007	2007	Maintenance	2	Poor condition	Planned	3.1
Laurium-Osceola 69-kV line rebuild	2007	2007	Maintenance	2	Poor condition	Planned	2.2
Laurium-Adams 69-kV line rebuild	2007	2007	Maintenance	2	Poor condition	Planned	1.5
Laurium-Hancock 69-kV line rebuild	2007	2007	Maintenance	2	Poor condition	Planned	1.4
Wood structures - Zone 2 blanket	2007	2007	Maintenance	2	Poor condition	Provisional	0.8
Relay improvements - Zone 2 blanket	2007	2007	Maintenance	2	Improve protection	Provisional	0.8
Cedar substation removal	2007	2007	Maintenance	2	Poor condition	Planned	0.7
Breaker improvements - Zone 2 blanket	2007	2007	Maintenance	2	Poor condition	Provisional	0.5
Oregon-Verona (Y119) line rebuild	2007	2007	Maintenance	3	Poor condition	Planned	3.5
Spring Green-Stagecoach (Y62) line rebuild	2007	2007	Maintenance	3	Poor condition	Planned	3.2
Mount Horeb-Rock Branch (Y135) line rebuild	2007	2007	Maintenance	3	Poor condition	Planned	2.3
Boscobel-Lone Rock (Y124) line rebuild	2007	2007	Maintenance	3	Poor condition	Planned	2.1
Dam Height-Dane (Y8) line rebuild	2007	2007	Maintenance	3	Poor condition	Planned	1.0
RTU -Zone 4 blanket	2007	2007	Protection	4	Improve reliability	Provisional	2.1
North Fond du Lac relay upgrades	2007	2007	Protection	4	Improve protection	Planned	1.3
Elkhart Lake-Random Lake line reinsulated	2007	2007	Maintenance	4	Poor condition	Planned	1.0
Breaker improvements - Zone 4 blanket	2007	2007	Maintenance	4	Poor condition	Provisional	0.5
Relay improvements - Zone 4 blanket	2007	2007	Maintenance	4	Improve protection	Provisional	0.5
Relay improvements - Zone 5 blanket	2007	2007	Protection	5	Improve protection	Provisional	0.7
Breaker improvements - Zone 5 blanket	2007	2007	Maintenance	5	Poor condition	Provisional	0.8
RTU -Zone 5 blanket	2007	2007	Protection	5	Improve reliability	Provisional	0.8

Table PR-24
Maintenance, Operations or Protection Projects over $0.5 Million (2006-2010)

Project description	System need year	In-service year	Initiated	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Switch improvements - Zone 5 blanket	2007	2007	Maintenance	5	Poor condition	Provisional	0.6
Breaker improvements - blanket	2007	2007	Maintenance	-	Poor condition	Provisional	1.0
Relay improvements - West blanket	2007	2007	Protection	-	Improve protection	Provisional	1.0
Substation improvements - blanket	2007	2007	Maintenance	-	Poor condition	Provisional	0.7
Chaffee Creek-Hancock (Y90) line rebuild	2008	2008	Maintenance	1	Poor condition	Planned	3.2
Relay improvements - Zone 1 blanket	2008	2008	Protection	1	Improve protection	Provisional	0.5
Breaker improvements - Zone 2 blanket	2008	2008	Maintenance	2	Poor condition	Provisional	0.5
Wood structures - Zone 2 blanket	2008	2008	Maintenance	2	Poor condition	Provisional	0.8
Relay improvements - Zone 2 blanket	2008	2008	Maintenance	2	Improve protection	Provisional	0.5
Relay improvements - Zone 4 blanket	2008	2008	Protection	4	Improve protection	Provisional	1.2
Random Lake-Saukville line reinsulate	2008	2008	Maintenance	4	Poor condition	Planned	1.0
Breaker improvements - Zone 4 blanket	2008	2008	Maintenance	4	Poor condition	Provisional	0.5
Breaker improvements - Zone 5 blanket	2008	2008	Maintenance	5	Poor condition	Provisional	0.8
Relay improvements - Zone 5 blanket	2008	2008	Protection	5	Improve protection	Provisional	0.7
Switch improvements - Zone 5 blanket	2008	2008	Maintenance	5	Poor condition	Provisional	0.7
RTU -Zone 5 blanket	2008	2008	Protection	5	Improve reliability	Provisional	0.5
Breaker improvements - blanket	2008	2008	Maintenance	-	Poor condition	Provisional	1.0
Relay improvement - West blanket	2008	2008	Protection	-	Improve protection	Provisional	1.0
Substation improvements - blanket	2008	2008	Maintenance	-	Poor condition	Provisional	0.7
Relay improvements - Zone 1 blanket	2009	2009	Protection	1	Improve protection	Provisional	0.5
Breaker improvements - Zone 2 blanket	2009	2009	Maintenance	2	Poor condition	Provisional	0.5
Wood structures - Zone 2 blanket	2009	2009	Maintenance	2	Poor condition	Provisional	0.8
Relay improvements - Zone 2 blanket	2009	2009	Maintenance	2	Improve protection	Provisional	0.5
Relay improvements - Zone 4 blanket	2009	2009	Protection	4	Improve protection	Provisional	1.1

Table PR-24
Maintenance, Operations or Protection Projects over $0.5 Million (2006-2010)

Project description	System need year	In-service year	Initiated	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Breaker improvements - Zone 4 blanket	2009	2009	Maintenance	4	Poor condition	Provisional	0.6
Switch improvements - Zone 5 blanket	2009	2009	Maintenance	5	Poor condition	Provisional	0.9
Breaker improvements - Zone 5 blanket	2009	2009	Maintenance	5	Poor condition	Provisional	0.8
Relay improvements - Zone 5 blanket	2009	2009	Protection	5	Improve reliability	Provisional	0.8
RTU -Zone 5 blanket	2009	2009	Protection	5	Improve protection	Provisional	0.5
Breaker improvements - blanket	2009	2009	Maintenance	-	Poor condition	Provisional	1.0
Relay improvement - west blanket	2009	2009	Protection	-	Improve protection	Provisional	1.0
Substation improvements - blanket	2009	2009	Maintenance	-	Poor condition	Provisional	0.7
Relay improvements - Zone 1 blanket	2010	2010	Protection	1	Improve protection	Provisional	0.5
Breaker improvements - Zone 2 blanket	2010	2010	Maintenance	2	Poor condition	Provisional	0.5
Wood structures - Zone 2 blanket	2010	2010	Maintenance	2	Poor condition	Provisional	0.8
Relay improvements - Zone 2 blanket	2010	2010	Maintenance	2	Improve protection	Provisional	0.6
Breaker improvements - Zone 4 blanket	2010	2010	Maintenance	4	Poor condition	Provisional	0.6
Relay Improvements - Zone 4 blanket	2010	2010	Protection	4	Improve protection	Provisional	1.1
Breaker Improvements - Zone 5 blanket	2010	2010	Maintenance	5	Poor condition	Provisional	0.8
Relay Improvements - Zone 5 blanket	2010	2010	Protection	5	Improve protection	Provisional	0.8
RTU -Zone 5 blanket	2010	2010	Protection	5	Improve reliability	Provisional	0.5
Inland 69 kV line rebuild	2010	2010	Maintenance	-	Poor condition	Strategic	11.1
Breaker improvements - blanket	2010	2010	Maintenance	-	Poor condition	Provisional	1.0
Relay improvement - west blanket	2010	2010	Protection	-	Improve protection	Provisional	1.0
Substation improvements - blanket	2010	2010	Maintenance	-	Poor condition	Provisional	0.7

Table PR-25
Projects In Design or Construction

Project	Zone
Install 16.3 MVAR capacitor banks at Council Creek 138-kV	1
Reconductor Wien-McMillan 115-kV line (ATC,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 new Gardner Park 345/115-kV Substation	1
Construct Hiawatha-Engadine 69-kV line	2
Rebuild from Nordic to Randville substation single-circuit 69-kV line to double-circuit 69 kV	2
Rebuild and convert one Hiawatha-Indian Lake 69-kV circuit to double circuit 138 kV standards, string one circuit initially and operate at 69 kV	2
Uprate Sun Prairie to Gaston Road 69-kV line to 48 MVA	3
Uprate Colorado to Sun Prairie 69-kV line to 72 MVA	3
Uprate Dane to Waunakee and Waunakee to Huiskamp 69-kV lines	3
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	3
Reconfigure 345-kV bus at Columbia	3
Convert Columbia-North Madison 138-kV line to 345 kV	3
Construct North Appleton double-breaker ring bus configuration	4
Uprate the North Appleton-Rocky Run 345-kV line	4
Construct a 345-kV switching station at new Sheboygan Energy Center; loop existing Point Beach-Granville line into new Sheboygan Energy Center	4
Install 2-27 MVAR capacitor banks at Moorland 138-kV	5

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

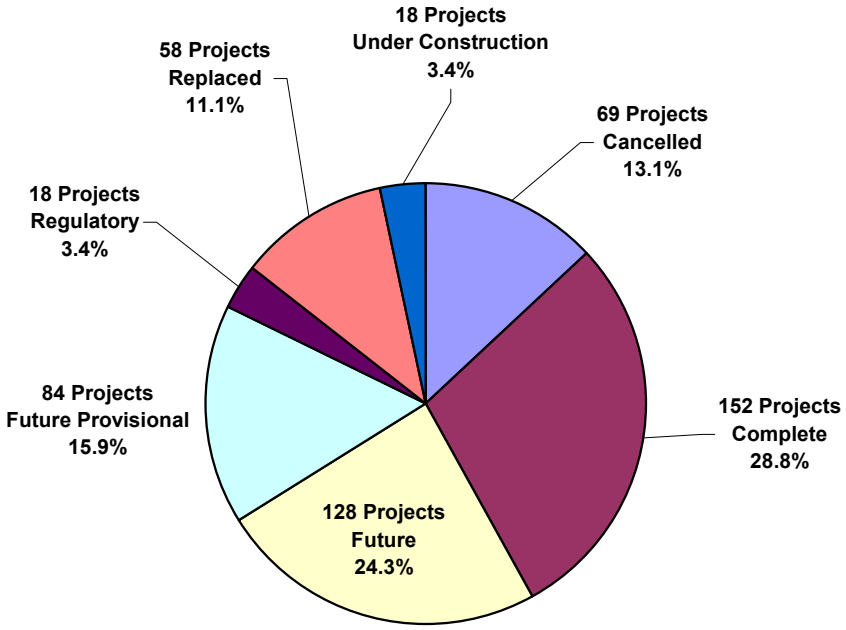
Project	Zone
Construct North Beaver Dam-East Beaver Dam 138-kV line	3
Construct Sprecher-Femrite 138-kV line	3
Rebuild Turtle-Bristol 69-kV line to 138 kV and operate at 69 kV	3
Construct Werner West 345/138-kV substation	4

Table PR-27
Projects Awaiting Regulatory Review/Approval

Project	Zone
Construct Gardner Park-Central Wisconsin 345-kV line	1
Rebuild Weston-Sherman Street-Hilltop 115-kV line to double-circuit 115 kV	1
Construct Venus-Metonga 115-kV line	1
Construct Cranberry-Conover 115-kV line and rebuild/convert Conover-Plains 69-kV to 138 kV	1 & 2
Construct Jefferson-Stony Brook 138-kV line	3
Construct new line from West Darien to Southwest Delavan at 138 kV, operate at 69 kV	3
Construct Morgan-Werner West 345-kV line and Werner West-Clintonville 138-kV line	4

Figure PR-6

American Transmission Company - Number of Projects by Status
10-Year Assessments 2001-2005
Planned, Proposed and Provisional Projects



Projects > New in 2005

Summary of Planned, Proposed and Provisional additions, 2005-2015

The transmission facilities that we are proposing based on this 2005 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 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 2004 Update Assessment that have been cancelled, deferred, changed or are new to the 2005 10-Year Assessment are listed in Table PR-23**.** Finally, new to this Assessment, Table PR-24 describes operations, maintenance and protection projects greater than $0.5 million for the years 2006-2010.

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 2005-2015 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 2005-2015. 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 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.

Table PR-2
Transmission System Additions for 2005

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct new Eagle River Muni distribution Substation directly adjacent to the existing Cranberry 115-kV Substation	2005	2005	1	T-D interconnection	Planned	1.9
Uprate North Lake Geneva to Lake Geneva 69-kV line to 72 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Brick Church to Walworth 69-kV line to 48 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Brick Church to Katzenberg 69-kV line to 93 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Sun Prairie to Gaston Road 69-kV line to 48 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Colorado to Sun Prairie 69-kV line to 72 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Dane to Waunakee and Waunakee to Huiskamp 69-kV lines	2004	2005	3	reliability	Proposed	0.7
Uprate the North Appleton-Rocky Run 345-kV line	2005	2005	4	reliability	Planned	1
Construct a 138-kV substation at a new Forward Energy Center; loop existing Butternut-South Fond du Lac line into Forward Energy Center	2005	2005	4	new generation	Planned	3.2
Install 2-27 MVAR capacitor banks at Moorland 138 kV	2004	2005	5	reliability	Planned	1.1

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 2006

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install 2-8.16 MVAR capacitor banks at Council Creek 138 kV	2005	2006	1	reliability	Planned	2.3
Reconductor Wien-McMillan 115-kV line (ATC,MEWD)	2006	2006	1	reliability	Planned	3.4
Reconductor Weston-Northpoint 115-kV line	2005	2006	1	achieve transfer capability associated with Arrowhead-Gardner Park, reliability, new generation	Planned	5.5
Construct new Gardner Park 345/115-kV Substation	2006	2006	1	service limitation, reliability, import capability & Weston stability	Planned	Included in Arrowhead-Gardner Park estimate
Replace 345/115-kV 200 MVA transformer at Weston with two 500 MVA units at the Gardner Park Substation	2005	2006	1	service limitation, reliability, import capability & Weston stability	Planned	Included in Arrowhead-Gardner Park estimate
Construct Gardner Park-Stone Lake 345-kV line	1997	2006	1	service limitation, reliability, import capability & Weston stability	Planned	262.1
Install 3-50 MVAR capacitor banks at Gardner Park 115 kV	2006	2006	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	Included in Arrowhead-Gardner Park estimate
Install a 345/161-kV transformer at Stone Lake (temporary installation for construction outages)	2006	2006	1	reliability	Planned	Included in Arrowhead-Gardner Park estimate
Upgrade Weston-Kelly 115-kV line conductor clearances to 300F	2006	2006	1	new generation, reliability	Planned	1

Table PR-3
Transmission System Additions for 2006 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Increase size of existing Summit Lake 115-kV capacitor bank from 11.3 to 16.9 MVAR	2006	2006	1	reliability	Planned	1
Install 1-5.4 MVAR capacitor bank at Munising 69 kV	2006	2006	2	reliability	Proposed	0.4
Install 1-5.4 MVAR capacitor bank at Sawyer 69 kV	2006	2006	2	reliability	Proposed	0.9
Construct Hiawatha-Engadine 69-kV line	2003	2006	2	reliability	Planned	0
Rebuild and convert one Hiawatha-Indian Lake 69-kV circuit to double-circuit 138-kV standards, string two circuits initially and operate one at 69 kV	2004	2006	2	reliability, service limitation	Planned	44.2
Install 2-8.16 MVAR capacitor banks at Lincoln 69 kV	2006	2006	2	reliability	Proposed	1.1
Rebuild from Nordic to Randville Substation (5 miles) of single-circuit 69-kV line to double-circuit 69 kV	2005	2006	2	reliability, condition	Planned	5.2
Reconnect the 138/69-kV transformers at Kilbourn on separate breakers to operate individually	2006	2006	3	reliability	Provisional	0.3
Construct Butler Ridge 138-kV Substation	2006	2006	3	new generation	Planned	2.8
Install 36 MVAR capacitor bank at Hartford 138-kV Substation	2006	2006	3	reliability	Planned	1.2
Uprate Colley Road 138/69-kV transformer	2006	2006	3	reliability	Proposed	0.1
Uprate North Monroe 138/69-kV transformer	2006	2006	3	reliability	Proposed	0
Uprate Paddock-Shaw 69-kV line	2006	2006	3	reliability	Proposed	0
Uprate Brodhead-South Monroe 69-kV line	2006	2006	3	reliability	Provisional	0.1
Uprate McCue 138/69-kV transformer	2006	2006	3	reliability	Proposed	0.1

Table PR-3
Transmission System Additions for 2006 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct new 69-kV line from Columbia to Rio to feed the proposed Wyocena Substation	2004	2006	3	T-D interconnection, reliability	Planned	5
Rebuild Turtle-Bristol 69-kV line to 138 kV and operate at 69 kV	2004	2006	3	condition, reliability, new generation	Planned	5.9
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	2006	2006	3	reliability, new generation	Planned	17.7
Reconfigure 345-kV bus at Columbia	2006	2006	3	reliability, new generation	Planned	2.5
Convert Columbia-North Madison 138-kV line to 345 kV	2005	2006	3	reliability, new generation	Planned	6
Construct new line from West Darien to Southwest Delavan at 138 kV, operate at 69 kV	2006	2006	3	T-D interconnection	Planned	4
Install a 138-kV series reactor at Highway V	2005	2006	4	reliability, service limitation, T-D interconnection	Planned	1.4
Upgrade 48 MVA RTU and CT at Mullet River 138/69 kV	2006	2006	4	reliability	Proposed	0
Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress	2006	2006	4	new generation	Planned	5.1
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	14.3

Table PR-3
Transmission System Additions for 2006 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct a Martin Road-South Fond du Lac/Ohmstead 138-kV line	2006	2006	4	T-D interconnection	Planned	1.6
Construct North Appleton 345-kV double breaker ring bus configuration	2006	2006	4	operations, maintenance and stability	Planned	8.4
Install 2-27 MVAR capacitor banks at Burlington 138 kV	2005	2006	5	reliability	Proposed	1.6
Rebuild Stiles-Amberg double-circuit 138-kV line	1996	2006	2 & 4	reliability, service limitation, condition	Planned	45.8

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 2007

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Uprate Metomen-North Fond du Lac 69-kV line terminal equipment	2006	2007	1	reliability	Planned	0.2
Install 2-16.3 MVAR capacitor banks at Wautoma 138 kV	2007	2007	1	reliability	Proposed	1.2
Construct Venus-Metonga 115-kV line	2007	2007	1	T-D interconnection	Planned	8
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	Proposed	7.3
Construct Brandon-Fairwater 69-kV line	2007	2007	1	T-D interconnection	Provisional	0.6
Construct Mackinac 138-kV Substation (new Straits Substation)	2005	2007	2	reliability, service limitation	Proposed	5.8
Relocate Cedar Substation (North Lake)	2005	2007	2	reliability, condition	Proposed	7.3
Relocate Brule Substation (Aspen)	2007	2007	2	reliability, condition	Proposed	5.7
Install 2-8.16 MVAR capacitor banks at Ontonagon 138 kV	2007	2007	2	reliability	Proposed	1.2
Uprate McCue-Janesville 69-kV line	2007	2007	3	reliability	Proposed	0
Rebuild the Verona to Oregon 69-kV line Y119	2006	2007	3	reliability	Proposed	3.8
Uprate Rockdale to Jefferson 138-kV line	2007	2007	3	reliability, service limitation	Planned	0.2
Uprate Rockdale to Boxelder 138-kV line	2007	2007	3	reliability, service limitation	Planned	0.2
Uprate Boxelder to Stonybrook 138-kV line	2007	2007	3	reliability, service limitation	Planned	0.2
Construct a Jefferson-Lake Mills-Stony Brook 138-kV line	2006	2007	3	reliability, T-D interconnection	Proposed	19.7
Convert Kegonsa-McFarland-Femrite 69-kV line to 138 kV	2007	2007	3	reliability, new generation	Proposed	3.4
Construct Sprecher-Femrite 138-kV line	2007	2007	3	reliability, new generation	Proposed	8.1
Install 138/69-kV transformer at Femrite	2007	2007	3	reliability, new generation	Proposed	3.4

Table PR-4
Transmission System Additions for 2007 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install 138/69-kV transformer at Reiner	2007	2007	3	reliability, new generation	Proposed	3.4
Convert Sycamore-Reiner-Sprecher from 69-kV to 138 kV	2007	2007	3	reliability	Proposed	2.5
Install/upgrade capacitor bank at South Monroe 69 kV to 32 MVAR	2007	2007	3	reliability	Proposed	1.1
Construct new line from Southwest Delavan to Delavan or Bristol at 138 kV, operate at 69 kV	2007	2007	3	T-D interconnection	Proposed	4.3
String a new Ellinwood-Sunset Point 138-kV line on existing structures	2007	2007	4	reliability	Provisional	2.5
Install 2-16.3 MVAR capacitor bank at Canal 69 kV	2007	2007	4	reliability	Planned	1.8
Replace the 1200 A breaker at Edgewater T22 345/138 kV	2007	2007	4	reliability	Proposed	0.3
Construct double-circuit 138-kV line from Forest Junction/Howards Grove/Charter Steel to Plymouth #4	2007	2007	4	T-D interconnection	Proposed	2.5
Uprate North Appleton-Lawn Road-White Clay 138-kV line	2007	2007	4	reliability	Planned	0.6
Construct a 345-kV bus at Bain	2005	2007	5	reliability	Provisional	2.1
Install 200 MVAR capacitor bank at Bluemound	2007	2007	5	reliability	Provisional	3.3
Install series reactor at Cornell	2007	2007	5	reliability	Proposed	0.8

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Table PR-5
Transmission System Additions for 2008

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2008	2008	1	T-D interconnection	Provisional	0.6
Upgrade Kelly-Whitcomb 115-kV line conductor clearances to 300F	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	1.9
Construct Stone Lake-Arrowhead 345-kV line	1997	2008	1	service limitation, reliability, import capability & Weston stability	Planned	158.2
Install 2-75 MVAR capacitor banks at Arrowhead 345 kV	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	Included in Arrowhead-Gardner Park estimate
Install 1-75 MVAR capacitor bank and 1-45 MVAR inductor at Stone Lake 345 kV	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	Included in Arrowhead-Gardner Park estimate
Install 1-50 MVAR capacitor bank at Arpin	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	Included in Arrowhead-Gardner Park estimate
Construct the new permanent Stone Lake 345/161-kV Substation	2008	2008	1	reliability, import capability & Weston stability	Planned	8
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Berlin 69 kV	2008	2008	1	reliability	Proposed	0.5
Rebuild Atlantic-Osceola 69-kV line (Laurium #1)	2006	2008	2	reliability, condition	Planned	9.2
Increase ground clearance of Atlantic-Osceola (Laurium #2) 69-kV line from 120 to 167 degrees F	2008	2008	2	reliability	Proposed	2.1

Table PR-5
Transmission System Additions for 2008 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install second 345/138-kV transformer at Plains	2008	2008	2	reliability	Provisional	5.4
Install 1-5.4 MVAR capacitor bank at L'Anse 69 kV	2008	2008	2	reliability	Provisional	0.5
Install 2-8.16 MVAR capacitor banks at M38 69 kV	2008	2008	2	reliability	Proposed	1.8
Install 2-5.4 MVAR capacitor banks at Osceola 69 kV	2008	2008	2	reliability	Proposed	1.3
Uprate Atlantic 138/69-kV transformer	2008	2008	2	reliability	Proposed	1.4
Construct a Rubicon-Hustisford 138-kV line	2008	2008	3	reliability	Proposed	4.8
Rebuild Hustisford-Horicon 69 kV to 138 kV	2008	2008	3	reliability	Proposed	2.4
Construct 138/69-kV substation at a site near Horicon and install a 138/69-kV transformer	2008	2008	3	reliability	Proposed	8.8
Convert Rock River to Bristol to Elkhorn 138 kV operation; rebuild Bristol with a new 138-kV bus	2008	2008	3	reliability	Proposed	5.1
Construct a new 138-kV line from North Madison to Waunakee	2005	2008	3	reliability	Proposed	10.1
Construct a new 138/69-kV substation near Waunakee and install a 100 MVA 138/69-kV transformer	2005	2008	3	reliability	Proposed	1
Install 1-8.16 MVAR capacitor bank at Richland Center 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2008	2008	3	reliability	Provisional	1.1
Construct 138-kV line from Canal to Dunn Road	2008	2008	4	reliability	Proposed	4.2

Table PR-5
Transmission System Additions for 2008 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install 60 MVA 138/69-kV transformer at Dunn Road	2008	2008	4	reliability	Proposed	2.2
Rebuild/Convert Pulliam-New Suamico 69-kV line to 138 kV	2008	2008	4	reliability, condition, T-D interconnection	Provisional	12.9
Uprate North Appleton-Mason Street 138-kV line	2008	2008	4	reliability, service limitation	Proposed	1.7
Uprate North Appleton-Lost Dauphin 138-kV line	2008	2008	4	reliability, service limitation	Proposed	1.6
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	2
Install 138/69-kV transformer at the expanded Menominee Substation	2008	2008	4	reliability	Provisional	2.1
Rebuild Crivitz-High Falls 69-kV double-circuit line	2008	2008	4	reliability	Provisional	7.8
Construct a new Mill Road Substation at intersection of Granville-Arcadian 345-kV, Forest Junction-Arcadian 345-kV, Sussex-Tamarack 138-kV and Sussex-Germantown 138-kV lines; install a 345/138-kV transformer	2008	2008	5	reliability	Proposed	29.2
Reconductor Pleasant Valley-Saukville 138-kV line	2008	2008	5	new generation	Proposed	3
Reconductor Pleasant Valley-St. Lawrence 138-kV line	2008	2008	5	new generation	Proposed	3.1

Table PR-5
Transmission System Additions for 2008 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Reconductor Cornell-Range Line 138-kV line	2008	2008	5	new generation	Proposed	6
Construct Cranberry-Conover 115-kV line	2008	2008	1 & 2	reliability, transfer capability	Proposed	17.1
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2008	2008	1 & 2	reliability, transfer capability	Proposed	69.1
Construct 138-kV bus and install 138/115-kV 150 MVA and 138/69-kV 60 MVA transformers at Conover	2008	2008	1 & 2	reliability, transfer capability	Proposed	18.5
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Iron Grove	2008	2008	1 & 2	reliability, transfer capability	Proposed	2.9
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Aspen	2008	2008	1 & 2	reliability	Proposed	2.9
Relocate Iron River Substation (Iron Grove)	2008	2008	1 & 2	reliability	Proposed	5.9

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

Table PR-6
Transmission System Additions for 2009

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Uprate Rocky Run-Plover 115-kV line terminal equipment	2009	2009	1	new generation	Proposed	0
Construct Gardner Park-Central Wisconsin 345-kV line	2009	2009	1	service limitation, reliability, import capability and Weston stability	Planned	90.2
Construct new Central Wisconsin 345-kV Substation	2009	2009	1	service limitation, reliability, import capability and Weston stability	Planned	12.2
Relocate 69-kV Rexton tap to 69-kV Hiawatha-Pine River line (6909)	2009	2009	2	condition	Provisional	0.3
Relocate 69-kV Trout Lake tap to 69-kV Hiawatha-Pine River line (6909)	2009	2009	2	condition	Provisional	0.3
Construct Mackinac 138-kV Substation additions (portions may be earlier for maintenance issues)	2009	2009	2	reliability, service limitation	Provisional	5.8
Rebuild Hiawatha-Pine River-Mackinac 69 kV to 138 kV	2009	2009	2	reliability, condition	Provisional	57.4
Construct 138-kV bus and install one 138/69-kV, 50 MVA transformer at Pine River	2009	2009	2	reliability	Provisional	10
Convert rebuilt Hiawatha-Indian Lake circuit (operated at 69 kV) to 138 kV	2009	2009	2	reliability, service limitation	Planned	0.2
Construct 138-kV ring bus at Hiawatha Substation	2009	2009	2	reliability, service limitation	Planned	3.3
Install 138-kV substation modifications at Indian Lake Substation	2009	2009	2	reliability, service limitation	Planned	1.9
Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69 kV	2009	2009	2	reliability	Proposed	0.6
Install 1-5.4 MVAR capacitor bank at Roberts 69 kV	2009	2009	2	reliability	Proposed	0.6

Table PR-6
Transmission System Additions for 2009 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install 4-25 MVAR capacitor banks at Portage 138 kV	2009	2009	3	reliability	Provisional	2.2
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva	2009	2009	3	reliability	Provisional	6
Construct new 138-kV line from South Lake Geneva to White River	2009	2009	3	reliability, T-D interconnection	Provisional	2.5
Construct new 138-kV bus and 138/69-kV 100 MVA transformer at Montrose Substation	2009	2009	3	reliability	Proposed	1.4
Construct new Montrose-Sun Valley-Oak Ridge 138-kV line	2009	2009	3	reliability	Proposed	5.1
Uprate Colley Road to Brick Church 69-kV line to 72 MVA	2008	2009	3	reliability	Proposed	0.5
Install a second 138/69-kV transformer at Hillman	2009	2009	3	reliability	Proposed	3.9
Install a 69-kV 16.32 MVAR capacitor bank at Kilbourn Substation	2009	2009	3	reliability	Provisional	0.4
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2009	2009	4	reliability	Proposed	1
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	included in Morgan-Werner estimate
Construct Morgan-Werner West 345-kV line	2004	2009	4	reliability, service limitation	Planned	113.8
Reconductor Oak Creek-Ramsey 138-kV line	2009	2009	5	new generation	Proposed	0.4
Reconductor Oak Creek-Allerton 138-kV line	2009	2009	5	new generation	Proposed	2

Table PR-6
Transmission System Additions for 2009 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Replace relaying on 230-kV circuits at Oak Creek	2009	2009	5	new generation	Proposed	3
Replace two 345-kV circuit breakers at Pleasant Prairie on the Racine and Zion lines with IPO breakers and upgrade relaying	2009	2009	5	new generation	Proposed	2.1
Expand Oak Creek 345-kV switchyard to interconnect one new generator	2009	2009	5	new generation	Proposed	10.8
Loop Ramsey5-Harbor 138-kV line into Norwich and Kansas to form a new line from Ramsey-Norwich and Harbor-Kansas 138-kV lines	2009	2009	5	new generation	Provisional	4.1
Construct Rockdale-Concord 345-kV line in parallel with existing 138-kV on existing double-width right-of-way	2009	2009	3 & 5	reliability, service limitation	Proposed	22.2
Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Concord	2009	2009	3 & 5	reliability	Proposed	12.9

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

Table PR-7
Transmission System Additions for 2010

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Uprate Wautoma-Berlin 69-kV line terminal equipment at Wautoma	2010	2010	1	reliability	Provisional	0
Replace 138/69-kV transformer at Metomen	2010	2010	1	reliability	Provisional	2
Construct Monroe County-Council Creek 161-kV line	2010	2010	1	access initiative, reliability	Provisional	16.7
Install a 161/138-kV transformer at Council Creek	2010	2010	1	access initiative, reliability	Provisional	2.5
Uprate Council Creek-Petenwell 138-kV line	2010	2010	1	access initiative, reliability	Provisional	0.2
Rebuild/reconductor Petenwell-Saratoga 138-kV line	2010	2010	1	access initiative, reliability	Provisional	14.8
Install a 69-kV bus and 138/69-kV 100 MVA transformer at Northwest Beloit	2010	2010	3	reliability	Provisional	2
Reroute Paddock to Shirland Avenue 69-kV line into and out of Northwest Beloit	2010	2010	3	reliability	Provisional	0.5
Loop the Femrite to Royster 69-kV line into AGA Gas	2010	2010	3	reliability	Provisional	1.6
Convert Hillman to Eden 69-kV line to 138 kV	2010	2010	3	reliability	Proposed	16.5
Install 1-8.16 MVAR capacitor bank at Boscobel 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2010	2010	3	reliability	Provisional	1.2
Rebuild Brodhead to South Monroe 69-kV line using 477 ACSR	2010	2010	3	reliability	Provisional	4
Convert Waunakee-Blount 69-kV line to 138 kV	2010	2010	3	reliability	Proposed	20

Table PR-7
Transmission System Additions for 2010 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Uprate Darlington-Rock Branch 69-kV line	2010	2010	3	reliability	Provisional	0.1
Uprate existing 18 MVAR capacitor bank at Spring Green 138 kV with a 50 MVAR bank	2010	2010	3	reliability	Provisional	1.2
Retap 48 MVA CT at South Sheboygan Falls 138/69-kV transformer	2010	2010	4	reliability	Proposed	0
Rebuild/convert New Holstein-St. Nazianz-Custer-Lakefront 69-kV line to 138 kV (1225 Amps minimum)	2010	2010	4	access initiative	Provisional	7.7
Rebuild Tecumseh Road-New Holstein to double-circuit 138/69 kV, where 69 kV will serve Gravesville via New Holstein	2010	2010	4	access initiative	Provisional	2.4
Install 47 MVA 138/69-kV transformer at Custer	2010	2010	4	access initiative	Provisional	3.1
Install 100 MVA 138/69-kV transformer at Lakefront	2010	2010	4	access initiative	Provisional	2.5
Construct a second Dunn Road-Egg Harbor 69-kV line	2010	2010	4	reliability	Proposed	6.2
Uprate Kansas-Ramsey6 138-kV line	2009	2010	5	new generation	Proposed	0.1
Install second 500 MVA 345/138-kV transformer at Oak Creek	2010	2010	5	new generation	Proposed	6.6
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Proposed	10.8
Uprate Oak Creek-Root River 138-kV line	2010	2010	5	new generation	Proposed	0.6
Uprate Oak Creek-Nicholson 138-kV line	2010	2010	5	new generation	Proposed	1.2
Convert Bark River-Mill Road 138-kV line to 345 kV	2010	2010	3 & 5	reliability, new generation	Proposed	0.8

Table PR-7
Transmission System Additions for 2010 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct a Concord-Bark River 345-kV line	2010	2010	3 & 5	reliability, new generation	Proposed	50.3
Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Bark River	2010	2010	3 & 5	reliability, new generation	Proposed	8.4

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New to this 10-Year Assessment

Table PR-8
Transmission System Additions for 2011

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69 kV	2011	2011	1	reliability	Provisional	0.5
Uprate Yahara-Token Creek 69-kV line	2011	2011	3	reliability	Provisional	0.1
Construct Evansville-Brooklyn 69-kV line	2011	2011	3	reliability	Provisional	7.9
Construct 345-kV line from Rockdale to West Middleton	2011	2011	3	reliability	Proposed	49
Construct a 345-kV bus and install a 345/138-kV 500 MVA transformer at West Middleton	2011	2011	3	reliability	Proposed	12
Install a 138/69-kV transformer and 69-kV bus at Yahara River Substation	2011	2011	3	reliability	Provisional	1.3
Loop the Deforest to Token Creek 69-kV line into the Yahara River Substation	2011	2011	3	reliability	Provisional	1.2
Constuct a Lake Delton-Birchwood 138-kV line	2011	2011	3	reliability	Provisional	3
Install a second 138/69-kV transformer at Janesville Substation	2011	2011	3	reliability	Provisional	2
Uprate Northgate-20th Street 138-kV line	2011	2011	4	reliability	Provisional	0.1
Replace the 400 amp metering CT at North Mullet River 69 kV	2011	2011	4	reliability	Provisional	0.2

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Table PR-9
Transmission System Additions for 2012

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Uprate Gardner Park-Black Brook 115-kV line - scope TBD	2012	2012	1	reliability	Provisional	0.6
Install a 12.2 MVAR capacitor bank at Hilltop 69 kV	2012	2012	1	reliability	Provisional	1.3
Uprate M38 138/69-kV transformer	2012	2012	2	reliability	Provisional	1.4
Rebuild Blaney Park-Munising 69 kV to 138 kV	2012	2012	2	reliability, condition	Provisional	53.7
Uprate Sun Prairie-Bird Street 69-kV line	2012	2012	3	reliability	Proposed	0.1
Uprate North Monroe-Idle Hour 69-kV line	2012	2012	3	reliability	Provisional	0.1
Install 138/69-kV transformer at Bass Creek	2012	2012	3	reliability	Provisional	4.5
Rebuild and convert West Middleton-Spring Green 69-kV line to 138 kV	2012	2012	3	reliability	Provisional	22.7
Construct West Middleton-Stagecoach double-circuit 138/69-kV line	2012	2012	3	reliability	Provisional	6.9
Construct 69-kV line Eden through Muscoda to Richland Center	2012	2012	3	reliability	Provisional	23.4
Move Lone Rock 69-kV phase shifter to Richland Center	2012	2012	3	reliability	Provisional	0.5
Retap 400A primary CT at Edgewater to 600A	2012	2012	4	reliability	Provisional	0

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

Table PR-10
Transmission System Additions for 2013

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Replace 300 A metering CT at Edgewater 69 kV	2013	2013	4	reliability	Proposed	0
Replace 300 A metering CT at Riverside 69 kV	2013	2013	4	reliability	Proposed	0
Uprate Port Edwards-Saratoga 138-kV line - Scope TBD	2013	2013	1	reliability	Provisional	0.1
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	2013	3	access initiative	Provisional	343.9
Rebuild/convert Chalk Hills-Chandler 69 kV to 138 kV operation	2013	2013	2 & 4	reliability	Provisional	25.1
Expand 345 kV to 6 positions at Paddock	2013	2013	3	access initiative	Provisional	0.6
Expand 138 kV to 7 positions at Paddock	2013	2013	3	access initiative	Provisional	0.5
Install second 345/138-kV transformer at Paddock (500 MVA normal/625 MVA emergency)	2013	2013	3	access initiative	Provisional	1.9
Rebuild Paddock-Town Line Road 138 kV to double-circuit 1600 Amps minimum summer emergency each	2013	2013	3	access initiative	Provisional	5
Reconductor Town Line Road-Russell 138 kV to 1600 Amps minimum summer emergency	2013	2013	3	access initiative	Provisional	1.3
Construct new 69-kV line from South Lake Geneva to Lake Shore Substation	2013	2013	3	T-D interconnection	Provisional	2.4

Table PR-10
Transmission System Additions for 2013 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Convert South Lake Geneva to Twin Lakes 69-kV line to 138 kV	2013	2013	3	reliability	Provisional	3
Construct new 138-kV line from Twin Lakes to Spring Valley	2013	2013	3	reliability	Provisional	27
Construct a Horicon-East Beaver Dam 138-kV line	2013	2013	3	reliability	Provisional	6
Replace the 300A current transformer at Sheboygan Falls 69 kV	2013	2013	4	reliability	Provisional	0
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	15
Construct a 345/138-kV switchyard at Hale (Brookdale) to accommodate two 345-kV lines, a 500 MVA 345/138-kV transformer and four 138-kV lines plus two 138/26.2 kV transformers	2013	2013	5	new generation	Provisional	19.6
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	15.2
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	40.7
Construct Oak Creek-St Martins 138-kV circuit #2 installing 16.6 mi. conductor on existing towers	2013	2013	5	new generation	Provisional	10.7

Table PR-10
Transmission System Additions for 2013 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct a Hale (Brookdale)-Granville 345-kV line converting/reconductoring 5.6 miles of 138 kV, rebuilding 7 miles of 138-kV double-circuit tower line and converting/reconductoring 3 miles of 138 kV on existing 345-kV structures	2013	2013	5	new generation	Provisional	41.9
Restring Bluemound-Butler 138-kV line (KK5051) on new 345-kV structures installed with Hale (Brookdale)-Granville line	2013	2013	5	new generation	Provisional	0.7
String Butler-Tamarack (Carmen) 138-kV line on new 345-kV structures installed with Hale (Brookdale)-Granville line	2013	2013	5	new generation	Provisional	0.9
Replace CTs at Racine 345-kV Substation	2013	2013	5	new generation	Provisional	0

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New to this 10-Year Assessment

Table PR-11
Transmission System Additions for 2014

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Increase McKenna 69-kV capacitor bank from 6.3 to 10.8 MVAR	2014	2014	1	reliability	Provisional	0.3
Uprate Metomen-Ripon 69-kV line - scope TBD	2014	2014	1	reliability	Provisional	2.2
Install a second 138/69-kV transformer at North Monroe	2014	2014	3	reliability	Provisional	2.3
Construct West Middleton-Blount 138-kV line	2014	2014	3	reliability	Provisional	11
Construct West Middleton-North Madison 345-kV line	2014	2014	3	reliability, access initiative	Proposed	46.7
Install 1-16.32 MVAR capacitor bank at Burke 69 kV	2014	2014	3	reliability	Provisional	0.1
Install a second Femrite 138/69-kV transformer	2014	2014	3	reliability	Provisional	2.4
Replace the Kilbourn 47 MVA 138/69-kV transformer with a 100 MVA unit	2014	2014	3	reliability	Provisional	0.2
Uprate Colley Road to Park Street Tap 69-kV line to 114 MVA	2014	2014	3	reliability	Provisional	0.1
Replace the existing 46.7 MVA 138/69-kV transformer at South Sheboygan Falls with 100 MVA transformer	2014	2014	4	reliability	Provisional	1.3
Uprate the Melissa-Tayco to 229 MVA (300F)	2014	2014	4	reliability	Provisional	0.1

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Table PR-12
Transmission System Additions for 2015

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Replace 138/69-kV transformer at Wautoma	2015	2015	1	reliability	Provisional	1.4
Construct Fitzgerald-Omro Industrial 69-kV line	2015	2015	1	reliability	Provisional	5.3
Install additional 13.6 MVAR capacitor bank at Clear Lake 115 kV	2015	2015	1	reliability	Provisional	0.5
Install 2-5.4 MVAR capacitor banks at M-38 69 kV	2015	2015	2	reliability	Provisional	0.3
Replace the Colley Road 138/69-kV transformer	2015	2015	3	reliability	Provisional	1.4
Install 28.8 MVAR capacitor bank at Butternut 138 kV	2015	2015	4	reliability	Provisional	1
Construct a Northside-City Limits 138-kV line	2015	2015	4	reliability	Provisional	5
Reconductor Pulliam-Danz 69-kV line	2015	2015	4	reliability	Provisional	2.2
Reconductor Danz-Henry Street 69-kV line	2015	2015	4	reliability	Provisional	0.1
Reconductor Pulliam-Van Buren 69-kV line	2015	2015	4	reliability	Provisional	0.1
Rebuild/Convert New Suamico-Pioneer 69-kV line to 138 kV	2015	2015	4	reliability, condition	Provisional	13.3

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
Construct new Eagle River Muni distribution Substation directly adjacent to the existing Cranberry 115-kV Substation	2005	2005	1	T-D interconnection	Planned
Install 2-8.16 MVAR capacitor banks at Council Creek 138 kV	2005	2006	1	reliability	Planned
Reconductor Wien-McMillan 115-kV line (ATC,MEWD)	2006	2006	1	reliability	Planned
Reconductor Weston-Northpoint 115-kV line	2005	2006	1	achieve transfer capability associated with Arrowhead-Gardner Park, reliability, new generation	Planned
Construct new Gardner Park 345/115-kV Substation	2006	2006	1	service limitation, reliability, import capability & Weston stability	Planned
Replace 345/115-kV 200 MVA transformer at Weston with two 500 MVA units at the Gardner Park Substation	2005	2006	1	service limitation, reliability, import capability & Weston stability	Planned
Construct Gardner Park-Stone Lake 345-kV line	1997	2006	1	service limitation, reliability, import capability & Weston stability	Planned
Install 3-50 MVAR capacitor banks at Gardner Park 115 kV	2006	2006	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned
Install a 345/161-kV transformer at Stone Lake (temporary installation for construction outages)	2006	2006	1	reliability	Planned
Upgrade Weston-Kelly 115-kV line conductor clearances to 300F	2006	2006	1	new generation, reliability	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
Increase size of existing Summit Lake 115-kV capacitor bank from 11.3 to 16.9 MVAR	2006	2006	1	reliability	Planned
Uprate Metomen-North Fond du Lac 69-kV line terminal equipment	2006	2007	1	reliability	Planned
Install 2-16.3 MVAR capacitor banks at Wautoma 138 kV	2007	2007	1	reliability	Proposed
Construct Venus-Metonga 115-kV line	2007	2007	1	T-D interconnection	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	Proposed
Construct Brandon-Fairwater 69-kV line	2007	2007	1	T-D interconnection	Provisional
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2008	2008	1	T-D interconnection	Provisional
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
Install 2-75 MVAR capacitor banks at Arrowhead 345 kV	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned
Install 1-75 MVAR capacitor bank and 1-45 MVAR inductor at Stone Lake 345 kV	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned
Install 1-50 MVAR capacitor bank at Arpin	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 the new permanent Stone Lake 345/161-kV Substation	2008	2008	1	reliability, import capability & Weston stability	Planned
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Berlin 69 kV	2008	2008	1	Reliability	Proposed
Construct Cranberry-Conover 115-kV line	2008	2008	1 & 2	reliability, transfer capability	Proposed
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2008	2008	1 & 2	reliability, transfer capability	Proposed
Construct 138-kV bus and install 138/115-kV 150 MVA and 138/69-kV 60 MVA transformers at Conover	2008	2008	1 & 2	reliability, transfer capability	Proposed
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Iron Grove	2008	2008	1 & 2	reliability, transfer capability	Proposed
Construct 138-kV bus and install 138/69-kV, 60 MVA transformer at Aspen	2008	2008	1 & 2	reliability	Proposed
Relocate Iron River Substation (Iron Grove)	2008	2008	1 & 2	reliability	Proposed
Uprate Rocky Run-Plover 115-kV line terminal equipment	2009	2009	1	new generation	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
Uprate Wautoma-Berlin 69-kV line terminal equipment at Wautoma	2010	2010	1	reliability	Provisional
Replace 138/69-kV transformer at Metomen	2010	2010	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
Construct Monroe County-Council Creek 161-kV line	2010	2010	1	access initiative, reliability	Provisional
Install a 161/138-kV transformer at Council Creek	2010	2010	1	access initiative, reliability	Provisional
Uprate 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
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69 kV	2011	2011	1	reliability	Provisional
Uprate Gardner Park-Black Brook 115-kV line - scope TBD	2012	2012	1	reliability	Provisional
Install a 12.2 MVAR capacitor bank at Hilltop 69 kV	2012	2012	1	reliability	Provisional
Uprate Port Edwards-Saratoga 138-kV line - Scope TBD	2013	2013	1	reliability	Provisional
Increase McKenna 69-kV capacitor bank from 6.3 to 10.8 MVAR	2014	2014	1	reliability	Provisional
Uprate Metomen-Ripon 69-kV line - scope TBD	2014	2014	1	reliability	Provisional
Replace 138/69-kV transformer at Wautoma	2015	2015	1	reliability	Provisional
Construct Fitzgerald-Omro Industrial 69-kV line	2015	2015	1	reliability	Provisional
Install additional 13.6 MVAR capacitor bank at Clear Lake 115 kV	2015	2015	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
Install 1-5.4 MVAR capacitor bank at Munising 69 kV	2006	2006	2	reliability	Proposed
Install 1-5.4 MVAR capacitor bank at Sawyer 69 kV	2006	2006	2	reliability	Proposed
Construct Hiawatha-Engadine 69-kV line	2003	2006	2	reliability	Planned
Rebuild and convert one Hiawatha-Indian Lake 69-kV circuit to double-circuit 138-kV standards, string two circuits initially and operate one at 69 kV	2004	2006	2	reliability, service limitation	Planned
Install 2-8.16 MVAR capacitor banks at Lincoln 69 kV	2006	2006	2	reliability	Proposed
Rebuild from Nordic to Randville Substation (5 miles) of single circuit 69-kV line to double-circuit 69 kV	2005	2006	2	reliability, condition	Planned
Rebuild Stiles-Amberg double-circuit 138-kV line	1996	2006	2 & 4	reliability, service limitation, condition	Planned
Construct Mackinac 138-kV Substation (new Straits Substation)	2005	2007	2	reliability, service limitation	Proposed
Relocate Cedar Substation (North Lake)	2005	2007	2	reliability, condition	Proposed
Relocate Brule Substation (Aspen)	2007	2007	2	reliability, condition	Proposed
Install 2-8.16 MVAR capacitor banks at Ontonagon 138 kV	2007	2007	2	reliability	Proposed
Rebuild Atlantic-Osceola 69-kV line (Laurium #1)	2006	2008	2	reliability, condition	Planned
Increase ground clearance of Atlantic-Osceola (Laurium #2) 69-kV line from 120 to 167 degrees F	2008	2008	2	reliability	Proposed
Install second 345/138-kV transformer at Plains	2008	2008	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 1-5.4 MVAR capacitor bank at L'Anse 69 kV	2008	2008	2	reliability	Provisional
Install 2-8.16 MVAR capacitor banks at M38 69 kV	2008	2008	2	reliability	Proposed
Install 2-5.4 MVAR capacitor banks at Osceola 69 kV	2008	2008	2	reliability	Proposed
Uprate Atlantic 138/69-kV transformer	2008	2008	2	reliability	Proposed
Construct Cranberry-Conover 115-kV line	2008	2008	1 & 2	reliability, transfer capability	Proposed
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2008	2008	1 & 2	reliability, transfer capability	Proposed
Construct 138-kV bus and install 138/115-kV 150 MVA and 138/69-kV 60 MVA transformers at Conover	2008	2008	1 & 2	reliability, transfer capability	Proposed
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Iron Grove	2008	2008	1 & 2	reliability, transfer capability	Proposed
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Aspen	2008	2008	1 & 2	reliability	Proposed
Relocate Iron River Substation (Iron Grove)	2008	2008	1 & 2	reliability	Proposed
Relocate 69-kV Rexton tap to 69-kV Hiawatha-Pine River line (6909)	2009	2009	2	condition	Provisional
Relocate 69-kV Trout Lake tap to 69-kV Hiawatha-Pine River line (6909)	2009	2009	2	condition	Provisional
Construct Mackinac 138-kV Substation additions (portions may be earlier for maintenance issues)	2009	2009	2	reliability, service limitation	Provisional
Rebuild Hiawatha-Pine River-Mackinac 69 kV to 138 kV	2009	2009	2	reliability, condition	Provisional
Construct 138-kV bus and install one 138/69-kV, 50 MVA transformer at Pine River	2009	2009	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
Convert rebuilt Hiawatha-Indian Lake circuit (operated at 69 kV) to 138 kV	2009	2009	2	reliability, service limitation	Planned
Construct 138-kV ring bus at Hiawatha Substation	2009	2009	2	reliability, service limitation	Planned
Install 138-kV substation modifications at Indian Lake Substation	2009	2009	2	reliability, service limitation	Planned
Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69 kV	2009	2009	2	reliability	Proposed
Install 1-5.4 MVAR capacitor bank at Roberts 69 kV	2009	2009	2	reliability	Proposed
Uprate M38 138/69-kV transformer	2012	2012	2	reliability	Provisional
Rebuild Blaney Park-Munising 69 kV to 138 kV	2012	2012	2	reliability, condition	Provisional
Rebuild/convert Chalk Hills-Chandler 69 kV to 138 kV operation	2013	2013	2 & 4	reliability	Provisional
Install 2-5.4 MVAR capacitor banks at M-38 69 kV	2015	2015	2	reliability	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
Uprate North Lake Geneva to Lake Geneva 69-kV line to 72 MVA	2004	2005	3	reliability	Proposed
Uprate Brick Church to Walworth 69-kV line to 48 MVA	2004	2005	3	reliability	Proposed
Uprate Brick Church to Katzenberg 69-kV line to 93 MVA	2004	2005	3	reliability	Proposed
Uprate Sun Prairie to Gaston Road 69-kV line to 48 MVA	2004	2005	3	reliability	Proposed
Uprate Colorado to Sun Prairie 69-kV line to 72 MVA	2004	2005	3	reliability	Proposed
Uprate Dane to Waunakee and Waunakee to Huiskamp 69-kV lines	2004	2005	3	reliability	Proposed
Reconnect the 138/69-kV transformers at Kilbourn on separate breakers to operate individually	2006	2006	3	reliability	Provisional
Construct Butler Ridge 138-kV Substation	2006	2006	3	new generation	Planned
Install 36 MVAR capacitor bank at Hartford 138-kV Substation	2006	2006	3	reliability	Planned
Uprate Colley Road 138/69-kV transformer	2006	2006	3	reliability	Proposed
Uprate North Monroe 138/69-kV transformer	2006	2006	3	reliability	Proposed
Uprate Paddock-Shaw 69-kV line	2006	2006	3	reliability	Proposed
Uprate Brodhead-South Monroe 69-kV line	2006	2006	3	reliability	Provisional
Uprate McCue 138/69-kV transformer	2006	2006	3	reliability	Proposed
Construct new 69-kV line from Columbia to Rio to feed the proposed Wyocena Substation	2004	2006	3	T-D interconnection, reliability	Planned
Rebuild Turtle-Bristol 69-kV line to 138 kV and operate at 69 kV	2004	2006	3	condition, reliability, new generation	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
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	2006	2006	3	reliability, new generation	Planned
Reconfigure 345-kV bus at Columbia	2006	2006	3	reliability, new generation	Planned
Convert Columbia-North Madison 138-kV line to 345 kV	2005	2006	3	reliability, new generation	Planned
Construct new line from West Darien to Southwest Delavan at 138 kV, operate at 69 kV	2006	2006	3	T-D interconnection	Planned
Uprate McCue-Janesville 69-kV line	2007	2007	3	reliability	Proposed
Rebuild the Verona to Oregon 69-kV line Y119	2006	2007	3	reliability	Proposed
Uprate Rockdale to Jefferson 138-kV line	2007	2007	3	reliability, service limitation	Planned
Uprate Rockdale to Boxelder 138-kV line	2007	2007	3	reliability, service limitation	Planned
Uprate Boxelder to Stonybrook 138-kV line	2007	2007	3	reliability, service limitation	Planned
Construct a Jefferson-Lake Mills-Stony Brook 138-kV line	2006	2007	3	reliability, T-D interconnection	Proposed
Convert Kegonsa-McFarland-Femrite 69-kV line to 138 kV	2007	2007	3	reliability, new generation	Proposed
Construct Sprecher-Femrite 138-kV line	2007	2007	3	reliability, new generation	Proposed
Install 138/69-kV transformer at Femrite	2007	2007	3	reliability, new generation	Proposed
Install 138/69-kV transformer at Reiner	2007	2007	3	reliability, new generation	Proposed
Convert Sycamore-Reiner-Sprecher from 69 kV to 138 kV	2007	2007	3	reliability	Proposed
Install/upgrade capacitor bank at South Monroe 69 kV to 32 MVAR	2007	2007	3	reliability	Proposed
Construct new line from Southwest Delavan to Delavan or Bristol at 138 kV, operate at 69 kV	2007	2007	3	T-D interconnection	Proposed
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

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 138/69-kV substation at a site near Horicon and install a 138/69-kV transformer	2008	2008	3	reliability	Proposed
Convert Rock River to Bristol to Elkhorn 138 kV operation; rebuild Bristol with a new 138-kV bus	2008	2008	3	reliability	Proposed
Construct a new 138-kV line from North Madison to Waunakee	2005	2008	3	reliability	Proposed
Construct a new 138/69-kV substation near Waunakee and install a 100 MVA 138/69-kV transformer	2005	2008	3	reliability	Proposed
Install 1-8.16 MVAR capacitor bank at Richland Center 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2008	2008	3	reliability	Provisional
Install 4-25 MVAR capacitor banks at Portage 138 kV	2009	2009	3	reliability	Provisional
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva	2009	2009	3	reliability	Provisional
Construct new 138-kV line from South Lake Geneva to White River	2009	2009	3	reliability, T-D interconnection	Provisional
Construct new 138-kV bus and 138/69-kV 100 MVA transformer at Montrose Substation	2009	2009	3	reliability	Proposed
Construct new Montrose-Sun Valley-Oak Ridge 138-kV line	2009	2009	3	reliability	Proposed
Uprate Colley Road to Brick Church 69-kV line to 72 MVA	2008	2009	3	reliability	Proposed
Install a second 138/69-kV transformer at Hillman	2009	2009	3	reliability	Proposed
Install a 69-kV 16.32 MVAR capacitor bank at Kilbourn Substation	2009	2009	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 Rockdale-Concord 345-kV line in parallel with existing 138 kV on existing double-width right-of-way	2007	2009	3 & 5	reliability, service limitation	Proposed
Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Concord	2007	2009	3 & 5	reliability	Proposed
Install a 69-kV bus and 138/69-kV 100 MVA transformer at Northwest Beloit	2010	2010	3	reliability	Provisional
Reroute Paddock to Shirland Avenue 69-kV line into and out of Northwest Beloit	2010	2010	3	reliability	Provisional
Loop the Femrite to Royster 69-kV line into AGA Gas	2010	2010	3	reliability	Provisional
Convert Hillman to Eden 69-kV line to 138 kV	2010	2010	3	reliability	Proposed
Install 1-8.16 MVAR capacitor bank at Boscobel 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2010	2010	3	reliability	Provisional
Rebuild Brodhead to South Monroe 69-kV line using 477 ACSR	2010	2010	3	reliability	Provisional
Convert Waunakee-Blount 69-kV line to 138 kV	2010	2010	3	reliability	Proposed
Uprate Darlington-Rock Branch 69-kV line	2010	2010	3	reliability	Provisional
Uprate existing 18 MVAR capacitor bank at Spring Green 138 kV with a 50 MVAR bank	2010	2010	3	reliability	Provisional
Convert Bark River-Mill Road 138-kV line to 345 kV	2009	2010	3 & 5	reliability, new generation	Proposed
Construct a Concord-Bark River 345-kV line	2009	2010	3 & 5	reliability, new generation	Proposed
Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Bark River	2009	2010	3 & 5	reliability, new generation	Proposed
Uprate Yahara-Token Creek 69-kV line	2011	2011	3	reliability	Provisional
Construct Evansville-Brooklyn 69-kV line	2011	2011	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 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	2011	2011	3	reliability	Proposed
Install a 138/69-kV transformer and 69-kV bus at Yahara River Substation	2011	2011	3	reliability	Provisional
Loop the Deforest to Token Creek 69-kV line into the Yahara River Substation	2011	2011	3	reliability	Provisional
Constuct a Lake Delton-Birchwood 138-kV line	2011	2011	3	reliability	Provisional
Install a second 138/69-kV transformer at Janesville Substation	2011	2011	3	reliability	Provisional
Uprate Sun Prairie-Bird Street 69-kV line	2012	2012	3	reliability	Proposed
Uprate North Monroe-Idle Hour 69-kV line	2012	2012	3	reliability	Provisional
Install 138/69-kV transformer at Bass Creek	2012	2012	3	reliability	Provisional
Rebuild and convert West Middleton-Spring Green 69-kV line to 138 kV	2012	2012	3	reliability	Provisional
Construct West Middleton-Stagecoach double-circuit 138/69-kV line	2012	2012	3	reliability	Provisional
Construct 69-kV line Eden through Muscoda to Richland Center	2012	2012	3	reliability	Provisional
Move Lone Rock 69-kV phase shifter to Richland Center	2012	2012	3	reliability	Provisional
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	2013	3	access initiative	Provisional
Expand 345 kV to 6 positions at Paddock	2013	2013	3	access initiative	Provisional
Expand 138 kV to 7 positions at Paddock	2013	2013	3	access initiative	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
Install second 345/138-kV transformer at Paddock (500 MVA normal/625 MVA emergency)	2013	2013	3	access initiative	Provisional
Rebuild Paddock-Town Line Road 138 kV to double-circuit 1600 Amps minimum summer emergency each	2013	2013	3	access initiative	Provisional
Reconductor Town Line Road-Russell 138 kV to 1600 Amps minimum summer emergency	2013	2013	3	access initiative	Provisional
Construct new 69-kV line from South Lake Geneva to Lake Shore Substation	2013	2013	3	T-D interconnection	Provisional
Convert South Lake Geneva to Twin Lakes 69-kV line to 138 kV	2013	2013	3	reliability	Provisional
Construct new 138-kV line from Twin Lakes to Spring Valley	2013	2013	3	reliability	Provisional
Construct a Horicon-East Beaver Dam 138-kV line	2013	2013	3	reliability	Provisional
Install a second 138/69-kV transformer at North Monroe	2014	2014	3	reliability	Provisional
Construct West Middleton-Blount 138-kV line	2014	2014	3	reliability	Provisional
Construct West Middleton-North Madison 345-kV line	2014	2014	3	reliability, access initiative	Proposed
Install 1-16.32 MVAR capacitor bank at Burke 69 kV	2014	2014	3	reliability	Provisional
Install a second Femrite 138/69-kV transformer	2014	2014	3	reliability	Provisional
Replace the Kilbourn 47 MVA 138/69-kV transformer with a 100 MVA unit	2014	2014	3	reliability	Provisional
Uprate Colley Road to Park Street Tap 69-kV line to 114 MVA	2014	2014	3	reliability	Provisional
Replace the Colley Road 138/69-kV transformer	2015	2015	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
Uprate the North Appleton-Rocky Run 345-kV line	2005	2005	4	reliability	Planned
Construct a 138-kV substation at a new Forward Energy Center; loop existing Butternut-South Fond du Lac line into Forward Energy Center	2005	2005	4	new generation	Planned
Install a 138-kV series reactor at Highway V	2005	2006	4	reliability, service limitation, T-D interconnection	Planned
Upgrade 48 MVA RTU and CT at Mullet River 138/69 kV	2006	2006	4	reliability	Proposed
Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress	2006	2006	4	new generation	Planned
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 Martin Road-South Fond du Lac/Ohmstead 138-kV line	2006	2006	4	T-D interconnection	Planned
Construct North Appleton 345-kV double breaker ring bus configuration	2006	2006	4	operations, maintenance and stability	Planned
Rebuild Stiles-Amberg double-circuit 138-kV line	1996	2006	2 & 4	reliability, service limitation, condition	Planned
String a new Ellinwood-Sunset Point 138-kV line on existing structures	2007	2007	4	reliability	Provisional
Install 2-16.3 MVAR capacitor bank at Canal 69 kV	2007	2007	4	reliability	Planned
Replace the 1200 A breaker at Edgewater T22 345/138 kV	2007	2007	4	reliability	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
Construct double-circuit 138-kV line from Forest Junction/Howards Grove/Charter Steel to Plymouth #4	2007	2007	4	T-D interconnection	Proposed
Uprate North Appleton-Lawn Road-White Clay 138-kV line	2007	2007	4	reliability	Planned
Construct 138-kV line from Canal to Dunn Road	2008	2008	4	reliability	Proposed
Install 60 MVA 138/69-kV transformer at Dunn Road	2008	2008	4	reliability	Proposed
Rebuild/Convert Pulliam-New Suamico 69-kV line to 138 kV	2008	2008	4	reliability, condition, T-D interconnection	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
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
Rebuild Crivitz-High Falls 69-kV double-circuit line	2008	2008	4	reliability	Provisional
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2009	2009	4	reliability	Proposed
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
Retap 48 MVA CT at South Sheboygan Falls 138/69-kV transformer	2010	2010	4	reliability	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
Rebuild/convert New Holstein-St Nazianz-Custer-Lakefront 69-kV line to 138 kV (1225 Amps minimum)	2010	2010	4	access initiative	Provisional
Rebuild Tecumseh Road-New Holstein to double-circuit 138/69 kV, where 69 kV will serve Gravesville via New Holstein	2010	2010	4	access initiative	Provisional
Install 47 MVA 138/69-kV transformer at Custer	2010	2010	4	access initiative	Provisional
Install 100 MVA 138/69-kV transformer at Lakefront	2010	2010	4	access initiative	Provisional
Construct a second Dunn Road-Egg Harbor 69-kV line	2010	2010	4	reliability	Proposed
Uprate Northgate-20th Street 138-kV line	2011	2011	4	reliability	Provisional
Replace the 400 amp metering CT at North Mullet River 69 kV	2011	2011	4	reliability	Provisional
Retap 400A primary CT at Edgewater to 600A	2012	2012	4	reliability	Provisional
Replace 300 A metering CT at Edgewater 69 kV	2013	2013	4	reliability	Proposed
Rebuild/convert Chalk Hills-Chandler 69 kV to 138 kV operation	2013	2013	2 & 4	reliability	Provisional
Replace 300 A metering CT at Riverside 69 kV	2013	2013	4	reliability	Proposed
Replace the 300A current transformer at Sheboygan Falls 69 kV	2013	2013	4	reliability	Provisional
Replace the existing 46.7 MVA 138/69-kV transformer at South Sheboygan Falls with 100 MVA transformer	2014	2014	4	reliability	Provisional
Uprate the Melissa-Tayco to 229 MVA (300F)	2014	2014	4	reliability	Provisional
Install 28.8 MVAR capacitor bank at Butternut 138 kV	2015	2015	4	reliability	Provisional
Construct a Northside-City Limits 138-kV line	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
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
Rebuild/Convert New Suamico-Pioneer 69-kV line to 138 kV	2015	2015	4	reliability, condition	Provisional

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
Install 2-27 MVAR capacitor banks at Moorland 138 kV	2004	2005	5	reliability	Planned
Install 2-27 MVAR capacitor banks at Burlington 138 kV	2005	2006	5	reliability	Proposed
Install series reactor at Cornell	2007	2007	5	reliability	Proposed
Construct a 345-kV bus at Bain	2005	2007	5	reliability	Provisional
Install 200 MVAR capacitor bank at Bluemound	2007	2007	5	reliability	Provisional
Construct a new Mill Road Substation at intersection of Granville-Arcadian 345-kV, Forest Junction-Arcadian 345-kV, Sussex-Tamarack 138-kV and Sussex-Germantown 138-kV lines; install a 345/138-kV, 500 MVA transformer	2007	2008	5	reliability	Proposed
Reconductor Pleasant Valley-Saukville 138-kV line	2008	2008	5	new generation	Proposed
Reconductor Pleasant Valley-St. Lawrence 138-kV line	2008	2008	5	new generation	Proposed
Reconductor Cornell-Range Line 138-kV line	2008	2008	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
Replace relaying on 230-kV circuits at Oak Creek	2009	2009	5	new generation	Proposed
Replace two 345-kV circuit breakers at Pleasant Prairie 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

Table PR-17
Transmission System Additions for Zone 5 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional
Loop Ramsey5-Harbor 138-kV line into Norwich and Kansas to form a new line from Ramsey-Norwich and Harbor-Kansas 138-kV lines	2009	2009	5	new generation	Provisional
Construct Rockdale-Concord 345-kV line in parallel with existing 138 kV on existing double-width right-of-way	2009	2009	3 & 5	reliability, service limitation	Proposed
Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Concord	2009	2009	3 & 5	reliability	Proposed
Uprate Kansas-Ramsey6 138-kV line	2010	2010	5	new generation	Proposed
Install second 500 MVA 345/138-kV transformer at Oak Creek	2010	2010	5	new generation	Proposed
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Proposed
Uprate Oak Creek-Root River 138-kV line	2010	2010	5	new generation	Proposed
Uprate Oak Creek-Nicholson 138-kV line	2010	2010	5	new generation	Proposed
Convert Bark River-Mill Road 138-kV line to 345 kV	2010	2010	3 & 5	reliability, new generation	Proposed
Construct a Concord-Bark River 345-kV line	2010	2010	3 & 5	reliability, new generation	Proposed
Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Bark River	2010	2010	3 & 5	reliability, new generation	Proposed
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 two 138/26.2 kV transformers	2013	2013	5	new generation	Provisional

Table PR-17
Transmission System Additions for Zone 5 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or 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/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
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 (Carmen) 138-kV line on new 345-kV structures installed with Hale (Brookdale)-Granville line	2013	2013	5	new generation	Provisional
Replace CTs at Racine 345-kV Substation	2013	2013	5	new generation	Provisional

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
Relieve overloads or low voltages under contingency, replace aging facilities	Rebuild from Nordic to Randville Substation (5 miles) of single circuit 69-kV line to double-circuit 69 kV	5	1	2005	2006	2
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	2006	3
T-D interconnection request	Construct new line from West Darien to Southwest Delavan at 138 kV, operate at 69 kV	3	3	2006	2006	3
T-D interconnection request	Construct Venus-Metonga 115-kV line	12.5	11.5	2007	2007	1
T-D interconnection request	Construct Brandon-Fairwater 69-kV line	4	4	2007	2007	1
Relieve overloads or low voltages under contingency, T-D interconnection request	Construct a Jefferson-Lake Mills-Stony Brook 138-kV line	12	12	2006	2007	3
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	Construct new line from Southwest Delavan to Delavan or Bristol at 138 kV, 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	1.25	1.25	2007	2007	4

Table PR-18

Identified Needs and Transmission Lines Requiring New Right-of-Way (continued)

Identified need	Potential solutions	Approx. line mileage		System need year	Projected in-service year	Planning zone
		Total	New ROW			
T-D interconnection request	Construct a 69-kV line from Southwest Ripon to the Ripon-Metomen 69-kV line	1.5	1.5	2008	2008	1
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	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 Waunakee	5	5	2005	2008	3
Relieve overloads or low voltages under contingency, transfer capability	Construct Cranberry-Conover 115-kV line	14	14	2008	2008	1 & 2
Relieve overloads or low voltages under contingency, T-D interconnection request	Construct new 138-kV line from South Lake Geneva to White River	3	3	2009	2009	3
Relieve overloads or low voltages under contingency	Construct new Montrose-Sun Valley-Oak Ridge 138-kV line	9	3	2009	2009	3
Relieve overloads or low voltages under contingency, reduce service limitations	String a new 138-kV line from Clintonville-Werner West primarily on Morgan-Werner West 345-kV line structures	16	2	2004	2009	4
Relieve overloads or low voltages under contingency, reduce service limitations	Construct Morgan-Werner West 345-kV line	47	47	2004	2009	4
Relieve overloads or low voltages under contingency	Reroute Paddock to Shirland Avenue 69-kV line into and out of Northwest Beloit	1	0.5	2010	2010	3
Relieve overloads or low voltages under contingency	Loop the Femrite to Royster 69-kV line into AGA Gas	0.3	0.3	2010	2010	3

Table PR-18

Identified Needs and Transmission Lines Requiring New Right-of-Way (continued)

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	2010	2010	4
Relieve overloads or low voltages under contingency, accommodate new generation	Construct a Concord-Bark River 345-kV line	19	10	2009	2010	3 & 5
Relieve overloads or low voltages under contingency	Construct Evansville-Brooklyn 69-kV line	8	8	2011	2011	3
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
Relieve overloads or low voltages under contingency	Constuct a Lake Delton-Birchwood 138-kV line	5	5	2011	2011	3
Relieve overloads or low voltages under contingency	Construct 69-kV line Eden through Muscoda to Richland Center	35	35	2012	2012	3
Access initiative	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	114	114	2013	2013	3
Relieve overloads or low voltages under contingency	Rebuild/convert Chalk Hills-Chandler 69 kV to 138 kV operation	54	14	2013	2013	2 & 4
T-D interconnection request	Construct new 69-kV line from South Lake Geneva to Lake Shore Substation	3.2	3.2	2013	2013	3
Relieve overloads or low voltages under contingency	Construct new 138-kV line from Twin Lakes to Spring Valley	9	9	2013	2013	3
Relieve overloads or low voltages under contingency	Construct a Horicon-East Beaver Dam 138-kV line	9	9	2013	2013	3

Table PR-18

Identified Needs and Transmission Lines Requiring New Right-of-Way (continued)

Identified need	Potential solutions	Approx. line mileage		System need year	Projected in-service year	Planning zone
		Total	New ROW			
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	2010	2013	5
Relieve overloads or low voltages under contingency, access initiative	Construct West Middleton-North Madison 345-kV line	20	20	2014	2014	3
Relieve overloads or low voltages under contingency	Construct Fitzgerald-Omro Industrial 69-kV line	7	7	2015	2015	1

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

Identified need	Lines to be rebuilt/reconductored on existing ROW	Approx. mileage of rebuilt, reconductored or uprated lines	System need year	Projected in-service year	Planning zone
Relieve overloads or low voltages under contingency	Reconductor Wien-McMillan 115-kV line (ATC, MEWD)	20	2006	2006	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	2005	2006	1
Relieve overloads or low voltages under contingency	Construct Hiawatha-Engadine 69-kV line	0.2	2003	2006	2
Relieve overloads or low voltages under contingency, reduce service limitations	Rebuild and convert one Hiawatha-Indian Lake 69-kV circuit to double-circuit 138-kV standards, string two circuits initially and operate one at 69 kV	40	2004	2006	2
Replace aging facilities, relieve overloads or low voltages under contingency, accommodate new generation	Rebuild Turtle-Bristol 69-kV line to 138 kV and operate at 69 kV	29	2004	2006	3
Relieve overloads or low voltages under contingency, accommodate new generation	Convert Columbia-North Madison 138-kV line to 345 kV	17.41	2005	2006	3
T-D interconnection request	Construct a Martin Road-South Fond du Lac/Ohmstead 138-kV line	0.5	2006	2006	4
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

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

Identified need	Lines to be rebuilt/reconductored on existing ROW	Approx. mileage of rebuilt, reconductored or uprated lines	System need year	Projected in-service year	Planning zone
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
Relieve overloads or low voltages under contingency	Rebuild the Verona to Oregon 69-kV line Y119	11	2006	2007	3
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	Rebuild Hustisford-Horicon 69 kV to 138 kV	8	2008	2008	3
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	2008	3
Relieve overloads or low voltages under contingency	Construct 138-kV line from Canal to Dunn Road	7.64	2008	2008	4

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

Identified need	Lines to be rebuilt/reconductored on existing ROW	Approx. mileage of rebuilt, reconductored or uprated lines	System need year	Projected in-service year	Planning zone
Relieve overloads or low voltages under contingency, replace aging facilities, T-D interconnection request	Rebuild/Convert Pulliam-New Suamico 69-kV line to 138 kV	8.4	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
Relieve overloads or low voltages under contingency	Rebuild Crivitz-High Falls 69-kV double-circuit line	14.5	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
Accommodate new generation	Reconductor Cornell-Range Line 138-kV line	2.43	2008	2008	5
Relieve overloads or low voltages under contingency, transfer capability	Rebuild/convert Conover-Plains 69-kV line to 138 kV	73	2008	2008	1 & 2
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
Replace aging facilities	Relocate 69-kV Rexton tap to 69-kV Hiawatha-Pine River line (6909)	0	2009	2009	2
Replace aging facilities	Relocate 69-kV Trout Lake tap to 69-kV Hiawatha-Pine River line (6909)	0	2009	2009	2

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

Identified need	Lines to be rebuilt/reconductored on existing ROW	Approx. mileage of rebuilt, reconductored or uprated lines	System need year	Projected in-service year	Planning zone
Relieve overloads or low voltages under contingency, replace aging facilities	Rebuild Hiawatha-Pine River-Mackinac 69 kV to 138 kV	75	2009	2009	2
Relieve overloads or low voltages under contingency, reduce service limitations	Convert rebuilt Hiawatha-Indian Lake circuit (operated at 69 kV) to 138 kV	40	2009	2009	2
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
Accommodate new generation	Loop Ramsey5-Harbor 138-kV line into Norwich and Kansas to form a new line from Ramsey-Norwich and Harbor-Kansas 138-kV lines	5.72	2009	2009	5
Relieve overloads or low voltages under contingency, reduce service limitations	Construct Rockdale-Concord 345-kV line in parallel with existing 138 kV on existing double-width right-of-way	22.6	2009	2009	3 & 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 Hillman to Eden 69-kV line to 138 kV	28.13	2010	2010	3
Relieve overloads or low voltages under contingency	Rebuild Brodhead to South Monroe 69-kV line using 477 ACSR	18	2010	2010	3

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

Identified need	Lines to be rebuilt/reconductored on existing ROW	Approx. mileage of rebuilt, reconductored or uprated lines	System need year	Projected in-service year	Planning zone
Relieve overloads or low voltages under contingency	Convert Waunakee-Blount 69-kV line to 138 kV	5	2010	2010	3
Access initiative	Rebuild/convert New Holstein-St Nazianz-Custer-Lakefront 69-kV line to 138 kV (1225 Amps minimum)	20	2010	2010	4
Access initiative	Rebuild Tecumseh Road-New Holstein to double-circuit 138/69 kV, where 69 kV will serve Gravesville via New Holstein	2.5	2010	2010	4
Accommodate new generation	Uprate Kansas-Ramsey6 138-kV line	5.72	2010	2010	5
Accommodate new generation	Uprate Oak Creek-Nicholson 138-kV line	6.8	2010	2010	5
Relieve overloads or low voltages under contingency, accommodate new generation	Convert Bark River-Mill Road 138-kV line to 345 kV	11	2010	2010	3 & 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	Rebuild and convert West Middleton-Spring Green 69-kV line to 138 kV	5.71	2012	2012	3
Relieve overloads or low voltages under contingency	Construct West Middleton-Stagecoach double-circuit 138/69-kV line	6	2012	2012	3
Access initiative	Rebuild Paddock-Town Line Road 138 kV to double-circuit 1600 Amps minimum summer emergency each	7	2013	2013	3
Access initiative	Reconductor Town Line Road-Russell 138 kV to 1600 Amps minimum summer emergency	8.3	2013	2013	3
Relieve overloads or low voltages under contingency	Convert South Lake Geneva to Twin Lakes 69-kV line to 138 kV	11.5	2013	2013	3

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

Identified need	Lines to be rebuilt/reconductored on existing ROW	Approx. mileage of rebuilt, reconductored or uprated lines	System need year	Projected in-service year	Planning zone
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
Accommodate new generation	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	15.6	2013	2013	5
Accommodate new generation	Restring Bluemound-Butler 138-kV line (KK5051) on new 345-kV structures installed with Hale (Brookdale)-Granville line	5.41	2010	2013	5
Accommodate new generation	String Butler-Tamarack (Carmen) 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	Construct West Middleton-Blount 138-kV line	5	2014	2014	3
Relieve overloads or low voltages under contingency	Construct a Northside-City Limits 138-kV line	3.16	2015	2015	4
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, replace aging facilities	Rebuild/Convert New Suamico-Pioneer 69-kV line to 138 kV	13.1	2015	2015	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 138-kV substation at a new Forward Energy Center; loop existing Butternut-South Fond du Lac line into Forward Energy Center	N/A	N/A	2005	2005	4
Reduce service limitations, relieve overloads under contingency, improve transfer capability & Weston stability	Construct new Gardner Park 345/115-kV Substation	N/A	N/A	2006	2006	1
Reduce service limitations, relieve overloads under contingency, improve transfer capability & Weston stability	Replace 345/115-kV 200 MVA transformer at Weston with two 500 MVA units at the Gardner Park Substation	1000	200	2006	2006	1
Relieve overloads under contingency	Install a 345/161-kV transformer at Stone Lake (temporary installation for construction outages)	300	0	2006	2006	1
Accommodate new generation	Construct Butler Ridge 138-kV Substation	N/A	N/A	2006	2006	3
Relieve overloads under contingency	Uprate Colley Road 138/69-kV transformer	120	96	2006	2006	3
Relieve overloads under contingency	Uprate North Monroe 138/69-kV transformer	130	93	2006	2006	3
Relieve overloads under contingency	Uprate McCue 138/69-kV transformer	143	116	2006	2006	3
Relieve overloads under contingency, accommodate new generation	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	1000	510	2006	2006	3
Accommodate new generation	Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress	N/A	N/A	2006	2006	4
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

Table PR-20

New Substations, Transformer Additions and Replacements (continued)

Identified need	Potential additions or replacements	Transformer capacity (MVA)		System need year	Projected in-service year	Planning zone
		Install	Replace			
Relieve overloads under contingency, reduce service limitations	Construct Mackinac 138-kV Substation (new Straits Substation)	N/A	N/A	2005	2007	2
Relieve overloads under contingency, replace aging facilities	Relocate Cedar Substation (North Lake)	N/A	N/A	2005	2007	2
Relieve overloads under contingency, replace aging facilities	Relocate Brule Substation (Aspen)	N/A	N/A	2007	2007	2
Relieve overloads under contingency, accommodate new generation	Install 138/69-kV transformer at Femrite	100	0	2007	2007	3
Relieve overloads under contingency, accommodate new generation	Install 138/69-kV transformer at Reiner	100	0	2007	2007	3
Relieve overloads under contingency	Construct a 345-kV bus at Bain	N/A	N/A	2005	2007	5
Relieve overloads under contingency, improve transfer capability & Weston stability	Construct the new permanent Stone Lake 345/161-kV Substation	N/A	N/A	2008	2008	1
Relieve overloads under contingency	Install second 345/138-kV transformer at Plains	500	0	2008	2008	2
Relieve overloads under contingency	Uprate Atlantic 138/69-kV transformer	64	47	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 Waunakee and install a 100 MVA 138/69-kV transformer	100	0	2008	2008	3
Relieve overloads under contingency	Install 60 MVA 138/69-kV transformer at Dunn Road	60	0	2008	2008	4
Relieve overloads under contingency	Install 138/69-kV transformer at the expanded Menominee Substation	100	0	2008	2008	4

Table PR-20

New Substations, Transformer Additions and Replacements (continued)

Identified need	Potential additions or replacements	Transformer capacity (MVA)		System need year	Projected in-service year	Planning zone
		Install	Replace			
Relieve overloads under contingency	Construct a new Mill Road Substation at intersection of Granville-Arcadian 345-kV, Forest Junction-Arcadian 345-kV, Sussex-Tamarack 138-kV and Sussex-Germantown 138-kV lines; install a 345/138-kV, 500 MVA transformer	500	0	2008	2008	5
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	210	0	2008	2008	1 & 2
Relieve overloads under contingency, transfer capability	Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Iron Grove	60	0	2008	2008	1 & 2
Relieve overloads under contingency	Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Aspen	60	0	2008	2008	1 & 2
Relieve overloads under contingency	Relocate Iron River Substation (Iron Grove)	N/A	N/A	2008	2008	1 & 2
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	Construct 138-kV bus and install one 138/69-kV, 50 MVA transformer at Pine River	50	0	2009	2009	2
Relieve overloads under contingency	Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva	100	0	2009	2009	3
Relieve overloads under contingency	Construct new 138-kV bus and 138/69-kV 100 MVA transformer at Montrose Substation	100	0	2009	2009	3
Relieve overloads under contingency	Install a second 138/69-kV transformer at Hillman	47	0	2009	2009	3

Table PR-20

New Substations, Transformer Additions and Replacements (continued)

Identified need	Potential additions or replacements	Transformer capacity (MVA)		System need year	Projected in-service year	Planning zone
		Install	Replace			
Relieve overloads under contingency	Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Concord	500	0	2009	2009	3 & 5
Relieve overloads under contingency	Replace 138/69-kV transformer at Metomen	100	47	2010	2010	1
Access initiative, relieve overloads under contingency	Install a 161/138-kV transformer at Council Creek	100	0	2010	2010	1
Relieve overloads under contingency	Install a 69-kV bus and 138/69-kV 100 MVA transformer at Northwest Beloit	100	0	2010	2010	3
Access initiative	Install 47 MVA 138/69-kV transformer at Custer	47	0	2010	2010	4
Access initiative	Install 100 MVA 138/69-kV transformer at Lakefront	100	0	2010	2010	4
Accommodate new generation	Install second 500 MVA 345/138-kV transformer at Oak Creek	500	0	2010	2010	5
Relieve overloads under contingency, accommodate new generation	Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Bark River	500	0	2010	2010	3 & 5
Relieve overloads under contingency	Construct a 345-kV bus and install a 345/138-kV 500 MVA transformer at West Middleton	500	0	2011	2011	3
Relieve overloads under contingency	Install a 138/69-kV transformer and 69-kV bus at Yahara River Substation	100	0	2011	2011	3
Relieve overloads under contingency	Install a second 138/69-kV transformer at Janesville Substation	100	0	2011	2011	3
Relieve overloads under contingency	Uprate M38 138/69-kV transformer	64	47	2012	2012	2
Relieve overloads under contingency	Install 138/69-kV transformer at Bass Creek	100	0	2012	2012	3
Access initiative	Install second 345/138-kV transformer at Paddock (500 MVA normal/625 MVA emergency)	500	0	2013	2013	3

Table PR-20

New Substations, Transformer Additions and Replacements (continued)

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 two 138/26.2 kV transformers	500	0	2013	2013	5
Relieve overloads under contingency	Install a second 138/69-kV transformer at North Monroe	100	0	2014	2014	3
Relieve overloads under contingency	Install a second Femrite 138/69-kV transformer	100	0	2014	2014	3
Relieve overloads under contingency	Replace the Kilbourn 47 MVA 138/69-kV transformer with a 100 MVA unit	100	47	2014	2014	3
Relieve overloads under contingency	Replace the existing 46.7 MVA 138/69-kV transformer at South Sheboygan Falls with 100 MVA transformer	100	46.7	2014	2014	4
Relieve overloads under contingency	Replace 138/69-kV transformer at Wautoma	100	47	2015	2015	1
Relieve overloads under contingency	Replace the Colley Road 138/69-kV transformer	187	100	2015	2015	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	2005	2005	1
Relieve overloads or low voltages under contingency	Uprate North Lake Geneva to Lake Geneva 69-kV line to 72 MVA	N/A	2005	2005	3
Relieve overloads or low voltages under contingency	Uprate Brick Church to Walworth 69-kV line to 48 MVA	N/A	2005	2005	3
Relieve overloads or low voltages under contingency	Uprate Brick Church to Katzenberg 69-kV line to 93 MVA	N/A	2005	2005	3
Relieve overloads or low voltages under contingency	Uprate Sun Prairie to Gaston Road 69-kV line to 48 MVA	N/A	2005	2005	3
Relieve overloads or low voltages under contingency	Uprate Colorado to Sun Prairie 69-kV line to 72 MVA	N/A	2005	2005	3
Relieve overloads or low voltages under contingency	Uprate Dane to Waunakee and Waunakee to Huiskamp 69-kV lines	N/A	2005	2005	3
Relieve overloads or low voltages under contingency	Uprate the North Appleton-Rocky Run 345-kV line	N/A	2005	2005	4
Relieve overloads or low voltages under contingency	Install 2-27 MVAR capacitor banks at Moorland 138 kV	54	2004	2005	5
Relieve overloads or low voltages under contingency	Install 2-8.16 MVAR capacitor banks at Council Creek 138 kV	16.3	2005	2006	1
Achieve transfer capability associated with Arrowhead-Gardner Park	Install 3-50 MVAR capacitor banks at Gardner Park 115 kV	150	2006	2006	1
Accommodate new generation, relieve overloads or low voltages under contingency	Upgrade Weston-Kelly 115-kV line conductor clearances to 300F	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 Munising 69 kV	5.4	2006	2006	2

Table PR-21

Substation Equipment Additions and Replacements (continued)

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 Sawyer 69 kV	5.4	2006	2006	2
Relieve overloads or low voltages under contingency	Install 2-8.16 MVAR capacitor banks at Lincoln 69 kV	16.32	2006	2006	2
Relieve overloads or low voltages under contingency	Reconnect the 138/69-kV transformers at Kilbourn on separate breakers to operate individually	N/A	2006	2006	3
Relieve overloads or low voltages under contingency	Install 36 MVAR capacitor bank at Hartford 138-kV Substation	36	2006	2006	3
Relieve overloads or low voltages under contingency	Uprate Paddock-Shaw 69-kV line	N/A	2006	2006	3
Relieve overloads or low voltages under contingency	Uprate Brodhead-South Monroe 69-kV line	N/A	2006	2006	3
Relieve overloads or low voltages under contingency, accommodate new generation	Reconfigure 345-kV bus at Columbia	N/A	2006	2006	3
Relieve overloads or low voltages under contingency, reduce service limitations, T-D interconnection request	Install a 138-kV series reactor at Highway V	N/A	2005	2006	4
Relieve overloads or low voltages under contingency	Upgrade 48 MVA RTU and CT at Mullet River 138/69 kV	N/A	2006	2006	4
Operations, maintenance and stability	Construct North Appleton 345-kV double breaker ring bus configuration	N/A	2006	2006	4
Relieve overloads or low voltages under contingency	Install 2-27 MVAR capacitor banks at Burlington 138 kV	54	2005	2006	5
Relieve overloads or low voltages under contingency	Install series reactor at Cornell	N/A	2007	2007	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 2-16.3 MVAR capacitor banks at Wautoma 138 kV	32.6	2007	2007	1

Table PR-21

Substation Equipment Additions and Replacements (continued)

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 2-8.16 MVAR capacitor banks at Ontonagon 138 kV	16.32	2007	2007	2
Relieve overloads or low voltages under contingency	Uprate McCue-Janesville 69-kV line	N/A	2007	2007	3
Relieve overloads or low voltages under contingency, reduce service limitations	Uprate Rockdale to Jefferson 138-kV line	N/A	2007	2007	3
Relieve overloads or low voltages under contingency, reduce service limitations	Uprate Rockdale to Boxelder 138-kV line	N/A	2007	2007	3
Relieve overloads or low voltages under contingency, reduce service limitations	Uprate Boxelder to Stonybrook 138-kV line	N/A	2007	2007	3
Relieve overloads or low voltages under contingency	Install/upgrade capacitor bank at South Monroe 69 kV to 32 MVAR	32	2007	2007	3
Relieve overloads or low voltages under contingency	Install 2-16.3 MVAR capacitor bank at Canal 69 kV	32.6	2007	2007	4
Relieve overloads or low voltages under contingency	Replace the 1200 A breaker at Edgewater T22 345/138 kV	N/A	2007	2007	4
Relieve overloads or low voltages under contingency	Install 200 MVAR capacitor bank at Bluemound	200	2007	2007	5
Achieve transfer capability associated with Arrowhead-Gardner Park	Install 2-75 MVAR capacitor banks at Arrowhead 345 kV	150	2008	2008	1
Achieve transfer capability associated with Arrowhead-Gardner Park	Install 1-75 MVAR capacitor bank and 1-45 MVAR inductor at Stone Lake 345 kV	75	2008	2008	1
Achieve transfer capability associated with Arrowhead-Gardner Park	Install 1-50 MVAR capacitor bank at Arpin	50	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	12.3	2008	2008	1
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 (continued)

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	5.4	2008	2008	2
Relieve overloads or low voltages under contingency	Install 2-8.16 MVAR capacitor banks at M38 69 kV	16.32	2008	2008	2
Relieve overloads or low voltages under contingency	Install 2-5.4 MVAR capacitor banks at Osceola 69 kV	10.8	2008	2008	2
Relieve overloads or low voltages under contingency	Install 1-8.16 MVAR capacitor bank at Richland Center 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	10.8	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
Accommodate new generation	Uprate Rocky Run-Plover 115-kV line terminal equipment	N/A	2009	2009	1
Relieve overloads or low voltages under contingency, reduce service limitations	Construct Mackinac 138-kV Substation additions (portions may be earlier for maintenance issues)	N/A	2009	2009	2
Relieve overloads or low voltages under contingency, reduce service limitations	Construct 138-kV ring bus at Hiawatha Substation	N/A	2009	2009	2
Relieve overloads or low voltages under contingency, reduce service limitations	Install 138-kV substation modifications at Indian Lake Substation	N/A	2009	2009	2
Relieve overloads or low voltages under contingency	Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69 kV	5.4	2009	2009	2
Relieve overloads or low voltages under contingency	Install 1-5.4 MVAR capacitor bank at Roberts 69 kV	5.4	2009	2009	2
Relieve overloads or low voltages under contingency	Install 4-25 MVAR capacitor banks at Portage 138 kV	100	2009	2009	3
Relieve overloads or low voltages under contingency	Uprate Colley Road to Brick Church 69-kV line to 72 MVA	N/A	2009	2009	3

Table PR-21

Substation Equipment Additions and Replacements (continued)

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 a 69-kV 16.32 MVAR capacitor bank at Kilbourn Substation	16.32	2009	2009	3
Accommodate new generation	Replace relaying on 230-kV circuits at Oak Creek	N/A	2009	2009	5
Accommodate new generation	Replace two 345-kV circuit breakers at Pleasant Prairie on the Racine and Zion lines with IPO breakers and upgrade relaying	N/A	2009	2009	5
Accommodate new generation	Expand Oak Creek 345-kV switchyard to interconnect one new generator	N/A	2009	2009	5
Relieve overloads or low voltages under contingency	Uprate Wautoma-Berlin 69-kV line terminal equipment at Wautoma	N/A	2010	2010	1
Relieve overloads or low voltages under contingency	Install 1-8.16 MVAR capacitor bank at Boscobel 69-kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	10.8	2010	2010	3
Relieve overloads or low voltages under contingency	Uprate Darlington-Rock Branch 69-kV line	N/A	2010	2010	3
Relieve overloads or low voltages under contingency	Uprate existing 18 MVAR capacitor bank at Spring Green 138 kV with a 50 MVAR bank	32	2010	2010	3
Relieve overloads or low voltages under contingency	Retap 48 MVA CT at South Sheboygan Falls 138/69-kV transformer	N/A	2010	2010	4
Accommodate new generation	Expand 345-kV switchyard at Oak Creek to interconnect one new generator	N/A	2010	2010	5
Accommodate new generation	Uprate Oak Creek-Root River 138-kV line	N/A	2010	2010	5
Relieve overloads or low voltages under contingency	Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Ripon 69 kV	12.3	2011	2011	1
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	Uprate Northgate-20th Street 138-kV line	N/A	2011	2011	4

Table PR-21

Substation Equipment Additions and Replacements (continued)

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	Replace the 400 amp metering CT at North Mullet River 69 kV	N/A	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 a 12.2 MVAR capacitor bank at Hilltop 69 kV	12.2	2012	2012	1
Relieve overloads or low voltages under contingency	Uprate Sun Prairie-Bird Street 69-kV line	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	Move Lone Rock 69-kV phase shifter to Richland Center	N/A	2012	2012	3
Relieve overloads or low voltages under contingency	Retap 400A primary CT at Edgewater to 600A	N/A	2012	2012	4
Relieve overloads or low voltages under contingency	Replace 300 A metering CT at Edgewater 69 kV	N/A	2013	2013	4
Relieve overloads or low voltages under contingency	Replace 300 A metering CT at Riverside 69 kV	N/A	2013	2013	4
Relieve overloads or low voltages under contingency	Uprate Port Edwards-Saratoga 138-kV line - Scope TBD	N/A	2013	2013	1
Access initiative	Expand 345 kV to 6 positions at Paddock	N/A	2013	2013	3
Access initiative	Expand 138 kV to 7 positions at Paddock	N/A	2013	2013	3
Relieve overloads or low voltages under contingency	Replace the 300A current transformer at Sheboygan Falls 69 kV	N/A	2013	2013	4
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
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

Table PR-21

Substation Equipment Additions and Replacements (continued)

Identified need	Potential additions or replacements	Capacitor bank capacity (MVAR)	System need year	Projected in-service year	Planning zone
Accommodate new generation	Replace CTs at Racine 345-kV Substation	N/A	2013	2013	5
Relieve overloads or low voltages under contingency	Increase McKenna 69-kV capacitor bank from 6.3 to 10.8 MVAR	4.5	2014	2014	1
Relieve overloads or low voltages under contingency	Uprate Metomen-Ripon 69-kV line - scope TBD	N/A	2014	2014	1
Relieve overloads or low voltages under contingency	Install 1-16.32 MVAR capacitor bank at Burke 69 kV	16.32	2014	2014	3
Relieve overloads or low voltages under contingency	Uprate Colley Road to Park Street Tap 69-kV line to 114 MVA	N/A	2014	2014	3
Relieve overloads or low voltages under contingency	Uprate the Melissa-Tayco line to 229 MVA (300F)	N/A	2014	2014	4
Relieve overloads or low voltages under contingency	Install additional 13.6 MVAR capacitor bank at Clear Lake 115 kV	13.6	2015	2015	1
Relieve overloads or low voltages under contingency	Install 2-5.4 MVAR capacitor banks at M-38 69 kV	10.8	2015	2015	2
Relieve overloads or low voltages under contingency	Install 28.8 MVAR capacitor bank at Butternut 138 kV	28.8	2015	2015	4

Table PR-22
Alternative Solutions to Proposed Additions

Primary solution(s)	Alternate solution(s)	Projected in-service year	Planning zone
New Cranberry-Conover 115-kV line and Convert Conover-Iron River-Plains 69-kV to 138 kV	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 Rhinelander Loop 7.) Park Falls-Clear Lake 115-kV line 8.) Convert Whitcomb-Aurora Street 69 kV to 115 kV 9.) Gogebic-Watersmeet-Conover-Cranberry 138-kV line	2008	1
Berlin area reinforcements: New Omro Industrial-Fitzgerald 69-kV line, install capacitor banks at Ripon and Berlin	1.) Reconfigure N. Randolph-Ripon 69-kV line to N. Randolph-Metomen and Metomen-Ripon 69-kV lines. Cap bank installations at Berlin, Ripon and Winneconne and second 138/69-kV transformer at Metomen 2.) Convert Metomen-Ripon-Berlin 69-kV line to 138 kV with a new 138/69-kV transformer at Berlin 3.) Rebuild the Metomen-Ripon-Berlin 69-kV line to a 138/69-kV double-circuit line with new 138/69-kV transformer at Berlin	2005 - 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	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
Uprate Weston-Kelly 115-kV line	1.) Convert WPS's 46-kV system from Weston-Rothschild-Kelly to 115 kV 2.) Reroute/Reterminate Weston end of line to new Gardner Park 345/115-kV Substation 3.) New 115-kV substation at the intersection of Weston-Blackbrook and Kelly-Whitcomb 115-kV lines 4.) Rebuild the Weston-Kelly 115-kV line	2006	1

Table PR-22
Alternative Solutions to Proposed Additions (continued)

Primary solution(s)	Alternate solution(s)	Projected in-service year	Planning zone
Construct second Hiawatha-Pine River-Mackinac (Straits) 138-kV line	Rebuild Hiawatha-Pine River 69-kV line, Install a Phase Shifter at Mackinac to limit flows and add 138-kV capacitors at Brevort or Lakehead	2009	2
Install a 138/69-kV transformer at Yahara River Substation and loop the Token Creek 69-kV line into and out of Yahara River	1.) Reconfigure Sun Prairie 69-kV system, install second 138/69-kV transformer at North Madison 2.) Convert North Madison 69-kV line through Sun Prairie to Reiner to 138 kV	2011	3
Construct a new 345-kV line from Rockdale to West Middleton	1.) Construct a new 345-kV line from North Madison to West Middleton 2.) Rockdale to Sprecher/Femrite 138-kV double-circuit line 3) Numerous 138-kV and 69-kV capacitor banks, reconductor Kegonsa to Christiana, reconductor Fitchburg to Christiana, add a second 138/69-kV transformer at North Madison, add a third 345/138-kV transformer at North Madison, reconductor or uprate North Madison to Sycamore 138-kV line, install a second 138/69-kV transformer at Kegonsa, reconductor all three East Campus to Blount 69-kV lines, reconductor Blount to Gateway 69-kV line.	2011	3
Convert 69-kV line from West Middleton to Spring Green to 138 kV and Construct a new 345-kV line from Rockdale to West Middleton	Install several capacitor banks on 69-kV buses and on 138-kV buses	2012	3
Construct a new 138-kV line from North Madison to Waunakee and a new substation with a 138/69-kV transformer near Waunakee	1.) Install parallel transformers at Portage and North Madison 2.) Install line between Spring Green and Prairie du Sac to offload this line	2008	3
Construct a Canal-Dunn Road 138-kV line and add a 138/69-kV transformer at Dunn Road	1.) Add a third 138/69-kV transformer at Canal 2.) Add generation to the 69-kV system in Northern Door County 3.) Replace Canal 138/69-kV transformers 1 and 2	2008	4

Table PR-22
Alternative Solutions to Proposed Additions (continued)

Primary solution(s)	Alternate solution(s)	Projected in-service year	Planning zone
Add two 16.3 MVAR capacitor bank at Canal 69 kV	1.) Rebuild Pulliam-Brusbay-Sawyer-Canal 69-kV line for 138 kV 2.) Construct a 138-kV line from Egg Harbor to Menominee under the bay of Green Bay and operate at 69 kV 3.) Construct a 138-kV line from Sister Bay to Escanaba under the bay of Green Bay and operate at 69 kV 4.) Add generation to the 69-kV system in Door County	2007	4
Add 138-kV conductor for Ellinwood-Sunset Point 138-kV on existing structures	1.) Replace Ellinwood 138/69-kV transformer 2.) Add a third Ellinwood 138/69-kV transformer	2007	4
Construct the Morgan-Werner West 345-kV line and construct a 345/138-kV switchyard at a new Werner West; 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	1.) Construct a 345-kV line from Morgan to North Appleton, add a fourth 345/138-kV transformer at North Appleton, uprate the Kaukauna Central Tap-Melissa-Tayco 138-kV line, uprate Butte des Morts 138-kV bus tie, uprate Casaloma-Ellington-North Appleton 138-kV line. 2.) Add a fourth 345/138-kV transformer at North Appleton, uprate the Kaukauna Central Tap-Melissa-Tayco 138-kV line, uprate Butte des Morts 138-kV bus, uprate Casaloma-Ellington-North Appleton 138-kV line, uprate Ellington 138-kV bus, uprate Morgan-White Clay 138-kV line, and add a 14.4 MVAR capacitor bank at Casaloma 138-kV 3) Construct a new Morgan-North Appleton 345/138-kV double-circuit line 4) Add a fourth 345/138-kV transformer at North Appleton, construct Werner West-Clintonville 138-kV line, rebuild various 138-kV lines, replace terminal equipments at various 138-kV substations	2006, 2009	4
Construct a second Dunn Road-Egg Harbor 69-kV line	1.) Construct a new 138-kV line from Dunn Road to Egg Harbor 2.) Add generation to the 69-kV system in northern Door County	2010	4
Rebuild Crivitz-High Falls 69-kV double-circuit line	1.) Construct a new 138-kV line from Amberg to Goodman 3.) Construct a new Metonga-Goodman 115-kV line 4.) Construct a new 69-kV line from Pine to Goodman	2008	4
Replace South Sheboygan Falls 138/69-kV transformer with a minimum of 125 MVA unit	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 3.) Construct 2.5 miles of 138-kV line from Lodestar to Sheboygan Falls 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	2014	4

Table PR-22
Alternative Solutions to Proposed Additions (continued)

Primary solution(s)	Alternate solution(s)	Projected in-service year	Planning zone
Construct a 345-kV bus at Bain Substation	Reconfigure 345-kV bus at Pleasant Prairie	2007	5
Install two 345-kV series breakers at Pleasant Prairie on lines to Racine (L631) and Zion (L2221)	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.	2009	5
Construct Rockdale-Concord-Bark River-Mill Road 345-kV line with 345/138-kV transformers at Concord, Bark River and Mill Road (Lannon Junction)	1.) Construct a 345-kV line from Rockdale-Concord-St. Lawrence 2.) Add a 345/138-kV transformer at St. Lawrence 3.) Add a 345/138-kV transformer at Concord 4.) Install a 4-position 345-kV ring bus and a 345/138-kV transformer at Germantown	2008/10	3 & 5
Construct Rockdale-Concord-Bark River-Mill Road 345-kV line with 345/138-kV transformers at Concord, Bark River and Mill Road (Lannon Junction)	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 5.) Uprate Stonybrook-Boxelder 138-kV 6.) Install 32 MVAR capacitor bank at Summit and 75 MVAR at Hartford 138 kV	2008/10	3 & 5

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment

Projects cancelled	Former in-service date	Planning zone	Reason for removal
Install 2-5.4 MVAR capacitor banks at Iron River 69 kV	2006	2	Capacitors moved to Lincoln
Uprate Lewiston to Kilbourn 138-kV line to 286 MVA	2004	3	Updated rating information
Uprate South Beaver Dam to Juneau 69-kV line to 72 MVA	2004	3	Updated rating information
Uprate Saratoga-Baker 115-kV line terminal equipment at Saratoga	2009	1	Updated rating information
Install 2-16.3 MVAR capacitor bank at Apple Hills 138 kV	2015	4	Updated load/model information
Uprate Whitcomb-Deer Trail 69-kV line terminal equipment at Whitcomb	2012	1	Updated rating information
Reconfigure 345-kV bus at Pleasant Prairie	2006	5	Another alternative selected (Bain)
Install two 345-kV series breakers at Pleasant Prairie on lines to Racine (L631) and Zion (L2221)	2009	5	Oak Creek restudy results
Replace seven 138-kV overdutied breakers at Bluemound	2009	5	Oak Creek restudy results
Expand 345-kV switchyard at Bain and string Bain-Racine 345-kV circuit	2012	5	Oak Creek restudy results
Replace twenty-two 138-kV overdutied breakers at Harbor, Everett and Haymarket Substations	2014	5	Oak Creek restudy results
Remove Niagara Tap from 138-kV Plains-Amberg line and connect to new 138-kV line from Plains	2005	2	Improved reliability from line rebuild
Install two additional 5.4 MVAR capacitor banks at Iron River 69 kV	2013	2	Another alternative selected
Replace the two existing 33 MVA 138/69-kV transformers at Edgewater with two 60 MVA transformers	2006	4	Updated rating information
Replace the existing 46.7 MVA 138/69-kV transformer at Mullet River with 100 MVA transformer	2006	4	Updated rating information

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

Projects deferred	New date	Planning zone	Previous in-service year and reason for deferral
Install 2-8.16 MVAR capacitor banks at Council Creek 138 kV	2006	1	Originally 2005, budget considerations
Construct Hiawatha-Engadine 69-kV line	2006	2	Originally 2005, construction outage scheduling
Rebuild and convert one Hiawatha-Indian Lake 69-kV circuit to double-circuit 138-kV standards, string two circuits initially and operate one at 69 kV	2006	2	Originally 2005, construction outage scheduling
Construct Butler Ridge 138-kV Substation	2006	3	Originally 2005, additional design issues to be resolved
Install 36 MVAR capacitor bank at Hartford 138-kV Substation	2006	3	Originally 2005; was at Butler Ridge, additional design issues to be resolved
Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress	2006	4	Originally 2005, updated information from customer
Install series reactor at Cornell	2007	5	Originally 2006, budget considerations
Uprate Metomen-North Fond du Lac 69-kV line terminal equipment	2007	1	Originally 2006; updated load/model information and budget considerations
Construct Mackinac 138-kV Substation (new Straits Substation)	2007	2	Originally 2006, budget considerations
Construct new line from Southwest Delavan to Delavan or Bristol at 138 kV, operate at 69 kV	2007	3	Originally 2006, budget considerations
Install 2-16.3 MVAR capacitor bank at Canal 69 kV	2007	4	Originally 2006, budget considerations and updated load/model information
Install 200 MVAR capacitor bank at Bluemound	2007	5	Originally 2006, budget considerations
Rebuild Atlantic-Osceola 69-kV line (Laurium #1)	2008	2	Originally 2006, budget considerations
Construct 138-kV line from Canal to Dunn Road	2008	4	Originally 2007 and was previously on new right-of-way, updated load/model information

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

Projects deferred (continued)	New date	Planning zone	Previous in-service year and reason for deferral
Install 60 MVA 138/69-kV transformer at Dunn Road	2008	4	Originally 2007, updated load/model information
Construct a new Mill Road Substation at intersection of Granville-Arcadian 345-kV, Forest Junction-Arcadian 345-kV, Sussex-Tamarack 138-kV and Sussex-Germantown 138-kV lines; install a 345/138-kV, 500 MVA transformer	2008	5	Originally 2007; name change (was Lannon Junction), budget considerations
Uprate Colley Road to Brick Church 69-kV line to 72 MVA	2009	3	Originally 2005, updated load/model information
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2009	4	Originally 2007, updated load/model information
Replace 138/69-kV transformer at Metomen	2010	1	Originally 2009, updated load/model information
Construct Monroe County-Council Creek 161-kV line	2010	1	Originally 2009, updated load/model information
Install a 161/138-kV transformer at Council Creek	2010	1	Originally 2009, updated load/model information
Uprate Council Creek-Petenwell 138-kV line	2010	1	Originally 2009, updated load/model information
Rebuild/reconductor Petenwell-Saratoga 138-kV line	2010	1	Originally 2009, updated load/model information
Install 1-8.16 MVAR capacitor bank at Boscobel 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2010	3	Was Muscoda; originally 2008, updated load/model information
Uprate Gardner Park-Black Brook 115-kV line - scope TBD	2012	1	Originally 2011, updated load/model information
Expand 345 kV to 6 positions at Paddock	2013	3	Originally 2010, updated load/model information

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

Projects deferred (continued)	New date	Planning zone	Previous in-service year and reason for deferral
Expand 138 kV to 7 positions at Paddock	2013	3	Originally 2010, updated load/model information
Install second 345/138-kV transformer at Paddock (500 MVA normal/625 MVA emergency)	2013	3	Originally 2010, updated load/model information
Rebuild Paddock-Town Line Road 138 kV to double-circuit 1600 Amps minimum summer emergency each	2013	3	Originally 2010, updated load/model information
Reconductor Town Line Road-Russell 138 kV to 1600 Amps minimum summer emergency	2013	3	Originally 2010, updated load/model information
Install a second 138/69-kV transformer at North Monroe	2014	3	Originally 2010, updated load/model information
Replace the existing 46.7 MVA 138/69-kV transformer at South Sheboygan Falls with 100 MVA transformer	2014	4	Originally 2006, updated load/model information and updated rating information
Replace 138/69-kV transformer at Wautoma	2015	1	Originally 2013, updated load/model information
Install 2-5.4 MVAR capacitor banks at M-38 69 kV	2015	2	Originally 2013, updated load/model information
Install 28.8 MVAR capacitor bank at Butternut 138 kV	2015	4	Originally 2009, updated load/model information
Construct a Northside-City Limits 138-kV line	2015	4	Originally 2014, updated load/model information
Reconductor Pulliam-Danz 69-kV line	2015	4	Originally 2008, updated load/model information
Reconductor Danz-Henry Street 69-kV line	2015	4	Originally 2008, updated load/model information
Reconductor Pulliam-Van Buren 69-kV line	2015	4	Originally 2008, updated load/model information

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

Other project changes	Date	Planning zone	Reason for change or update
Construct new Eagle River Muni distribution Substation directly adjacent to the existing Cranberry 115-kV Substation	2005	1	Was new transformer at Cranberry
Rebuild and convert one Hiawatha-Indian Lake 69-kV circuit to double-circuit 138-kV standards, string two circuits initially and operate one at 69 kV	2006	2	in-service year, was 2005; previously: string one circuit initially and operate at 69 kV
Install 2-8.16 MVAR capacitor banks at Lincoln 69 kV	2006	2	Capacitors moved from Iron River
Install 36 MVAR capacitor bank at Hartford 138-kV Substation	2006	3	in-service year, was 2005; capacitors were previously at Butler Ridge
Relocate Brule Substation (Aspen)	2007	2	Previously: construct new Brule
Install/upgrade capacitor bank at South Monroe 69 kV to 32 MVAR	2007	3	in-service year, was 2008, previously: 24 MVAR capacitor bank
Install 2-75 MVAR capacitor banks at Arrowhead 345 kV	2008	1	Voltage changed from 230 to 345
Rebuild/Convert Pulliam-New Suamico 69-kV line to 138 kV	2008	4	This project was broken out separately from previous Pulliam-Pioneer project
Construct a new Mill Road Substation at intersection of Granville-Arcadian 345-kV, Forest Junction-Arcadian 345-kV, Sussex-Tamarack 138-kV and Sussex-Germantown 138-kV lines; install a 345/138-kV, 500 MVA transformer	2008	5	in-service year, was 2007; previously named Lannon Junction

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

Other project changes (continued)	Date	Planning zone	Reason for change or update
Construct Cranberry-Conover 115-kV line	2008	1 & 2	Previously a 138-kV line
Construct 138-kV bus and install 138/115-kV 150 MVA and 138/69-kV 60 MVA transformers at Conover	2008	1 & 2	150 MVA transformer was at Cranberry
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Iron Grove	2008	1 & 2	Previously named Iron River
Construct 138-kV bus and install one 138/69-kV, 50 MVA transformer at Pine River	2009	2	Was 2-50 MVA transformers at Pine River
Construct new 138-kV bus and 138/69-kV 100 MVA transformer at Montrose Substation	2009	3	Renamed, was Sugar River
Construct new Montrose-Sun Valley-Oak Ridge 138-kV line	2009	3	Renamed, was Sugar River-Lincoln-SE Fitchburg
Install 1-8.16 MVAR capacitor bank at Boscobel 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2010	3	in-service year, was 2008, was Muscoda
Construct a second Dunn Road-Egg Harbor 69-kV line	2010	4	in-service year, was 2011; previously under existing right-of-way
Install a second 138/69-kV transformer at Janesville Substation	2011	3	Previously at McCue
Rebuild/Convert New Suamico-Pioneer 69-kV line to 138 kV	2015	4	Broken out separately from previous Pulliam-Pioneer project

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

New projects	In-service date	Planning zone	Need for project
Install 1-5.4 MVAR capacitor bank at Munising 69 kV	2006	2	Improve voltage profile
Install 1-5.4 MVAR capacitor bank at Sawyer 69 kV	2006	2	Improve voltage profile
Uprate Colley Road 138/69-kV transformer	2006	3	Improve reliability
Uprate North Monroe 138/69-kV transformer	2006	3	Improve reliability
Uprate Paddock-Shaw 69-kV line	2006	3	Improve reliability
Uprate Brodhead-South Monroe 69-kV line	2006	3	Improve reliability
Uprate McCue 138/69-kV transformer	2006	3	Improve reliability
Upgrade 48 MVA RTU and CT at Mullet River 138/69-kV	2006	4	Improve reliability
Construct Brandon-Fairwater 69-kV line	2007	1	T-D interconnection request
Install 2-8.16 MVAR capacitor banks at Ontonagon 138 kV	2007	2	Improve voltage profile
Uprate McCue-Janesville 69-kV line	2007	3	Improve reliability
Uprate Boxelder to Stonybrook 138-kV line	2007	3	T-D interconnection request
Replace the 1200 A breaker at Edgewater T22 345/138 kV	2007	4	Improve reliability
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2008	1	T-D interconnection request
Increase ground clearance of Atlantic-Osceola (Laurium #2) 69-kV line from 120 to 167 degrees F	2008	2	Improve reliability
Install 1-5.4 MVAR capacitor bank at L'Anse 69 kV	2008	2	Improve voltage profile
Install 2-8.16 MVAR capacitor banks at M38 69 kV	2008	2	Improve voltage profile
Install 2-5.4 MVAR capacitor banks at Osceola 69 kV	2008	2	Improve voltage profile
Uprate Atlantic 138/69-kV transformer	2008	2	Improve reliability

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

New projects (continued)	In-service Date	Planning zone	Need for project
Uprate North Appleton-Mason Street 138-kV line	2008	4	Accommodate new generation
Uprate North Appleton-Lost Dauphin 138-kV line	2008	4	Accommodate new generation
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Aspen	2008	1 & 2	Improve reliability
Relocate Iron River Substation (Iron Grove)	2008	1 & 2	Improve reliability
Uprate Rocky Run-Plover 115-kV line terminal equipment	2009	1	Improve reliability
Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69 kV	2009	2	Improve voltage profile
Install 1-5.4 MVAR capacitor bank at Roberts 69 kV	2009	2	Improve voltage profile
Install 4-25 MVAR capacitor banks at Portage 138 kV	2009	3	Improve voltage profile
Uprate Darlington-Rock Branch 69-kV line	2010	3	Improve reliability
Uprate existing 18 MVAR capacitor bank at Spring Green 138 kV with a 50 MVAR bank	2010	3	Improve voltage profile
Retap 48 MVA CT at South Sheboygan Falls 138/69-kV transformer	2010	4	Improve reliability
Uprate Yahara-Token Creek 69-kV line	2011	3	Improve reliability
Construct Evansville-Brooklyn 69-kV line	2011	3	Improve reliability
Uprate Northgate-20th Street 138-kV line	2011	4	Improve reliability
Replace the 400 amp metering CT at North Mullet River 69 kV	2011	4	Improve reliability
Install a 12.2 MVAR capacitor bank at Hilltop 69 kV	2012	1	Improve voltage profile
Uprate M38 138/69-kV transformer	2012	2	Improve reliability
Uprate Sun Prairie-Bird Street 69-kV line	2012	3	Improve reliability
Uprate North Monroe-Idle Hour 69-kV line	2012	3	Improve reliability
Install 138/69-kV transformer at Bass Creek	2012	3	Improve reliability

Table PR-23
Summary of Cancellations, Deferrals, Changes and New Projects to the 2005 10-Year Assessment (continued)

New projects (continued)	In-service Date	Planning zone	Need for project
Retap 400A primary CT at Edgewater to 600A	2012	4	Improve reliability
Uprate Port Edwards-Saratoga 138-kV line - Scope TBD	2013	1	Improve reliability
Replace the 300A current transformer at Sheboygan Falls 69 kV	2013	4	Improve reliability
Replace CTs at Racine 345-kV Substation	2013	5	Accommodate new generation
Increase McKenna 69-kV capacitor bank from 6.3 to 10.8 MVAR	2014	1	Improve voltage profile
Install 1-16.32 MVAR capacitor bank at Burke 69 kV	2014	3	Improve voltage profile
Install a second Femrite 138/69-kV transformer	2014	3	Improve reliability
Replace the Kilbourn 47 MVA 138/69-kV transformer with a 100 MVA unit	2014	3	Improve reliability
Uprate Colley Road to Park Street Tap 69-kV line to 114 MVA	2014	3	Improve reliability
Uprate the Melissa-Tayco line to 229 MVA (300F)	2014	4	Improve reliability
Replace the Colley Road 138/69-kV transformer	2015	3	Improve reliability

Table PR-24
Maintenance, Operations or Protection Projects over $0.5 Million (2006-2010)

Project description	System need year	In-service year	Initiated	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Wautoma breaker replacement	2006	2006	Maintenance	1	Poor condition	Planned	2.1
Whitcomb relay upgrades	2006	2006	Operation	1	Improve reliability	Planned	1.3
Port Edwards substation upgrades	2006	2006	Maintenance	1	Poor condition	Planned	1.2
Endeavor tap on Y17	2006	2006	Maintenance	1	Poor condition	Planned	1.0
Chaffee Creek-Kilbourn (Y100) lline	2006	2006	Maintenance	1	Poor condition	Planned	0.6
Nordic-Sagola line rebuild	2006	2006	Maintenance	2	Reliability, cascading, update	Planned	1.7
Nordic-Felch line rebuild	2006	2006	Maintenance	2	Reliability, cascading, update	Planned	1.5
Wood Structures – Zone 2 blanket	2006	2006	Maintenance	2	Poor condition	Provisional	1.0
Straits equipment removal	2006	2006	Maintenance	2	Poor condition	Planned	0.5
Empire relay replacement	2006	2006	Protection	2	Improve protection	Planned	0.6
Hillman-Nelson Dewey (X15) line repair	2006	2006	Maintenance	3	Equipment damage	Planned	2.2
Eden-Spring Green (X17) pole replacement	2006	2006	Maintenance	3	Poor condition	Planned	1.9
Eden-Nelsen Dewey (X16) pole replacement	2006	2006	Maintenance	3	Poor condition	Planned	1.8
Kirkwood-Spring Green (X18) line maintenance	2006	2006	Maintenance	3	Poor condition	Planned	1.0
Eden-Rock Branch (Y106) line rebuild	2006	2006	Maintenance	3	Poor condition	Planned	0.9
Colley Road substation upgrades	2006	2006	Maintenance	3	Poor condition	Provisional	0.6
Caroline substation upgrade	2006	2006	Operation	4	Improve reliability	Provisional	1.6
Tecumseh-Elkhart Lake line update	2006	2006	Maintenance	4	Poor condition	Planned	0.6
Crivitz - RTU	2006	2006	Protection	4	Improve reliability	Provisional	0.6
Bluemound breaker replacement	2006	2006	Maintenance	5	Poor condition	Proposed	0.7
Enbridge-Portage (Y17) line rebuild	2006	2006	Maintenance	1-3	Poor condition	Planned	1.4
Y17 double circuit construct	2006	2006	Maintenance	1-3	Poor condition	Planned	1.7
Spare 138/69-kV transformer	2006	2006	Maintenance	-	Improve availability	Planned	0.9
Montello-Wautoma (Y17) line rebuild	2007	2007	Maintenance	1	Poor condition	Planned	3.9
Rozelleville-Sigel (Y107) line rebuild	2007	2007	Maintenance	1	Poor condition	Planned	3.5
RTU -Zone 1 blanket	2007	2007	Protection	1	Improve reliability	Provisional	1.8

Table PR-24
Maintenance, Operations or Protection Projects over $0.5 Million (2006-2010)

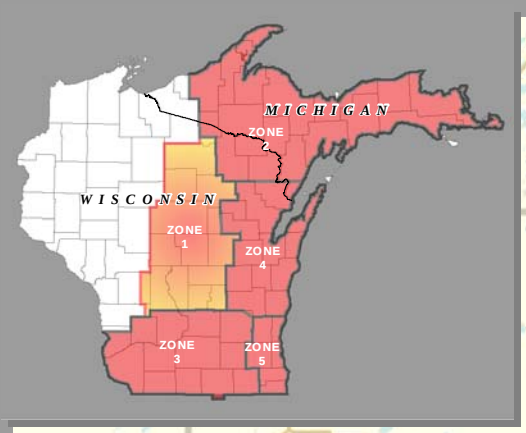
Project description	System need year	In-service year	Initiated	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Relay improvements - Zone 1 blanket	2007	2007	Maintenance	1	Improve protection	Provisional	1.0
Montello breaker replacement	2007	2007	Maintenance	1	Poor condition	Planned	0.6
Iola breaker replacement	2007	2007	Maintenance	1	Poor condition	Provisional	0.6
Laurium-Franklin 69-kV line rebuild	2007	2007	Maintenance	2	Poor condition	Planned	3.1
Laurium-Osceola 69-kV line rebuild	2007	2007	Maintenance	2	Poor condition	Planned	2.2
Laurium-Adams 69-kV line rebuild	2007	2007	Maintenance	2	Poor condition	Planned	1.5
Laurium-Hancock 69-kV line rebuild	2007	2007	Maintenance	2	Poor condition	Planned	1.4
Wood structures - Zone 2 blanket	2007	2007	Maintenance	2	Poor condition	Provisional	0.8
Relay improvements - Zone 2 blanket	2007	2007	Maintenance	2	Improve protection	Provisional	0.8
Cedar substation removal	2007	2007	Maintenance	2	Poor condition	Planned	0.7
Breaker improvements - Zone 2 blanket	2007	2007	Maintenance	2	Poor condition	Provisional	0.5
Oregon-Verona (Y119) line rebuild	2007	2007	Maintenance	3	Poor condition	Planned	3.5
Spring Green-Stagecoach (Y62) line rebuild	2007	2007	Maintenance	3	Poor condition	Planned	3.2
Mount Horeb-Rock Branch (Y135) line rebuild	2007	2007	Maintenance	3	Poor condition	Planned	2.3
Boscobel-Lone Rock (Y124) line rebuild	2007	2007	Maintenance	3	Poor condition	Planned	2.1
Dam Height-Dane (Y8) line rebuild	2007	2007	Maintenance	3	Poor condition	Planned	1.0
RTU -Zone 4 blanket	2007	2007	Protection	4	Improve reliability	Provisional	2.1
North Fond du Lac relay upgrades	2007	2007	Protection	4	Improve protection	Planned	1.3
Elkhart Lake-Random Lake line reinsulated	2007	2007	Maintenance	4	Poor condition	Planned	1.0
Breaker improvements - Zone 4 blanket	2007	2007	Maintenance	4	Poor condition	Provisional	0.5
Relay improvements - Zone 4 blanket	2007	2007	Maintenance	4	Improve protection	Provisional	0.5
Relay improvements - Zone 5 blanket	2007	2007	Protection	5	Improve protection	Provisional	0.7
Breaker improvements - Zone 5 blanket	2007	2007	Maintenance	5	Poor condition	Provisional	0.8
RTU -Zone 5 blanket	2007	2007	Protection	5	Improve reliability	Provisional	0.8

Table PR-24
Maintenance, Operations or Protection Projects over $0.5 Million (2006-2010)

Project description	System need year	In-service year	Initiated	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Switch improvements - Zone 5 blanket	2007	2007	Maintenance	5	Poor condition	Provisional	0.6
Breaker improvements - blanket	2007	2007	Maintenance	-	Poor condition	Provisional	1.0
Relay improvements - West blanket	2007	2007	Protection	-	Improve protection	Provisional	1.0
Substation improvements - blanket	2007	2007	Maintenance	-	Poor condition	Provisional	0.7
Chaffee Creek-Hancock (Y90) line rebuild	2008	2008	Maintenance	1	Poor condition	Planned	3.2
Relay improvements - Zone 1 blanket	2008	2008	Protection	1	Improve protection	Provisional	0.5
Breaker improvements - Zone 2 blanket	2008	2008	Maintenance	2	Poor condition	Provisional	0.5
Wood structures - Zone 2 blanket	2008	2008	Maintenance	2	Poor condition	Provisional	0.8
Relay improvements - Zone 2 blanket	2008	2008	Maintenance	2	Improve protection	Provisional	0.5
Relay improvements - Zone 4 blanket	2008	2008	Protection	4	Improve protection	Provisional	1.2
Random Lake-Saukville line reinsulate	2008	2008	Maintenance	4	Poor condition	Planned	1.0
Breaker improvements - Zone 4 blanket	2008	2008	Maintenance	4	Poor condition	Provisional	0.5
Breaker improvements - Zone 5 blanket	2008	2008	Maintenance	5	Poor condition	Provisional	0.8
Relay improvements - Zone 5 blanket	2008	2008	Protection	5	Improve protection	Provisional	0.7
Switch improvements - Zone 5 blanket	2008	2008	Maintenance	5	Poor condition	Provisional	0.7
RTU -Zone 5 blanket	2008	2008	Protection	5	Improve reliability	Provisional	0.5
Breaker improvements - blanket	2008	2008	Maintenance	-	Poor condition	Provisional	1.0
Relay improvement - West blanket	2008	2008	Protection	-	Improve protection	Provisional	1.0
Substation improvements - blanket	2008	2008	Maintenance	-	Poor condition	Provisional	0.7
Relay improvements - Zone 1 blanket	2009	2009	Protection	1	Improve protection	Provisional	0.5
Breaker improvements - Zone 2 blanket	2009	2009	Maintenance	2	Poor condition	Provisional	0.5
Wood structures - Zone 2 blanket	2009	2009	Maintenance	2	Poor condition	Provisional	0.8
Relay improvements - Zone 2 blanket	2009	2009	Maintenance	2	Improve protection	Provisional	0.5
Relay improvements - Zone 4 blanket	2009	2009	Protection	4	Improve protection	Provisional	1.1

Table PR-24
Maintenance, Operations or Protection Projects over $0.5 Million (2006-2010)

Project description	System need year	In-service year	Initiated	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Breaker improvements - Zone 4 blanket	2009	2009	Maintenance	4	Poor condition	Provisional	0.6
Switch improvements - Zone 5 blanket	2009	2009	Maintenance	5	Poor condition	Provisional	0.9
Breaker improvements - Zone 5 blanket	2009	2009	Maintenance	5	Poor condition	Provisional	0.8
Relay improvements - Zone 5 blanket	2009	2009	Protection	5	Improve reliability	Provisional	0.8
RTU -Zone 5 blanket	2009	2009	Protection	5	Improve protection	Provisional	0.5
Breaker improvements - blanket	2009	2009	Maintenance	-	Poor condition	Provisional	1.0
Relay improvement - west blanket	2009	2009	Protection	-	Improve protection	Provisional	1.0
Substation improvements - blanket	2009	2009	Maintenance	-	Poor condition	Provisional	0.7
Relay improvements - Zone 1 blanket	2010	2010	Protection	1	Improve protection	Provisional	0.5
Breaker improvements - Zone 2 blanket	2010	2010	Maintenance	2	Poor condition	Provisional	0.5
Wood structures - Zone 2 blanket	2010	2010	Maintenance	2	Poor condition	Provisional	0.8
Relay improvements - Zone 2 blanket	2010	2010	Maintenance	2	Improve protection	Provisional	0.6
Breaker improvements - Zone 4 blanket	2010	2010	Maintenance	4	Poor condition	Provisional	0.6
Relay Improvements - Zone 4 blanket	2010	2010	Protection	4	Improve protection	Provisional	1.1
Breaker Improvements - Zone 5 blanket	2010	2010	Maintenance	5	Poor condition	Provisional	0.8
Relay Improvements - Zone 5 blanket	2010	2010	Protection	5	Improve protection	Provisional	0.8
RTU -Zone 5 blanket	2010	2010	Protection	5	Improve reliability	Provisional	0.5
Inland 69 kV line rebuild	2010	2010	Maintenance	-	Poor condition	Strategic	11.1
Breaker improvements - blanket	2010	2010	Maintenance	-	Poor condition	Provisional	1.0
Relay improvement - west blanket	2010	2010	Protection	-	Improve protection	Provisional	1.0
Substation improvements - blanket	2010	2010	Maintenance	-	Poor condition	Provisional	0.7



Iron River
Florence
Vilas
Iron
Oneida
Forest
Price
Rusk
Taylor
Lincoln
Langlade
Marinette
Skanawan SW STA
Fox Hills SW STA
Bunker Hill SW STA
Blackbrook SW STA
Chippewa
Oconto
Menominee
Wien SW STA
Marathon
Shawano
Whitcomb
Morgan
Caroline
Badger
Eau Claire
Clark
Brown
Arpin
Rocky Run
Sigel
Wood
Portage
Waupaca
Coyne SW STA
West Wisconsin Rapids
Outagamie
Fox River SW YD
Jackson
Sand Lake
Waushara
Petenwell
Winnebago
Calumet
Fitzgerald
Tecumseh Rd
Forest Junction
Adams
Chaffee Creek
Lincoln Pump STA
Mckenna
Monroe
La Crosse
Juneau
Castle Rock
Marquette
Green Lake
Green Lake SW STA
Metomen
Ohmstead
Fond du Lac
Sheboygan
Vernon
North Randolph
Artesian
Columbia
Kirkwood
Sauk
Dodge
Richland
Crawford
Academy
Washington

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

PLANNING ZONE 1

AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

- 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

- ATC Owned Substation
- Joint Owned Substation - Assets Conveyed
- Joint Owned Substation - Assets Retained
- Proposed/Design/Construction
- ATC Office Location
- Generation
- Other Facility

Figure PR-2

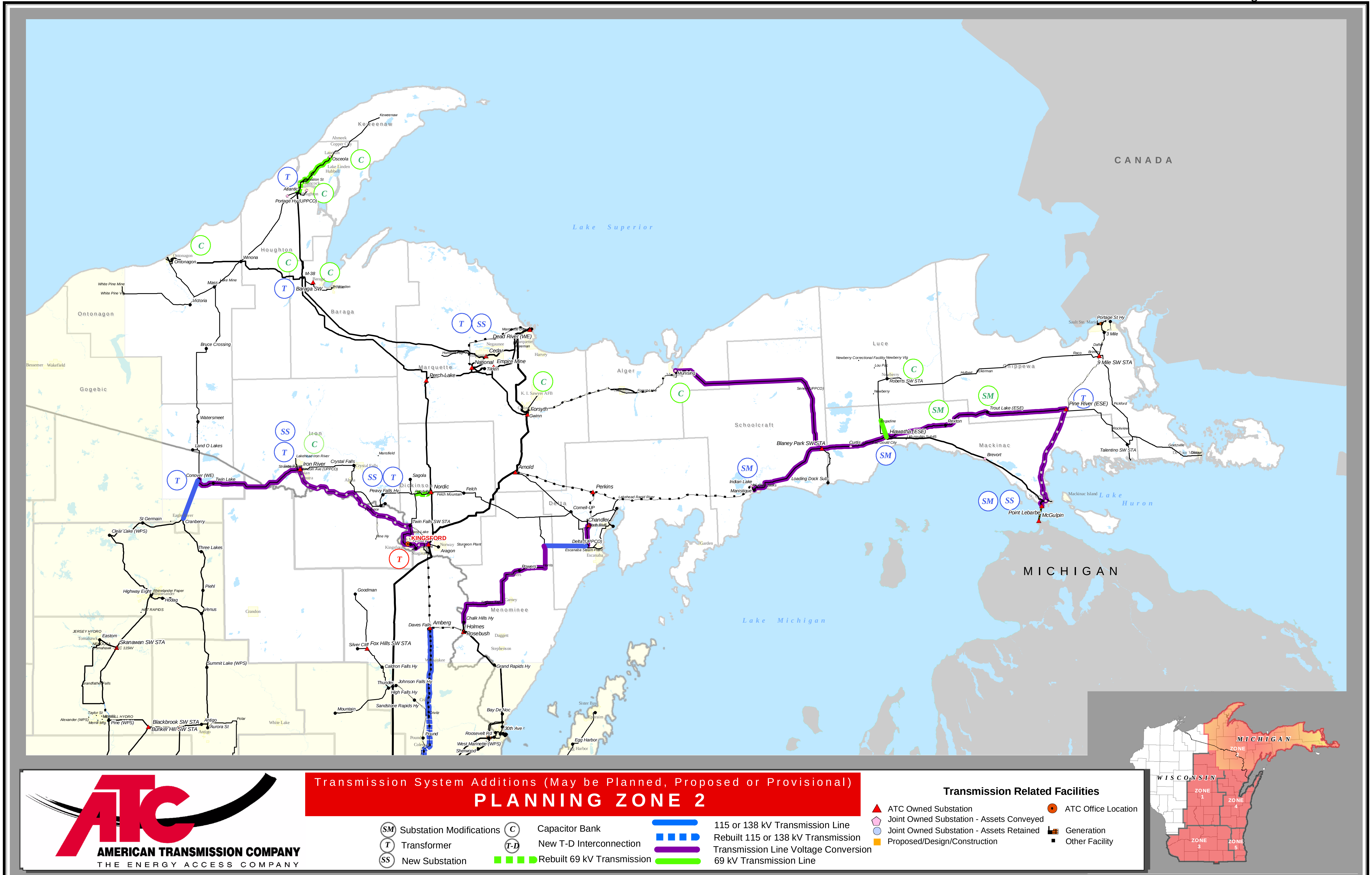
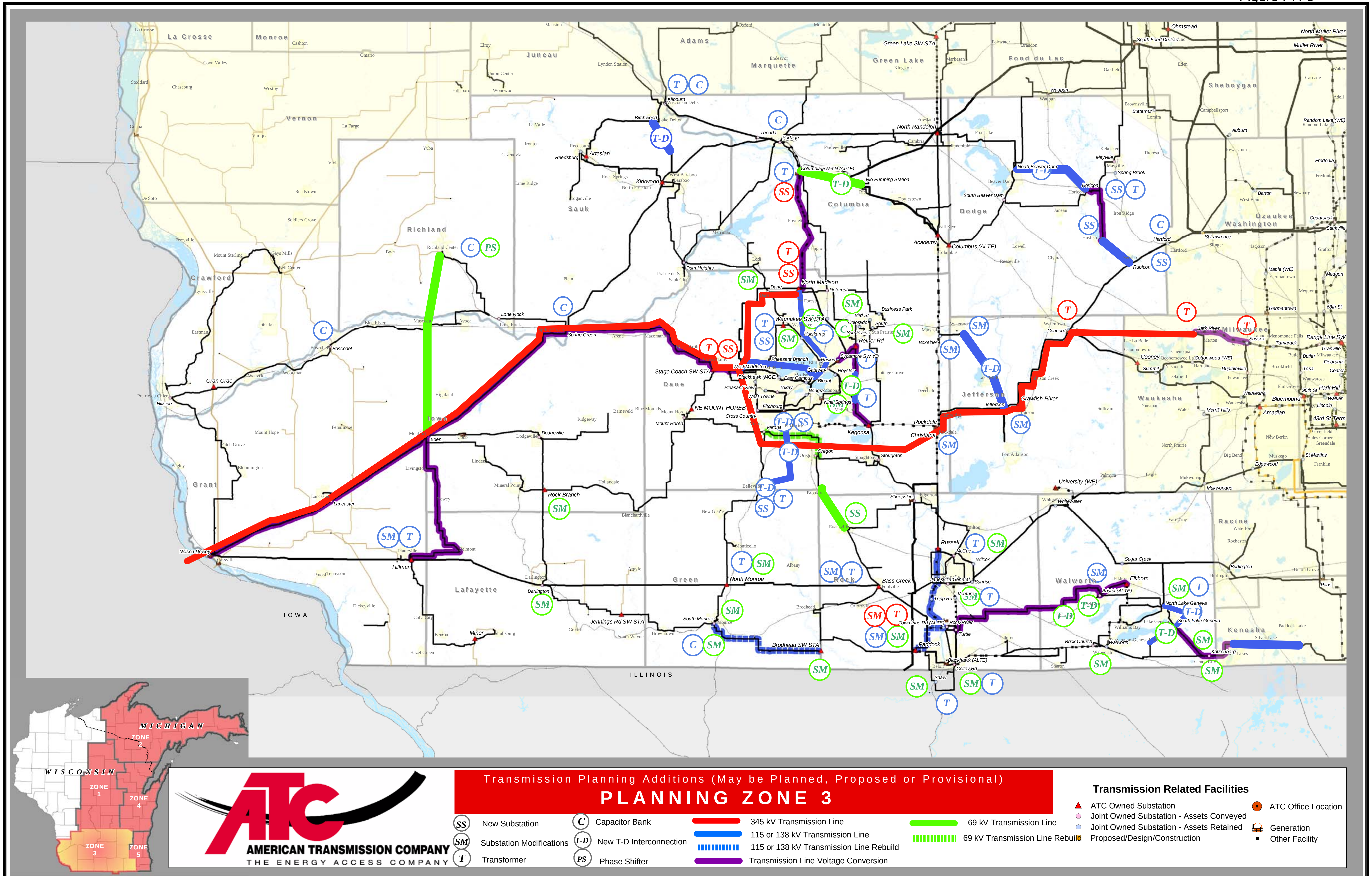
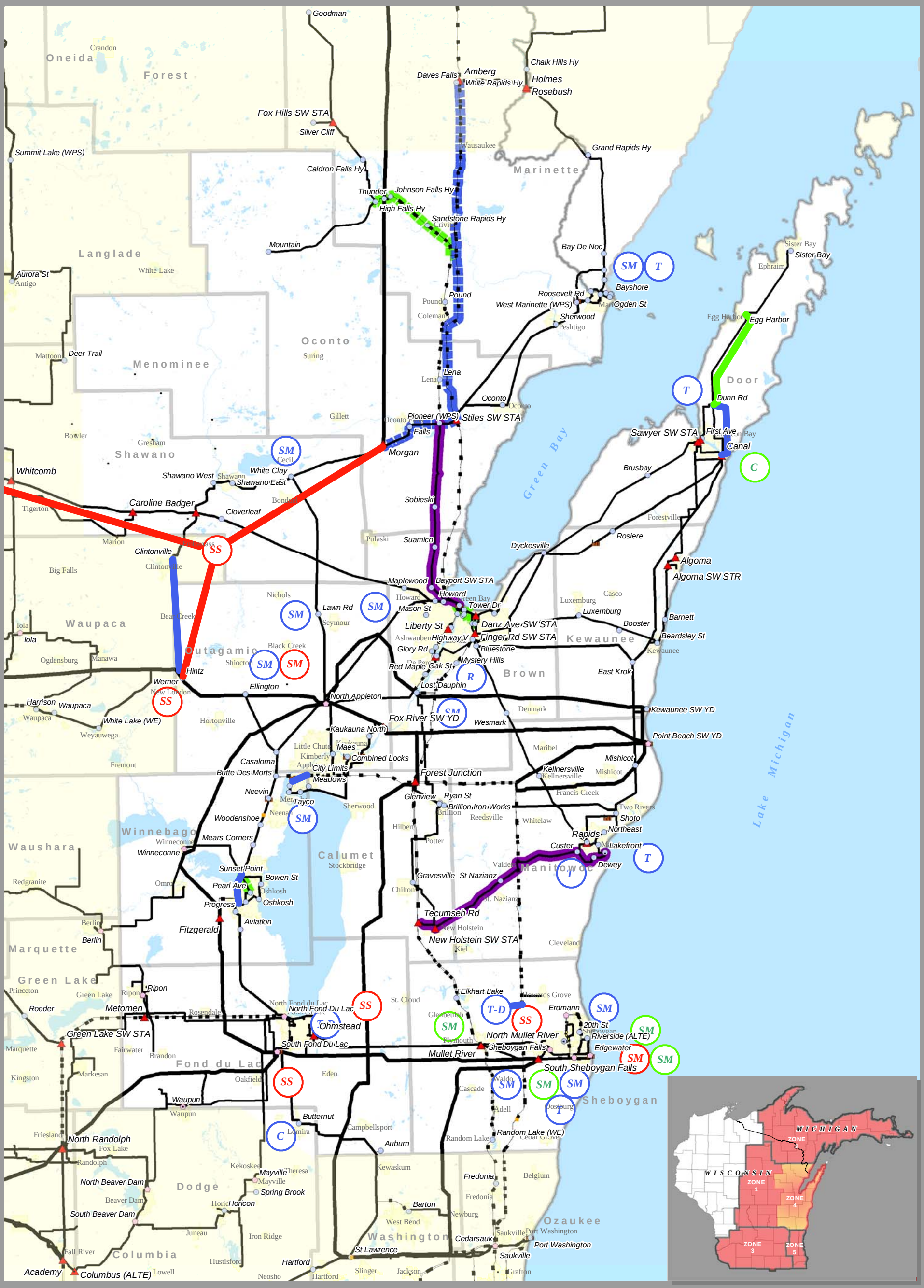

Transmission System Additions (May be Planned, Proposed or Provisional)
PLANNING ZONE 2
AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY
SM Substation Modifications
T Transformer
SS New Substation
C Capacitor Bank
T-D New T-D Interconnection
Rebuilt 69 kV Transmission
115 or 138 kV Transmission Line
Rebuilt 115 or 138 kV Transmission
Transmission Line Voltage Conversion
69 kV Transmission Line
Transmission Related Facilities
ATC Owned Substation
Joint Owned Substation - Assets Conveyed
Joint Owned Substation - Assets Retained
Proposed/Design/Construction
ATC Office Location
Generation
Other Facility
CANADA
MICHIGAN
WISCONSIN
Lake Superior
Lake Michigan
Lake Huron
ZONE 1
ZONE 2
ZONE 3
ZONE 4
ZONE 5
Keweenaw
Houghton
Ontonagon
Gogebic
Baraga
Marquette
Iron
Dickinson
Alger
Schoolcraft
Delta
Menominee
Luce
Mackinac
Chippewa
KINGSFORD

Figure PR-3



Zone3 11x17.mxd Modified: January 14, 2005



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

PLANNING ZONE 4

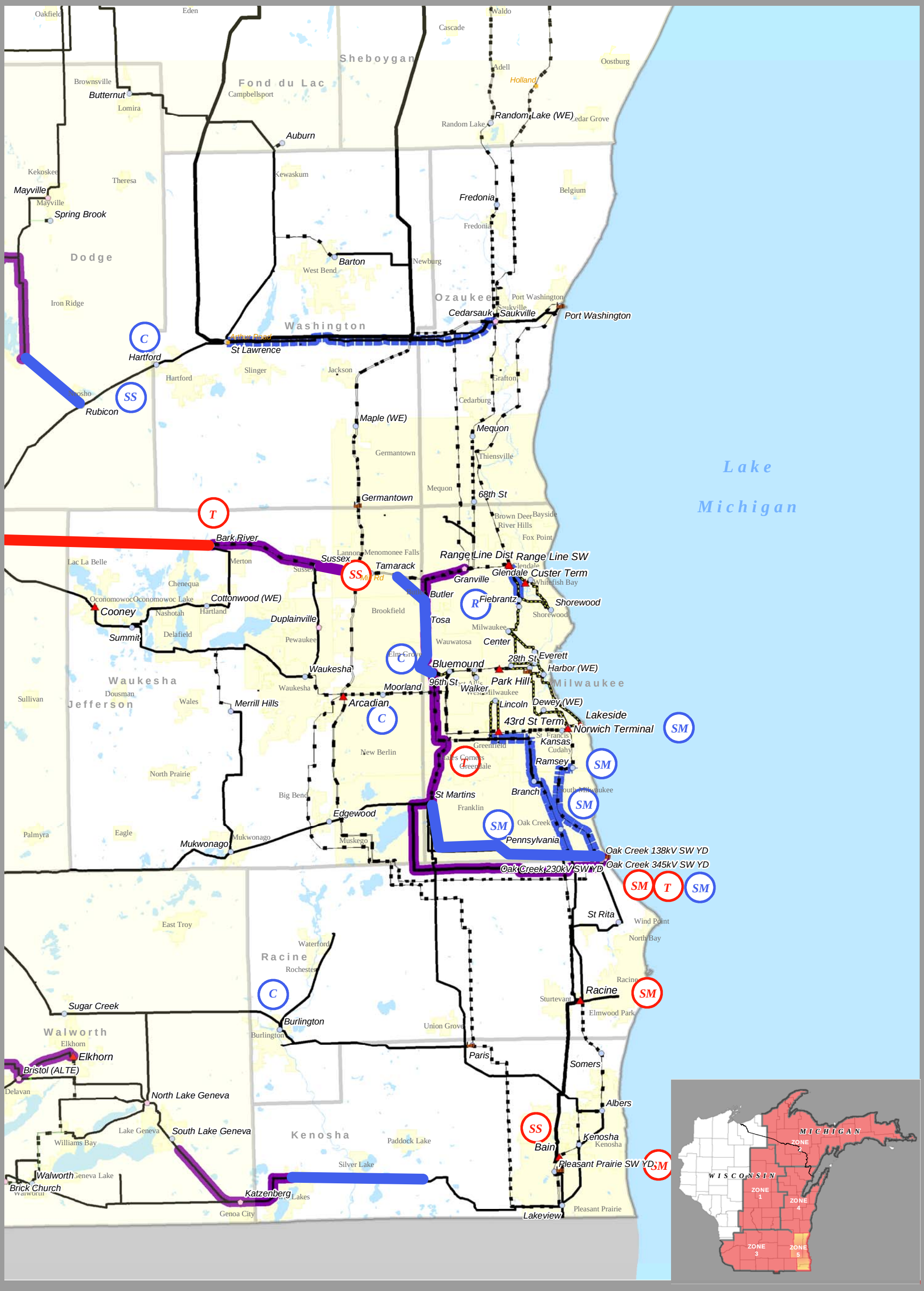
AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

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

- ATC Owned Substation
- Joint Owned Substation - Assets Conveyed
- Joint Owned Substation - Assets Retained
- Proposed/Design/Construction
- ATC Office Location
- Generation
- Other Facility



AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

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

- ATC Owned Substation
- Joint Owned Substation - Assets Conveyed
- Joint Owned Substation - Assets Retained
- Proposed/Design/Construction
- ATC Office Location
- Generation
- Other Facility

Projects > 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
- construction of the Gardner Park (Weston) 345/115-kV substation
- conversion of the Columbia-North Madison 138-kV to 345-kV operation

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.

Table PR-25
Projects In Design or Construction

Project	Zone
Install 16.3 MVAR capacitor banks at Council Creek 138-kV	1
Reconductor Wien-McMillan 115-kV line (ATC,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 new Gardner Park 345/115-kV Substation	1
Construct Hiawatha-Engadine 69-kV line	2
Rebuild from Nordic to Randville substation single-circuit 69-kV line to double-circuit 69 kV	2
Rebuild and convert one Hiawatha-Indian Lake 69-kV circuit to double circuit 138 kV standards, string one circuit initially and operate at 69 kV	2
Uprate Sun Prairie to Gaston Road 69-kV line to 48 MVA	3
Uprate Colorado to Sun Prairie 69-kV line to 72 MVA	3
Uprate Dane to Waunakee and Waunakee to Huiskamp 69-kV lines	3
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	3
Reconfigure 345-kV bus at Columbia	3
Convert Columbia-North Madison 138-kV line to 345 kV	3
Construct North Appleton double-breaker ring bus configuration	4
Uprate the North Appleton-Rocky Run 345-kV line	4
Construct a 345-kV switching station at new Sheboygan Energy Center; loop existing Point Beach-Granville line into new Sheboygan Energy Center	4
Install 2-27 MVAR capacitor banks at Moorland 138-kV	5

PROJECTS > Approved

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

The most notable projects in this category are the construction of the Werner West 345/138-kV Substation and the Femrite-Sprecher 138-kV line.

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

Project	Zone
Construct North Beaver Dam-East Beaver Dam 138-kV line	3
Construct Sprecher-Femrite 138-kV line	3
Rebuild Turtle-Bristol 69-kV line to 138 kV and operate at 69 kV	3
Construct Werner West 345/138-kV substation	4

PROJECTS > Pending approval

Transmission projects that are pending a certificate of authority or a certificate of public convenience and necessity approval from the Public Service Commission of Wisconsin are listed in Table PR-27.

Notable projects include:

- construction of the Gardner Park-Central Wisconsin 345-kV line
- construction of the Cranberry-Conover 115-kV line and the rebuild/conversion of Conover-Plains to 138-kV operation

Table PR-27
Projects Awaiting Regulatory Review/Approval

Project	Zone
Construct Gardner Park-Central Wisconsin 345-kV line	1
Rebuild Weston-Sherman Street-Hilltop 115-kV line to double-circuit 115 kV	1
Construct Venus-Metonga 115-kV line	1
Construct Cranberry-Conover 115-kV line and rebuild/convert Conover-Plains 69-kV to 138 kV	1 & 2
Construct Jefferson-Stony Brook 138-kV line	3
Construct new line from West Darien to Southwest Delavan at 138 kV, operate at 69 kV	3
Construct Morgan-Werner West 345-kV line and Werner West-Clintonville 138-kV line	4

PROJECTS > Costs

The estimated capital costs for all of the projects reflected in Figure PR-6 are shown in Figure PR-7 This figure shows that the combined capital costs for projects that are completed, canceled, replaced, in licensing and under construction account for roughly 56 percent of the estimated total capital costs, with future projects accounting for the remaining 44 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 2005 10-Year Assessment is approximately $2.4 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 2005 10-Year Assessment, made up the remaining $1 billion of the $3.4 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 $2.4 billion, or about $300 million greater than the 2004 Assessment Update estimate.

Figure PR-6

American Transmission Company - Number of Projects by Status
10-Year Assessments 2001-2005
Planned, Proposed and Provisional Projects

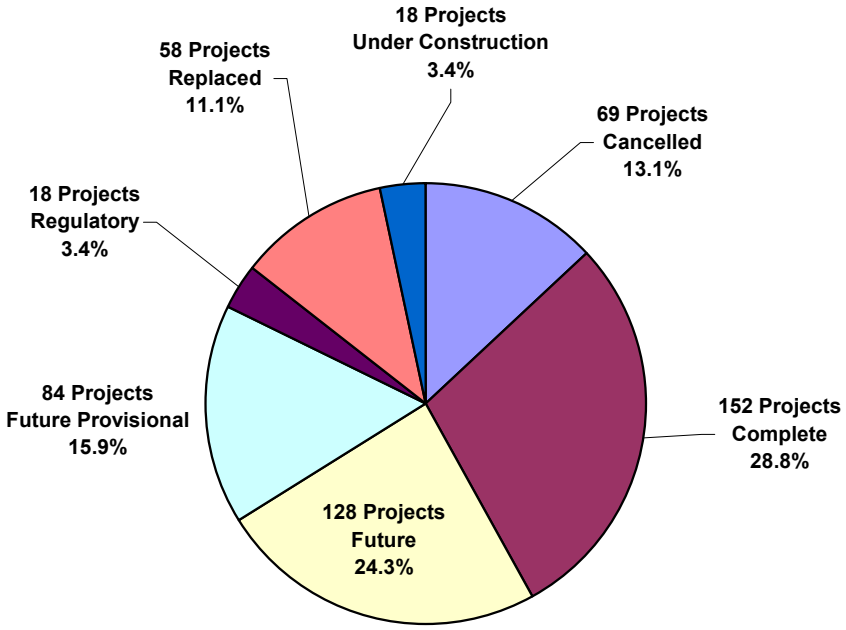
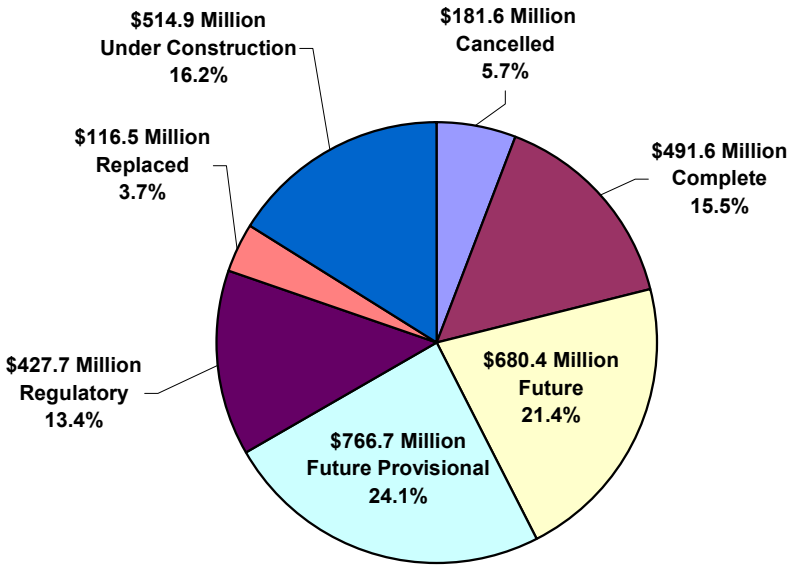


Figure PR-7

American Transmission Company - Cost of Projects by Status
10-Year Assessments 2001-2005
Planned, Proposed and Provisional Projects



PROJECTS > Transfer capability

2006 analysis

We conducted cursory transfer capability analyses to provide a relative indication of the simultaneous transfer capability into the ATC system in 2006, 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 2006 or before. This calculation also assumes the base case power transactions throughout the eastern interconnection system that were in the 2006 model discussed in Methodology & Assumptions. The summary of this analysis is shown in Figures PR-8 and PR-8a (ATC limiting elements only).

In Figures PR-8 and PR-8a, the red box inside the shaded area represents the base transfers modeled in the 2006 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 1,000-MW transfer from the west, the maximum transfer achievable from the south is 1,550 MW, or a total transfer capability of 2,550 MW.

It is important to note that the simultaneous transfer capability depicted in Figures PR-8 and PR-8a 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 2,500 MW to 2,600 MW, depending on the bias of the transfers. The most limiting element for transfers from the west is the Eau Claire-Presto-Wheaton 161-kV for outage of the Tremval-Alma 161-kV line, which limits transfers from the west to about 1,150 MW. The most limiting element for transfers from the south is the Turkey River-Cassville 161-kV line for outage of the Seneca-Genoa 161-kV line, which limits transfers from the south to about 2,600 MW.

The ATC limiting elements only transfer capability graph in Figure PR-8a shows that the transfer capability ranges from about 3,200 MW to about 4,200 MW, depending on the bias of the transfers. The most limiting element for transfers from the west is the Eau Claire-

Arpin 345-kV flow limit, which limits transfers from the west to about 2,000 MW. The most limiting element for transfers from the south is the Paris-Raymond-St. Martins 138-kV line for the outage of the Pleasant Prairie-Racine 345-kV line, which limits transfers from the south to about 2,700 MW.

2010 analysis

We conducted transfer capability analysis to provide a relative indication of the simultaneous transfer capability into the ATC system in 2010 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 2010 or before, most notably the Arrowhead-Gardner Park (Weston) project. The summary of that analysis is shown in Figures PR-9 and PR-9a (ATC Limits only)**.**

In Figure PR-9 and Figure PR-9a, the red box inside the shaded area represents the base transfers modeled in the 2010 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 450-MW transfer from the west, the maximum transfer achievable from the south is 2,200 MW, or a total transfer capability of 2,650 MW.

The simultaneous transfer capability depicted in Figures PR-9 and PR-9a 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 2,250 MW and the maximum transfer from the west is about 450 MW. The most limiting element for transfers from the west is the Hazelton-Dundee 161-kV line for outage of the Rock Creek-Quad Cities 345-kV line, limiting transfers from the west to about 450 MW. The most limiting element for transfers from the south is the Arcadian-Mill Road 345-kV line for outage of the Wempletown-Rockdale 345-kV line, limiting transfers from the south to about 2,250 MW. The maximum simultaneous transfer capability is approximately 2,000 MW.

The ATC limiting elements only transfer capability graph in Figure PR-9a shows that the maximum transfer from the south is about 2,200 MW, the maximum transfer from the west is about 2350 MW and the maximum simultaneous transfer capability is about 3,400 MW.

The most limiting element for transfers from the west is the Eau Claire-Arpin 345-kV flow limit, limiting transfers from the west to about 2350 MW. The most limiting elements for transfers from the south is the Arcadian-Mill Road 345-kV line for outage of the Wempletown-Rockdale 345-kV line, limiting transfers from the south to about 2,200 MW.

After thorough study, it was determined that the transmission system and generation mix external to the ATC system is primarily responsible for the decrease of 500 MW between the 2006 and the 2010 planning models. Changes applied to the transmission system and generation mix external to our footprint are responsible for approximately 95 percent of this decrease, with the remaining percentage due to the increased load and generation mix applied to the 2010 model compared to the 2006 model along with internal ATC transmission changes.

Table PR-2
Transmission System Additions for 2005

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct new Eagle River Muni distribution Substation directly adjacent to the existing Cranberry 115-kV Substation	2005	2005	1	T-D interconnection	Planned	1.9
Uprate North Lake Geneva to Lake Geneva 69-kV line to 72 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Brick Church to Walworth 69-kV line to 48 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Brick Church to Katzenberg 69-kV line to 93 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Sun Prairie to Gaston Road 69-kV line to 48 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Colorado to Sun Prairie 69-kV line to 72 MVA	2004	2005	3	reliability	Proposed	0.1
Uprate Dane to Waunakee and Waunakee to Huiskamp 69-kV lines	2004	2005	3	reliability	Proposed	0.7
Uprate the North Appleton-Rocky Run 345-kV line	2005	2005	4	reliability	Planned	1
Construct a 138-kV substation at a new Forward Energy Center; loop existing Butternut-South Fond du Lac line into Forward Energy Center	2005	2005	4	new generation	Planned	3.2
Install 2-27 MVAR capacitor banks at Moorland 138 kV	2004	2005	5	reliability	Planned	1.1

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 2006

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install 2-8.16 MVAR capacitor banks at Council Creek 138 kV	2005	2006	1	reliability	Planned	2.3
Reconductor Wien-McMillan 115-kV line (ATC,MEWD)	2006	2006	1	reliability	Planned	3.4
Reconductor Weston-Northpoint 115-kV line	2005	2006	1	achieve transfer capability associated with Arrowhead-Gardner Park, reliability, new generation	Planned	5.5
Construct new Gardner Park 345/115-kV Substation	2006	2006	1	service limitation, reliability, import capability & Weston stability	Planned	Included in Arrowhead-Gardner Park estimate
Replace 345/115-kV 200 MVA transformer at Weston with two 500 MVA units at the Gardner Park Substation	2005	2006	1	service limitation, reliability, import capability & Weston stability	Planned	Included in Arrowhead-Gardner Park estimate
Construct Gardner Park-Stone Lake 345-kV line	1997	2006	1	service limitation, reliability, import capability & Weston stability	Planned	262.1
Install 3-50 MVAR capacitor banks at Gardner Park 115 kV	2006	2006	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	Included in Arrowhead-Gardner Park estimate
Install a 345/161-kV transformer at Stone Lake (temporary installation for construction outages)	2006	2006	1	reliability	Planned	Included in Arrowhead-Gardner Park estimate
Upgrade Weston-Kelly 115-kV line conductor clearances to 300F	2006	2006	1	new generation, reliability	Planned	1

Table PR-3
Transmission System Additions for 2006 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Increase size of existing Summit Lake 115-kV capacitor bank from 11.3 to 16.9 MVAR	2006	2006	1	reliability	Planned	1
Install 1-5.4 MVAR capacitor bank at Munising 69 kV	2006	2006	2	reliability	Proposed	0.4
Install 1-5.4 MVAR capacitor bank at Sawyer 69 kV	2006	2006	2	reliability	Proposed	0.9
Construct Hiawatha-Engadine 69-kV line	2003	2006	2	reliability	Planned	0
Rebuild and convert one Hiawatha-Indian Lake 69-kV circuit to double-circuit 138-kV standards, string two circuits initially and operate one at 69 kV	2004	2006	2	reliability, service limitation	Planned	44.2
Install 2-8.16 MVAR capacitor banks at Lincoln 69 kV	2006	2006	2	reliability	Proposed	1.1
Rebuild from Nordic to Randville Substation (5 miles) of single-circuit 69-kV line to double-circuit 69 kV	2005	2006	2	reliability, condition	Planned	5.2
Reconnect the 138/69-kV transformers at Kilbourn on separate breakers to operate individually	2006	2006	3	reliability	Provisional	0.3
Construct Butler Ridge 138-kV Substation	2006	2006	3	new generation	Planned	2.8
Install 36 MVAR capacitor bank at Hartford 138-kV Substation	2006	2006	3	reliability	Planned	1.2
Uprate Colley Road 138/69-kV transformer	2006	2006	3	reliability	Proposed	0.1
Uprate North Monroe 138/69-kV transformer	2006	2006	3	reliability	Proposed	0
Uprate Paddock-Shaw 69-kV line	2006	2006	3	reliability	Proposed	0
Uprate Brodhead-South Monroe 69-kV line	2006	2006	3	reliability	Provisional	0.1
Uprate McCue 138/69-kV transformer	2006	2006	3	reliability	Proposed	0.1

Table PR-3
Transmission System Additions for 2006 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct new 69-kV line from Columbia to Rio to feed the proposed Wyocena Substation	2004	2006	3	T-D interconnection, reliability	Planned	5
Rebuild Turtle-Bristol 69-kV line to 138 kV and operate at 69 kV	2004	2006	3	condition, reliability, new generation	Planned	5.9
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	2006	2006	3	reliability, new generation	Planned	17.7
Reconfigure 345-kV bus at Columbia	2006	2006	3	reliability, new generation	Planned	2.5
Convert Columbia-North Madison 138-kV line to 345 kV	2005	2006	3	reliability, new generation	Planned	6
Construct new line from West Darien to Southwest Delavan at 138 kV, operate at 69 kV	2006	2006	3	T-D interconnection	Planned	4
Install a 138-kV series reactor at Highway V	2005	2006	4	reliability, service limitation, T-D interconnection	Planned	1.4
Upgrade 48 MVA RTU and CT at Mullet River 138/69 kV	2006	2006	4	reliability	Proposed	0
Construct a 345-kV substation at new Cypress; loop existing Forest Junction-Arcadian line into new Cypress	2006	2006	4	new generation	Planned	5.1
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	14.3

Table PR-3
Transmission System Additions for 2006 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct a Martin Road-South Fond du Lac/Ohmstead 138-kV line	2006	2006	4	T-D interconnection	Planned	1.6
Construct North Appleton 345-kV double breaker ring bus configuration	2006	2006	4	operations, maintenance and stability	Planned	8.4
Install 2-27 MVAR capacitor banks at Burlington 138 kV	2005	2006	5	reliability	Proposed	1.6
Rebuild Stiles-Amberg double-circuit 138-kV line	1996	2006	2 & 4	reliability, service limitation, condition	Planned	45.8

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 2007

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Uprate Metomen-North Fond du Lac 69-kV line terminal equipment	2006	2007	1	reliability	Planned	0.2
Install 2-16.3 MVAR capacitor banks at Wautoma 138 kV	2007	2007	1	reliability	Proposed	1.2
Construct Venus-Metonga 115-kV line	2007	2007	1	T-D interconnection	Planned	8
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	Proposed	7.3
Construct Brandon-Fairwater 69-kV line	2007	2007	1	T-D interconnection	Provisional	0.6
Construct Mackinac 138-kV Substation (new Straits Substation)	2005	2007	2	reliability, service limitation	Proposed	5.8
Relocate Cedar Substation (North Lake)	2005	2007	2	reliability, condition	Proposed	7.3
Relocate Brule Substation (Aspen)	2007	2007	2	reliability, condition	Proposed	5.7
Install 2-8.16 MVAR capacitor banks at Ontonagon 138 kV	2007	2007	2	reliability	Proposed	1.2
Uprate McCue-Janesville 69-kV line	2007	2007	3	reliability	Proposed	0
Rebuild the Verona to Oregon 69-kV line Y119	2006	2007	3	reliability	Proposed	3.8
Uprate Rockdale to Jefferson 138-kV line	2007	2007	3	reliability, service limitation	Planned	0.2
Uprate Rockdale to Boxelder 138-kV line	2007	2007	3	reliability, service limitation	Planned	0.2
Uprate Boxelder to Stonybrook 138-kV line	2007	2007	3	reliability, service limitation	Planned	0.2
Construct a Jefferson-Lake Mills-Stony Brook 138-kV line	2006	2007	3	reliability, T-D interconnection	Proposed	19.7
Convert Kegonsa-McFarland-Femrite 69-kV line to 138 kV	2007	2007	3	reliability, new generation	Proposed	3.4
Construct Sprecher-Femrite 138-kV line	2007	2007	3	reliability, new generation	Proposed	8.1
Install 138/69-kV transformer at Femrite	2007	2007	3	reliability, new generation	Proposed	3.4

Table PR-4
Transmission System Additions for 2007 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install 138/69-kV transformer at Reiner	2007	2007	3	reliability, new generation	Proposed	3.4
Convert Sycamore-Reiner-Sprecher from 69-kV to 138 kV	2007	2007	3	reliability	Proposed	2.5
Install/upgrade capacitor bank at South Monroe 69 kV to 32 MVAR	2007	2007	3	reliability	Proposed	1.1
Construct new line from Southwest Delavan to Delavan or Bristol at 138 kV, operate at 69 kV	2007	2007	3	T-D interconnection	Proposed	4.3
String a new Ellinwood-Sunset Point 138-kV line on existing structures	2007	2007	4	reliability	Provisional	2.5
Install 2-16.3 MVAR capacitor bank at Canal 69 kV	2007	2007	4	reliability	Planned	1.8
Replace the 1200 A breaker at Edgewater T22 345/138 kV	2007	2007	4	reliability	Proposed	0.3
Construct double-circuit 138-kV line from Forest Junction/Howards Grove/Charter Steel to Plymouth #4	2007	2007	4	T-D interconnection	Proposed	2.5
Uprate North Appleton-Lawn Road-White Clay 138-kV line	2007	2007	4	reliability	Planned	0.6
Construct a 345-kV bus at Bain	2005	2007	5	reliability	Provisional	2.1
Install 200 MVAR capacitor bank at Bluemound	2007	2007	5	reliability	Provisional	3.3
Install series reactor at Cornell	2007	2007	5	reliability	Proposed	0.8

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 2008

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct a 69-kV line from SW Ripon to the Ripon-Metomen 69-kV line	2008	2008	1	T-D interconnection	Provisional	0.6
Upgrade Kelly-Whitcomb 115-kV line conductor clearances to 300F	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	1.9
Construct Stone Lake-Arrowhead 345-kV line	1997	2008	1	service limitation, reliability, import capability & Weston stability	Planned	158.2
Install 2-75 MVAR capacitor banks at Arrowhead 345 kV	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	Included in Arrowhead-Gardner Park estimate
Install 1-75 MVAR capacitor bank and 1-45 MVAR inductor at Stone Lake 345 kV	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	Included in Arrowhead-Gardner Park estimate
Install 1-50 MVAR capacitor bank at Arpin	2008	2008	1	achieve transfer capability associated with Arrowhead-Gardner Park	Planned	Included in Arrowhead-Gardner Park estimate
Construct the new permanent Stone Lake 345/161-kV Substation	2008	2008	1	reliability, import capability & Weston stability	Planned	8
Upgrade 4.1 MVAR capacitor bank to 8.2 MVAR and install a new 8.2 MVAR capacitor bank at Berlin 69 kV	2008	2008	1	reliability	Proposed	0.5
Rebuild Atlantic-Osceola 69-kV line (Laurium #1)	2006	2008	2	reliability, condition	Planned	9.2
Increase ground clearance of Atlantic-Osceola (Laurium #2) 69-kV line from 120 to 167 degrees F	2008	2008	2	reliability	Proposed	2.1

Table PR-5
Transmission System Additions for 2008 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install second 345/138-kV transformer at Plains	2008	2008	2	reliability	Provisional	5.4
Install 1-5.4 MVAR capacitor bank at L'Anse 69 kV	2008	2008	2	reliability	Provisional	0.5
Install 2-8.16 MVAR capacitor banks at M38 69 kV	2008	2008	2	reliability	Proposed	1.8
Install 2-5.4 MVAR capacitor banks at Osceola 69 kV	2008	2008	2	reliability	Proposed	1.3
Uprate Atlantic 138/69-kV transformer	2008	2008	2	reliability	Proposed	1.4
Construct a Rubicon-Hustisford 138-kV line	2008	2008	3	reliability	Proposed	4.8
Rebuild Hustisford-Horicon 69 kV to 138 kV	2008	2008	3	reliability	Proposed	2.4
Construct 138/69-kV substation at a site near Horicon and install a 138/69-kV transformer	2008	2008	3	reliability	Proposed	8.8
Convert Rock River to Bristol to Elkhorn 138 kV operation; rebuild Bristol with a new 138-kV bus	2008	2008	3	reliability	Proposed	5.1
Construct a new 138-kV line from North Madison to Waunakee	2005	2008	3	reliability	Proposed	10.1
Construct a new 138/69-kV substation near Waunakee and install a 100 MVA 138/69-kV transformer	2005	2008	3	reliability	Proposed	1
Install 1-8.16 MVAR capacitor bank at Richland Center 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2008	2008	3	reliability	Provisional	1.1
Construct 138-kV line from Canal to Dunn Road	2008	2008	4	reliability	Proposed	4.2

Table PR-5
Transmission System Additions for 2008 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install 60 MVA 138/69-kV transformer at Dunn Road	2008	2008	4	reliability	Proposed	2.2
Rebuild/Convert Pulliam-New Suamico 69-kV line to 138 kV	2008	2008	4	reliability, condition, T-D interconnection	Provisional	12.9
Uprate North Appleton-Mason Street 138-kV line	2008	2008	4	reliability, service limitation	Proposed	1.7
Uprate North Appleton-Lost Dauphin 138-kV line	2008	2008	4	reliability, service limitation	Proposed	1.6
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	2
Install 138/69-kV transformer at the expanded Menominee Substation	2008	2008	4	reliability	Provisional	2.1
Rebuild Crivitz-High Falls 69-kV double-circuit line	2008	2008	4	reliability	Provisional	7.8
Construct a new Mill Road Substation at intersection of Granville-Arcadian 345-kV, Forest Junction-Arcadian 345-kV, Sussex-Tamarack 138-kV and Sussex-Germantown 138-kV lines; install a 345/138-kV transformer	2008	2008	5	reliability	Proposed	29.2
Reconductor Pleasant Valley-Saukville 138-kV line	2008	2008	5	new generation	Proposed	3
Reconductor Pleasant Valley-St. Lawrence 138-kV line	2008	2008	5	new generation	Proposed	3.1

Table PR-5
Transmission System Additions for 2008 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Reconductor Cornell-Range Line 138-kV line	2008	2008	5	new generation	Proposed	6
Construct Cranberry-Conover 115-kV line	2008	2008	1 & 2	reliability, transfer capability	Proposed	17.1
Rebuild/convert Conover-Plains 69-kV line to 138 kV	2008	2008	1 & 2	reliability, transfer capability	Proposed	69.1
Construct 138-kV bus and install 138/115-kV 150 MVA and 138/69-kV 60 MVA transformers at Conover	2008	2008	1 & 2	reliability, transfer capability	Proposed	18.5
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Iron Grove	2008	2008	1 & 2	reliability, transfer capability	Proposed	2.9
Construct 138-kV bus and install a 138/69-kV, 60 MVA transformer at Aspen	2008	2008	1 & 2	reliability	Proposed	2.9
Relocate Iron River Substation (Iron Grove)	2008	2008	1 & 2	reliability	Proposed	5.9

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 2009

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Uprate Rocky Run-Plover 115-kV line terminal equipment	2009	2009	1	new generation	Proposed	0
Construct Gardner Park-Central Wisconsin 345-kV line	2009	2009	1	service limitation, reliability, import capability and Weston stability	Planned	90.2
Construct new Central Wisconsin 345-kV Substation	2009	2009	1	service limitation, reliability, import capability and Weston stability	Planned	12.2
Relocate 69-kV Rexton tap to 69-kV Hiawatha-Pine River line (6909)	2009	2009	2	condition	Provisional	0.3
Relocate 69-kV Trout Lake tap to 69-kV Hiawatha-Pine River line (6909)	2009	2009	2	condition	Provisional	0.3
Construct Mackinac 138-kV Substation additions (portions may be earlier for maintenance issues)	2009	2009	2	reliability, service limitation	Provisional	5.8
Rebuild Hiawatha-Pine River-Mackinac 69 kV to 138 kV	2009	2009	2	reliability, condition	Provisional	57.4
Construct 138-kV bus and install one 138/69-kV, 50 MVA transformer at Pine River	2009	2009	2	reliability	Provisional	10
Convert rebuilt Hiawatha-Indian Lake circuit (operated at 69 kV) to 138 kV	2009	2009	2	reliability, service limitation	Planned	0.2
Construct 138-kV ring bus at Hiawatha Substation	2009	2009	2	reliability, service limitation	Planned	3.3
Install 138-kV substation modifications at Indian Lake Substation	2009	2009	2	reliability, service limitation	Planned	1.9
Install 1-5.4 MVAR capacitor bank at MTU or Henry Street 69 kV	2009	2009	2	reliability	Proposed	0.6
Install 1-5.4 MVAR capacitor bank at Roberts 69 kV	2009	2009	2	reliability	Proposed	0.6

Table PR-6
Transmission System Additions for 2009 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Install 4-25 MVAR capacitor banks at Portage 138 kV	2009	2009	3	reliability	Provisional	2.2
Construct new 138-kV bus and install a 138/69-kV 100 MVA transformer at South Lake Geneva	2009	2009	3	reliability	Provisional	6
Construct new 138-kV line from South Lake Geneva to White River	2009	2009	3	reliability, T-D interconnection	Provisional	2.5
Construct new 138-kV bus and 138/69-kV 100 MVA transformer at Montrose Substation	2009	2009	3	reliability	Proposed	1.4
Construct new Montrose-Sun Valley-Oak Ridge 138-kV line	2009	2009	3	reliability	Proposed	5.1
Uprate Colley Road to Brick Church 69-kV line to 72 MVA	2008	2009	3	reliability	Proposed	0.5
Install a second 138/69-kV transformer at Hillman	2009	2009	3	reliability	Proposed	3.9
Install a 69-kV 16.32 MVAR capacitor bank at Kilbourn Substation	2009	2009	3	reliability	Provisional	0.4
Rebuild 2.37 miles of 69 kV from Sunset Point to Pearl Ave with 477 ACSR	2009	2009	4	reliability	Proposed	1
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	included in Morgan-Werner estimate
Construct Morgan-Werner West 345-kV line	2004	2009	4	reliability, service limitation	Planned	113.8
Reconductor Oak Creek-Ramsey 138-kV line	2009	2009	5	new generation	Proposed	0.4
Reconductor Oak Creek-Allerton 138-kV line	2009	2009	5	new generation	Proposed	2

Table PR-6
Transmission System Additions for 2009 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Replace relaying on 230-kV circuits at Oak Creek	2009	2009	5	new generation	Proposed	3
Replace two 345-kV circuit breakers at Pleasant Prairie on the Racine and Zion lines with IPO breakers and upgrade relaying	2009	2009	5	new generation	Proposed	2.1
Expand Oak Creek 345-kV switchyard to interconnect one new generator	2009	2009	5	new generation	Proposed	10.8
Loop Ramsey5-Harbor 138-kV line into Norwich and Kansas to form a new line from Ramsey-Norwich and Harbor-Kansas 138-kV lines	2009	2009	5	new generation	Provisional	4.1
Construct Rockdale-Concord 345-kV line in parallel with existing 138-kV on existing double-width right-of-way	2009	2009	3 & 5	reliability, service limitation	Proposed	22.2
Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Concord	2009	2009	3 & 5	reliability	Proposed	12.9

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 2010

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Uprate Wautoma-Berlin 69-kV line terminal equipment at Wautoma	2010	2010	1	reliability	Provisional	0
Replace 138/69-kV transformer at Metomen	2010	2010	1	reliability	Provisional	2
Construct Monroe County-Council Creek 161-kV line	2010	2010	1	access initiative, reliability	Provisional	16.7
Install a 161/138-kV transformer at Council Creek	2010	2010	1	access initiative, reliability	Provisional	2.5
Uprate Council Creek-Petenwell 138-kV line	2010	2010	1	access initiative, reliability	Provisional	0.2
Rebuild/reconductor Petenwell-Saratoga 138-kV line	2010	2010	1	access initiative, reliability	Provisional	14.8
Install a 69-kV bus and 138/69-kV 100 MVA transformer at Northwest Beloit	2010	2010	3	reliability	Provisional	2
Reroute Paddock to Shirland Avenue 69-kV line into and out of Northwest Beloit	2010	2010	3	reliability	Provisional	0.5
Loop the Femrite to Royster 69-kV line into AGA Gas	2010	2010	3	reliability	Provisional	1.6
Convert Hillman to Eden 69-kV line to 138 kV	2010	2010	3	reliability	Proposed	16.5
Install 1-8.16 MVAR capacitor bank at Boscobel 69 kV and upgrade existing 5.4 MVAR bank with an 8.16 MVAR bank	2010	2010	3	reliability	Provisional	1.2
Rebuild Brodhead to South Monroe 69-kV line using 477 ACSR	2010	2010	3	reliability	Provisional	4
Convert Waunakee-Blount 69-kV line to 138 kV	2010	2010	3	reliability	Proposed	20

Table PR-7
Transmission System Additions for 2010 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Uprate Darlington-Rock Branch 69-kV line	2010	2010	3	reliability	Provisional	0.1
Uprate existing 18 MVAR capacitor bank at Spring Green 138 kV with a 50 MVAR bank	2010	2010	3	reliability	Provisional	1.2
Retap 48 MVA CT at South Sheboygan Falls 138/69-kV transformer	2010	2010	4	reliability	Proposed	0
Rebuild/convert New Holstein-St. Nazianz-Custer-Lakefront 69-kV line to 138 kV (1225 Amps minimum)	2010	2010	4	access initiative	Provisional	7.7
Rebuild Tecumseh Road-New Holstein to double-circuit 138/69 kV, where 69 kV will serve Gravesville via New Holstein	2010	2010	4	access initiative	Provisional	2.4
Install 47 MVA 138/69-kV transformer at Custer	2010	2010	4	access initiative	Provisional	3.1
Install 100 MVA 138/69-kV transformer at Lakefront	2010	2010	4	access initiative	Provisional	2.5
Construct a second Dunn Road-Egg Harbor 69-kV line	2010	2010	4	reliability	Proposed	6.2
Uprate Kansas-Ramsey6 138-kV line	2009	2010	5	new generation	Proposed	0.1
Install second 500 MVA 345/138-kV transformer at Oak Creek	2010	2010	5	new generation	Proposed	6.6
Expand 345-kV switchyard at Oak Creek to interconnect one new generator	2010	2010	5	new generation	Proposed	10.8
Uprate Oak Creek-Root River 138-kV line	2010	2010	5	new generation	Proposed	0.6
Uprate Oak Creek-Nicholson 138-kV line	2010	2010	5	new generation	Proposed	1.2
Convert Bark River-Mill Road 138-kV line to 345 kV	2010	2010	3 & 5	reliability, new generation	Proposed	0.8

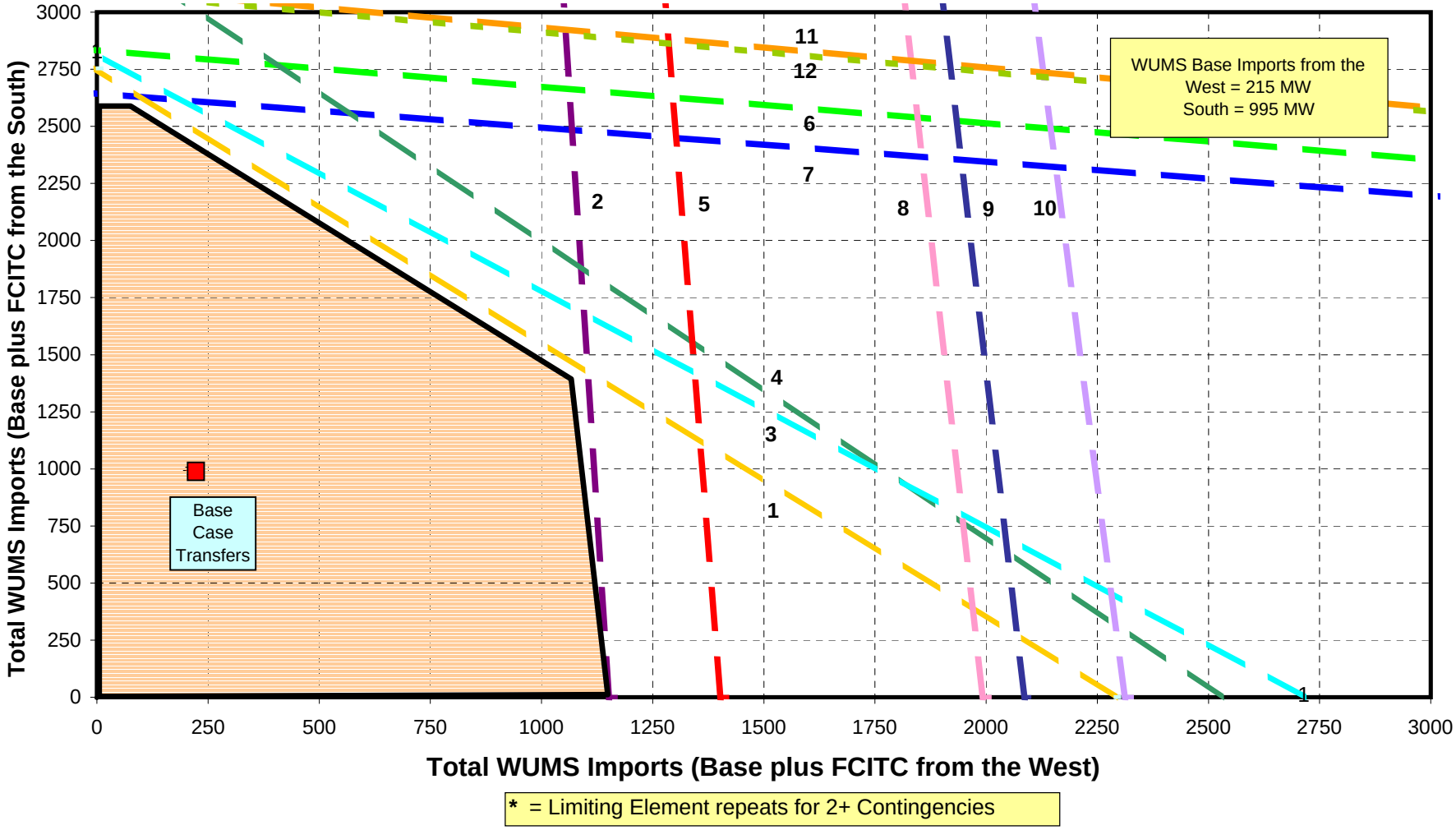
Table PR-7
Transmission System Additions for 2010 (continued)

System additions	System need year	Projected in-service year	Planning zone	Need category	Planned, Proposed or Provisional	Capital cost estimate (in millions)
Construct a Concord-Bark River 345-kV line	2010	2010	3 & 5	reliability, new generation	Proposed	50.3
Construct a 345-kV bus and install a 345/138-kV, 500 MVA transformer at Bark River	2010	2010	3 & 5	reliability, new generation	Proposed	8.4

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

Figure PR-8

WUMS Simultaneous Import Capabilities for 2006 Summer

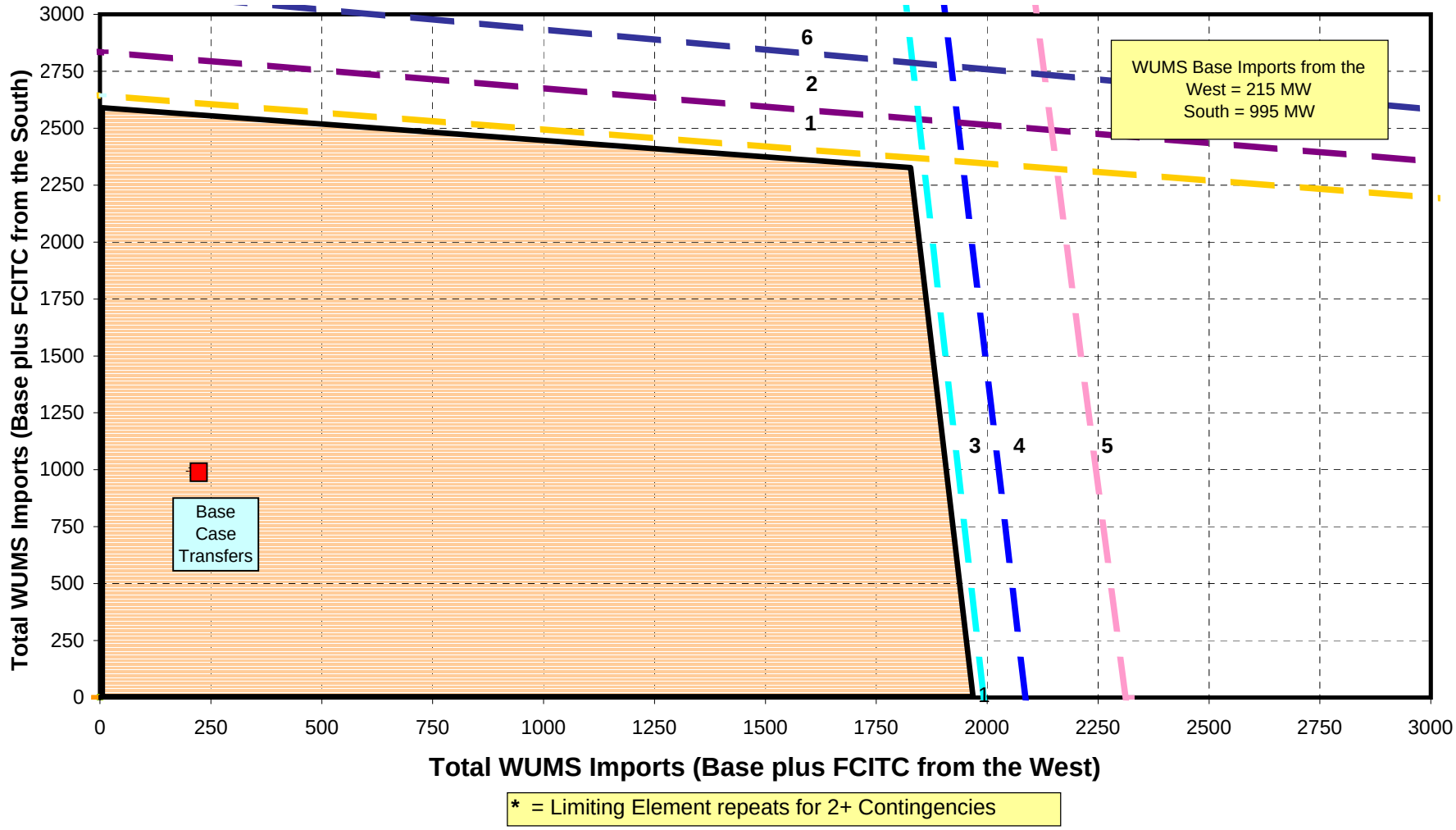


* = Limiting Element repeats for 2+ Contingencies

1	Turkey River-Cassville 161kV*	for outage of Seneca-Genoa 161kV
2	Eau Claire - Presto -Wheaton 161kV*	for outage of Tremval-Alma 161 kV
3	Lore-Turkey River 161kV*	for outage of Seneca-Genoa 161kV
4	Cassville-Nelson Dewey 161kV*	for outage of Seneca-Genoa 161kV
5	Hazelton - Dundee 161kV*	for outage of Rock Creek-Quad Cities 345 kV
6	Paddock 345/138kV Tr	for outage of Wempletown-Rockdale 345kV
7	Paris-Raymond-St Martins 138kV	for outage of Pleasant Prairie-Racine 345kV
8	Eau Claire - Arpin 345kV Flow Limit	for outage of N/A
9	T Corners-Wien-Cassel 115kV	for outage of Eau Claire-Arpin & Op Guide
10	Eden-Wyoming Valley 138kV	for outage of Eau Claire-Arpin & Op Guide
11	Pleasant Prairie-Racine 345kV	for outage of Pleasant Prairie-Arcadian 345kV
12	Hanover-Tollway 138kV Red	for outage of Silver Lk-Wayne 345kV Red

Figure PR-8a

WUMS Simultaneous Import Capabilities for 2006 Summer
(ATC Limiting Elements Only)

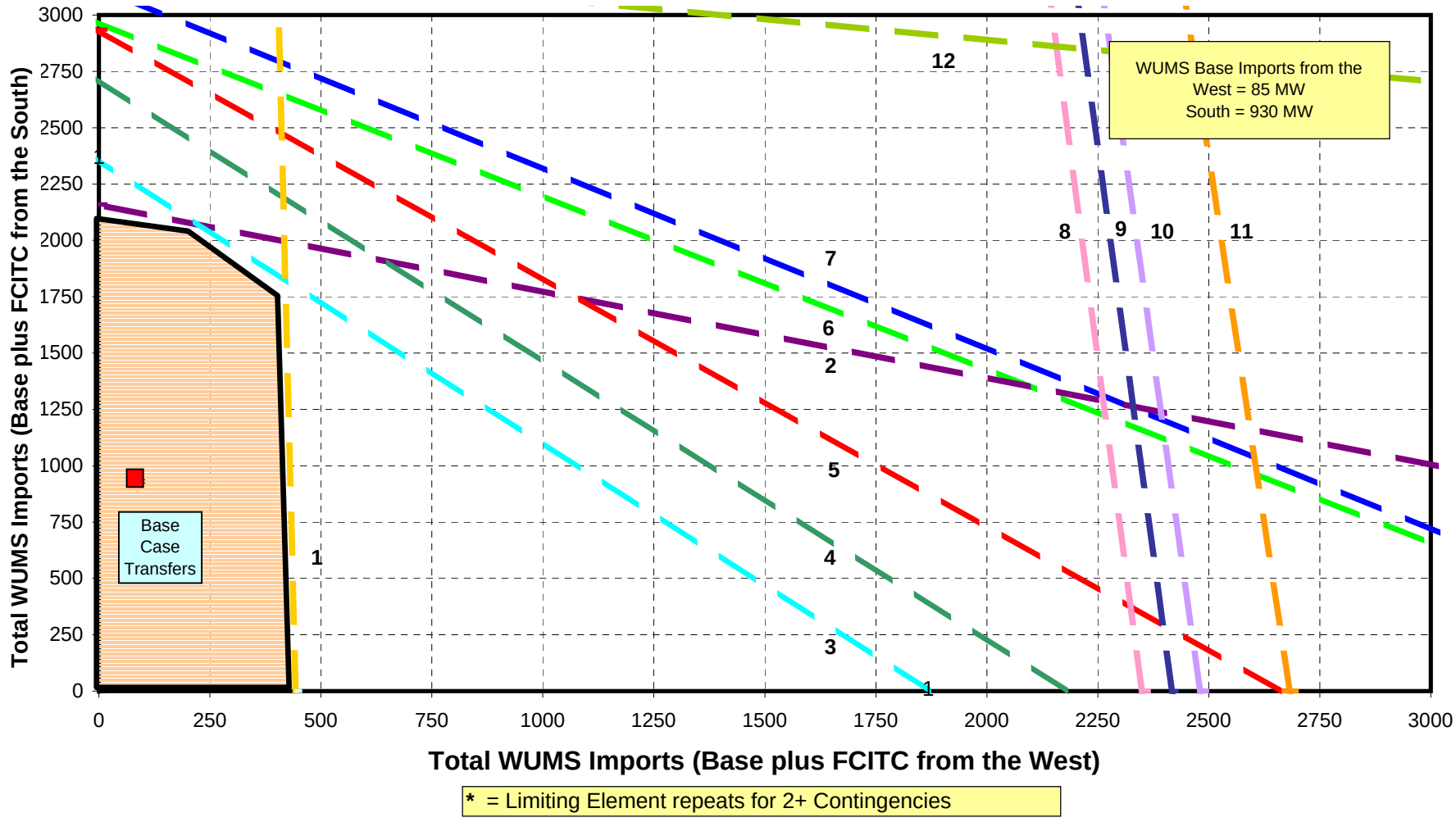


* = Limiting Element repeats for 2+ Contingencies

1	Paris-Raymond-St Martins 138kV	for outage of Pleasant Prairie-Racine 345kV	4	T Corners-Wien-Cassel 115kV	for outage of Eau Claire-Arpin & Op Guide
2	Paddock 345/138kV Tr	for outage of Wempletown-Rockdale 345kV	5	Eden-Wyoming Valley 138kV	for outage of Eau Claire-Arpin & Op Guide
3	Eau Claire - Arpin 345kV Flow Limit	for outage of N/A	6	Pleasant Prairie-Racine 345kV	for outage of Pleasant Prairie-Arcadian 345kV

Figure PR-9

WUMS Simultaneous Import Capabilities for 2010 Summer



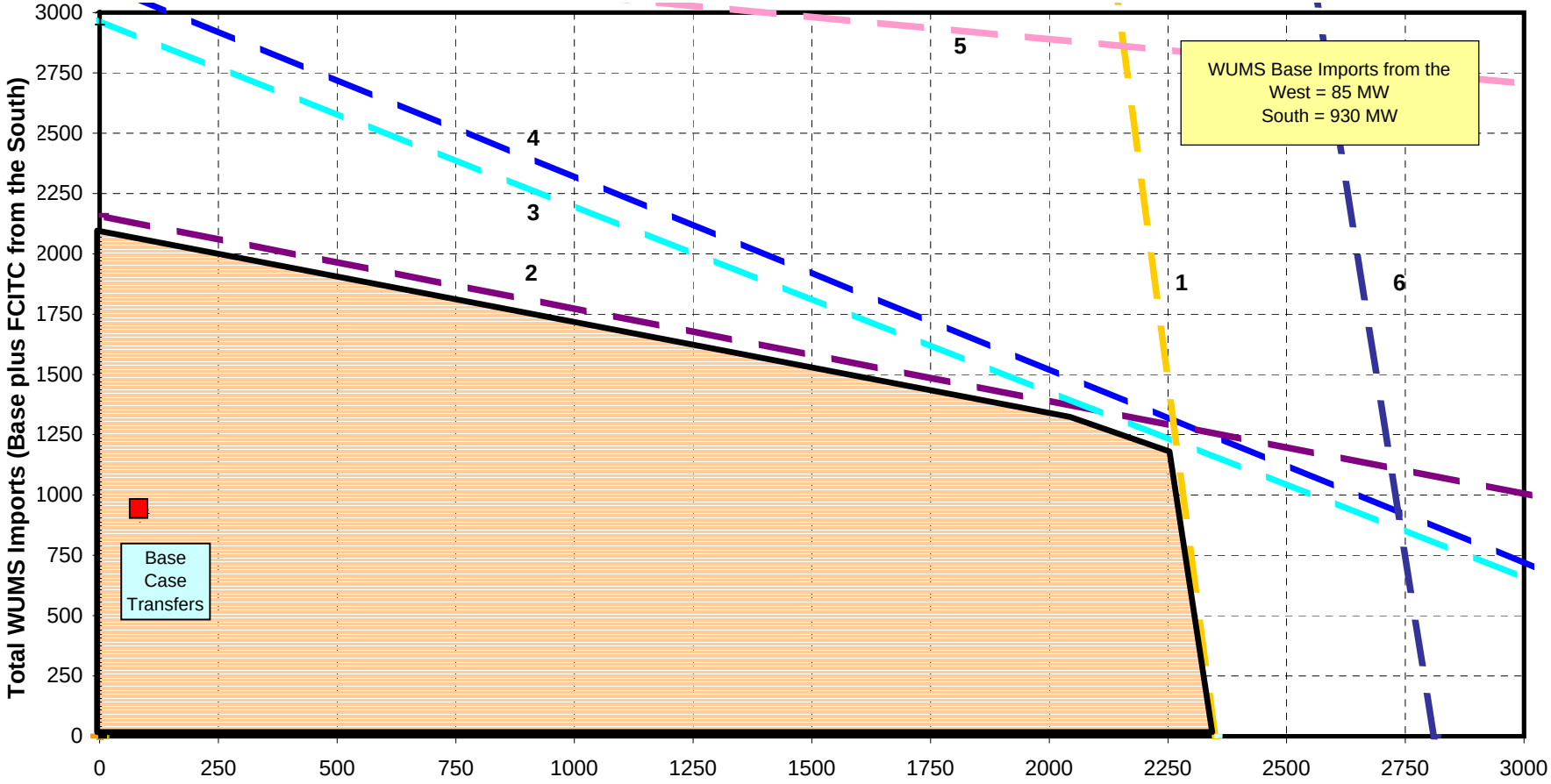
* = Limiting Element repeats for 2+ Contingencies

1	Hazelton - Dundee 161kV*	for outage of Rock Creek-Quad Cities 345 kV
2	Arcadian-Mill Road 345kV*	for outage of Wempletown-Rockdale 345kV
3	Cassville-Nelson Dewey 161kV*	for outage of Seneca-Genoa 161kV
4	Turkey River-Cassville 161kV*	for outage of Seneca-Genoa 161kV
5	Lore-Turkey River 161kV*	for outage of Seneca-Genoa 161kV
6	Wempletown-Rockdale 345kV*	for outage of Wempletown-Paddock 345kV
7	Paddock 345/138kV Tr	for outage of Wempletown-Rockdale 345kV
8	Eau Claire-Arpin 345kV Flow Limit	for outage of N/A
9	LaCrosse-Monroe Co 161kV	for outage of Eau Claire-Arpin & Op Guide
10	Byron-Cherry Valley 345 kV Red	for outage of Byron-Cherry Valley 345 kV Blue
11	Barron-Washington Co 161kV	for outage of Eau Claire-Arpin & Op Guide
12	McGulpin-Straits 138kV Ckt 3	for outage of McGulpin-Straits 138kV Ckt 1

Figure PR-9a

WUMS Simultaneous Import Capabilities for 2010 Summer

(ATC Limiting Elements Only)



***** = Limiting Element repeats for 2+ Contingencies

1 Eau Claire-Arpin 345kV Flow Limit	for outage of N/A	
2 Arcadian-Mill Road 345kV*	for outage of Wempletown-Rockdale 345kV	
3 Wempletown-Rockdale 345kV*	for outage of Wempletown-Paddock 345kV	
4 Paddock 345/138kV Tr	for outage of Wempletown-Rockdale 345kV	
5 McGulpin-Straits 138kV Ckt 3	for outage of McGulpin-Straits 138kV Ckt 1	
6 Arrowhead 230/345 kV Phase Shifter	for outage of Eau Claire-Arpin & Op Guide	

PROJECTS > Generation interconnections

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, 2005, 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 through 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 throughout 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 only 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 we have completed final interconnection studies. 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, five new generators have gone into service and one uprate to an existing generator has been completed, totaling 1,767 MW. These generators are shown in Table PR-28.

Table PR-29 lists the proposed generators in the generation queue for our service territory as of July 1, 2005. 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 8,252.25 MW. Of that proposed capacity, 54 percent reflects new coal units; wind units reflect 17 percent; combined cycle (natural gas) units reflect 27 percent; and the remaining 2 percent is comprised of simple cycle (natural gas) turbines and an existing nuclear unit uprate (see Figure PR-11.) 40 percent of this generation is proposed in Zone 5, 26 percent in Zone 4, 21 percent in Zone 1, 13 percent in Zone 3, and 0 percent in Zone 2.

Generation interconnection requests previously in the generation queue, which have been cancelled or removed from the queue since June 2004 (because the developer withdrew the request or missed contractual milestones), are summarized in Table PR-30. Nearly half of the 546 MW of generation was proposed to be located in Zone 3, with the rest in Zones 1 and 4. All of this generating capacity was to be wind units.

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
Zone 2
Zone 3
Zone 4
Zone 5

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 2007-2008 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

Zone 2
We have not completed any generation interconnection studies in Zone 2 and thus do not have the base of knowledge that we have in other zones relating to likely generation interconnection impacts. A few of the more logical locations from a transmission infrastructure standpoint would be near the existing Presque Isle Power Plant or the Plains Substation; however, any significant development at or near Presque Isle likely would require significant transmission reinforcements.

It is likely that given the scarcity of 138-kV infrastructure in the Upper Peninsula there are virtually no locations in Zone 2 that are ideal candidates for any 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.

It should be noted that 40 MW of previously mothballed steam turbine generation in Zone 2 has been reactivated; however, the output is significantly limited by transmission system constraints.

Zone 2 completed generation study links
None

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

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.

Another area where small-scale generation might defer the need for transmission reinforcements is in the Sheboygan area, provided the generation is appropriately located. Studies would need to be conducted to ensure stability.

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/G384-410_Evaluation_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G384-410_Impact_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G421_Evaluation_Study.pdf
http://oasis.midwestiso.org/documents/ATC/G427_Evaluation_Study.pdf

Zone 5

Two major generation additions have been proposed in Zone 5. The first addition is at Port Washington, has been approved by the Public Service Commission of Wisconsin and is under construction. Two groups of units will be installed with the first phase expected to be in service in 2005 and the second phase 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 Elm Road (Oak Creek). The Public Service Commission of Wisconsin has approved two units at Elm Road, 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

Table PR-28
Former Generator Requests Now In-Service

Date	Requests on-line	Megawatts
2000	IC006 (Eden/Little Badger)	31
2001	G074 (Combined Locks)	53
6/1/2003	G111 (Pulliam CT), G148 (Petenwell/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)	300
6/2/2005	G103 (Sheboygan)	370

Table PR-29
Proposed Projects in the Generation Queue as of July 1, 2005

Zone	Queue no.	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	G506	Monroe	100 MW	138 kV	wind turbine	11/06
1	G522	Portage	550 MW	345 kV	steam/coal	6/11
1	G523	Marathon	550 MW	345 kV	steam/coal	6/11
1	Total		1750 MW			
2	Total		0 MW			
3	G282	Lafayette	99 MW	138 kV	wind turbine	12/05
3	G338	Dodge	54 MW	138 kV	wind turbine	12/04
3	G366	Columbia	80 MW	138 kV	wind turbine	12/05
3	G483	Green	50 MW	69 kV	wind turbine	12/06
3	G527	Grant	280 MW	115 kV	steam/coal	10/11
3	G528	Columbia	550 MW	345 kV	steam/coal	10/11
3	Total		1113 MW			
4	G044	Outagamie	372 MW	345 kV	combined cycle/gas	12/05
4	G063	Manitowoc	90 MW	345 kV	nuclear	5/06, 5/06
4	G240	Manitowoc	55 MW	69 kV	simple cycle/gas	9/05
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	12/04
4	G376	Green Lake/Fond du Lac	160 MW	138 kV	wind turbine	6/05
4	G384	Manitowoc/ Kewaunee	99 MW	138 kV	wind turbine	11/05
4	G410	Kewaunee	99 MW	138 kV	wind turbine	6/06
4	G421	Brown	99 MW	69 kV	wind turbine	12/06
4	G427	Fond du Lac	98 MW	345 kV	wind turbine	12/05
4	G486	Manitowoc	19.25	345 kV	wind turbine	12/05
4	G507	Fond du Lac	98 MW	345 kV	wind turbine	12/06
4	G524	Brown	600 MW	138 kV	combined cycle/gas	6/11
4	Total		2149.25 MW			
5	G014	Ozaukee	1000 MW	138 kV	combined cycle/gas	7/05, 6/08
5	G051	Milwaukee	1950 MW	345 kV /138 kV	steam/coal gasification	6/09, 6/10, 6/13
5	G93	Ozaukee	200 MW	138 kV	combined cycle/gas	7/05, 6/08
5	G510	Ozaukee	90 MW	138 kV	combined cycle/gas	6/05, 6/08
5	Total		3240 MW			

Table PR-30
Requests Previously in the Generation Queue
Which Have been Withdrawn/Removed between June 2004 and July 1, 2005

Zone	Queue no.	County	Size	Voltage	Type	Date
1	G420	Marathon	99 MW	115 kV	wind turbine	12/06
3	G281	Green	130 MW	138 kV	wind turbine	12/05
3	G371	Columbia	100 MW	138 kV	Wind turbine	3/05
3	G423	Columbia	19 MW	138 kV	Wind turbine	12/05
4	G410	Kewaunee	99 MW	138 kV	wind turbine	6/06
4	G421	Brown	99 MW	69 kV	wind turbine	12/06

Figure PR-10
Generation Interconnection Requests
as of 7/1/05

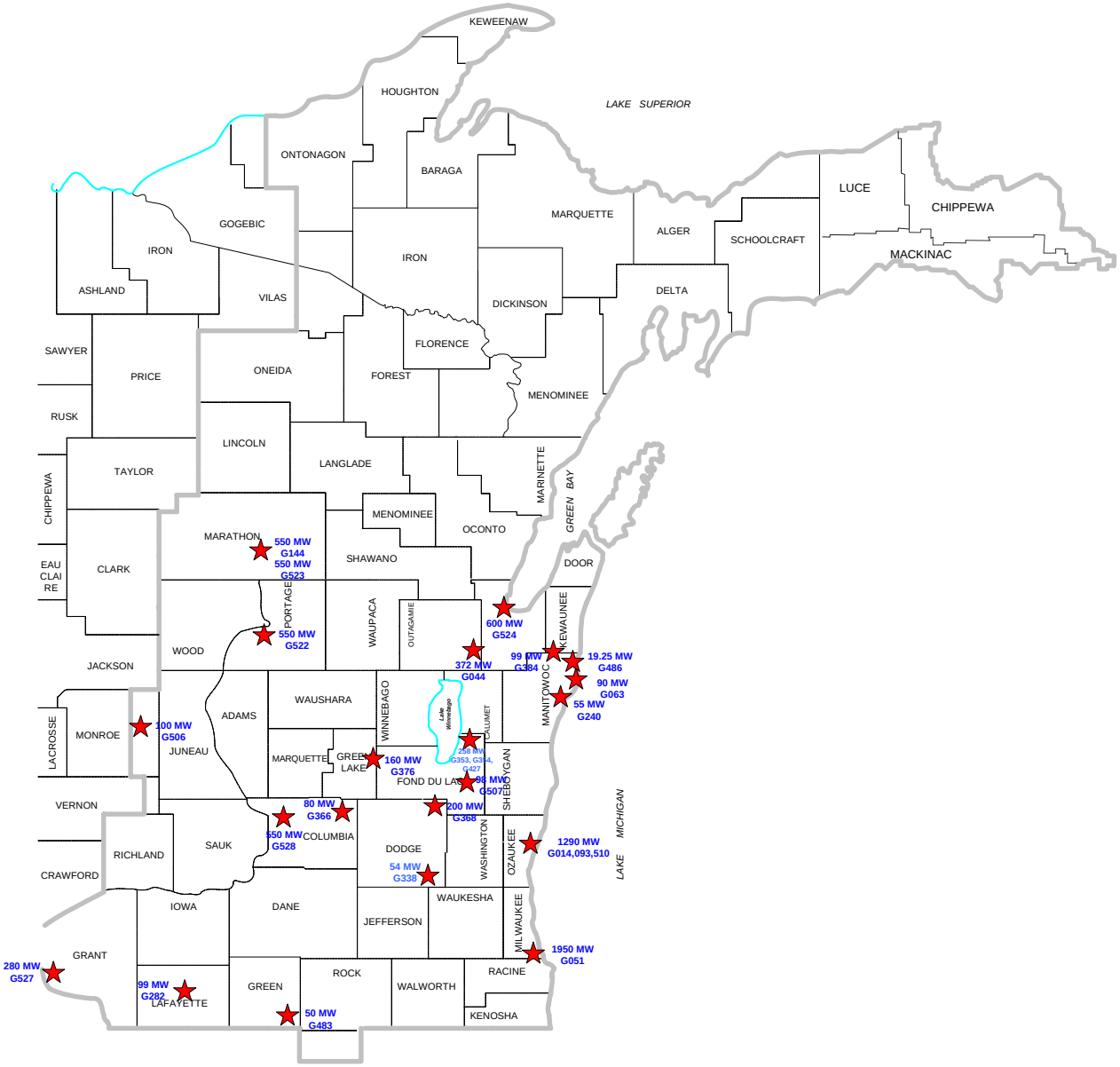
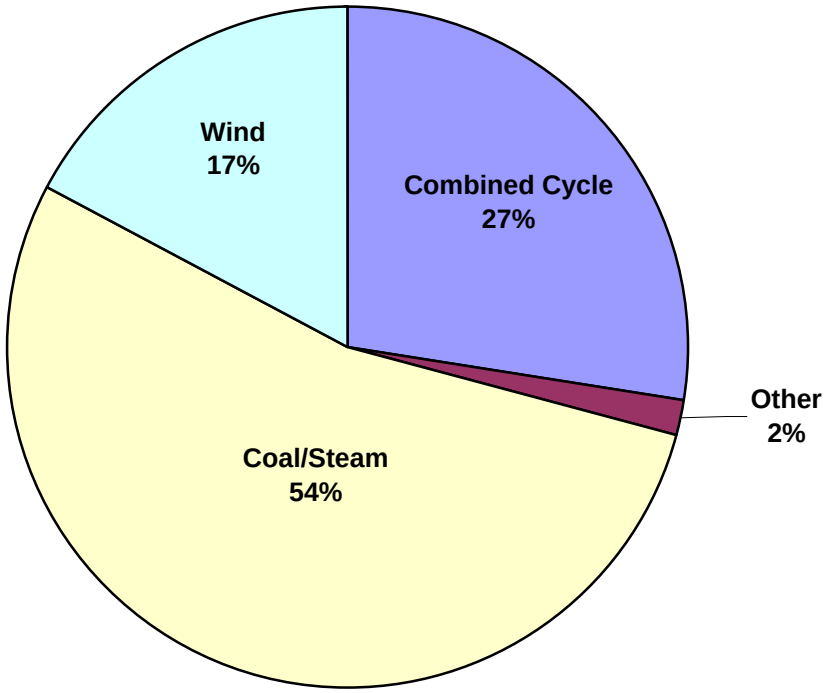


Figure PR-11

ATC New Generation Queue
Percentages of Megawatts by Technology
2005 10-Year Assessment



PROJECTS > 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:

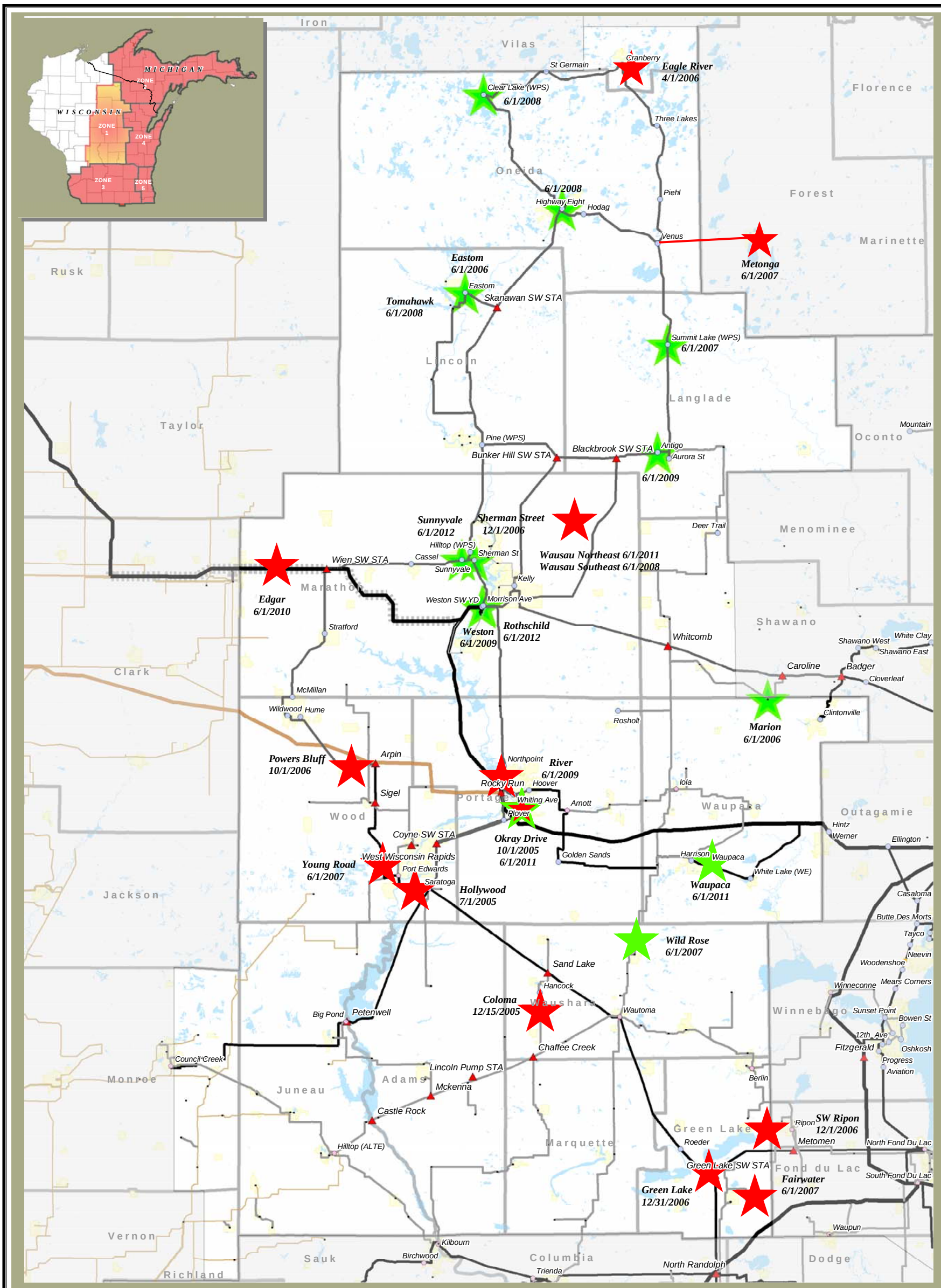
1. **Constructing new T-D substations**. Typically, these new interconnections involve constructing a new T-D substation adjacent to an existing transmission line and looping the transmission line into the new substation. In some instances, the new substation cannot be sited adjacent to the transmission 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.



AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

Transmission-Distribution Interconnection Requests
PLANNING ZONE 1

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

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

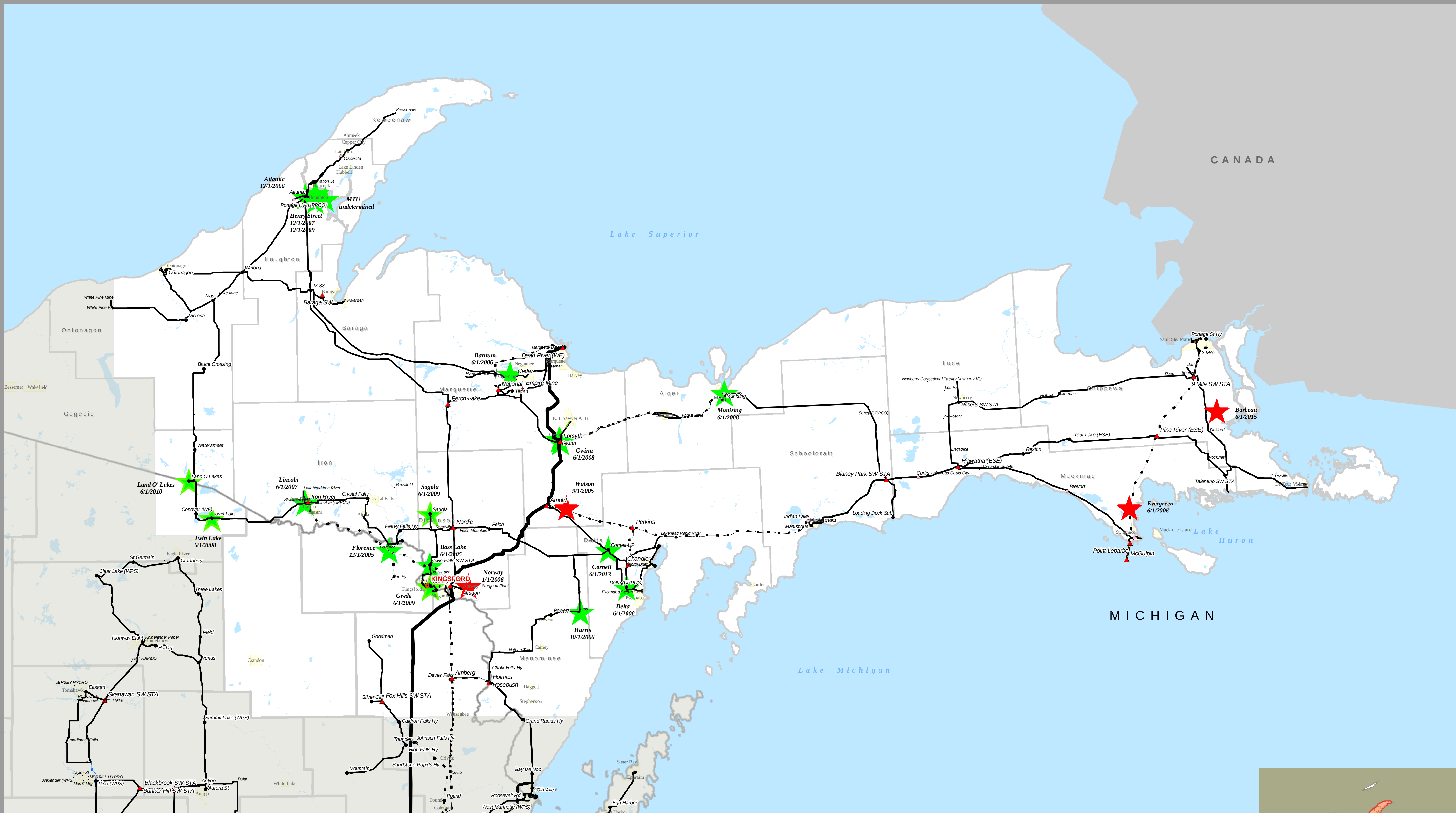
New Substation Interconnection Request

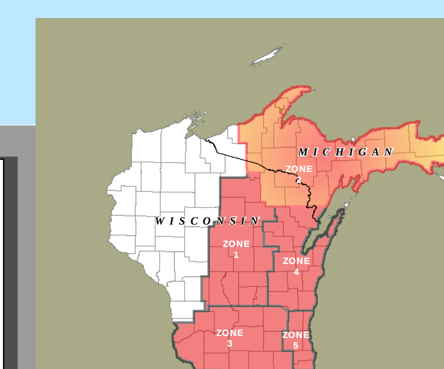
Transformer Addition/Replacement

Transmission Related Facilities

- ATC Owned Substation
- Joint Owned Substation - Assets Conveyed
- Joint Owned Substation - Assets Retained
- Proposed/Design/Construction
- ATC Office Location
- Generation
- Other Facility

Figure PR-13





AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

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:

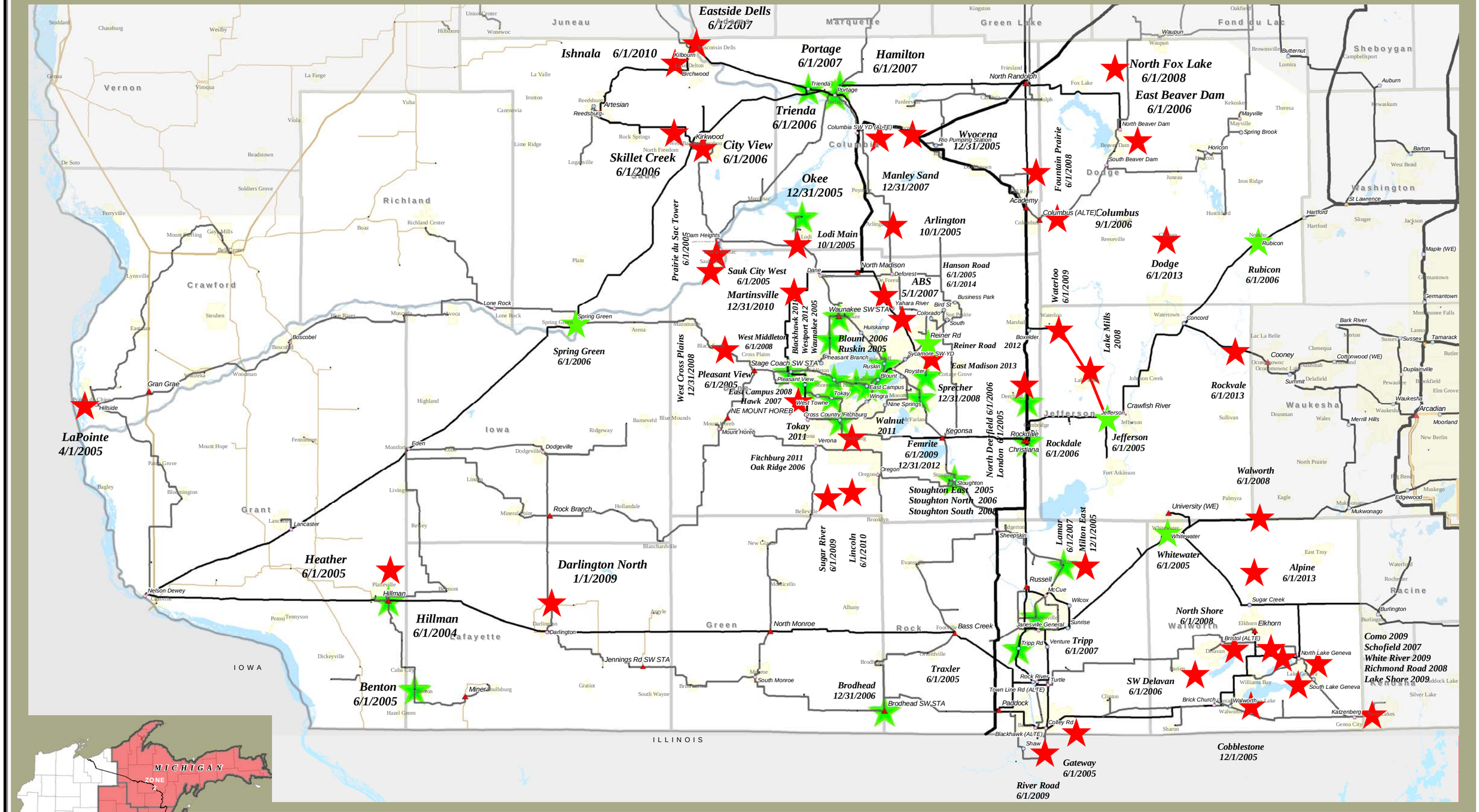
- *Approximately 8900 miles of transmission lines*
- *98 wholly owned substations*
- *358 jointly owned substations*
- *ATC offices in Madison (2), Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, MI*

New Substation Interconnection Request
Transformer Addition/Replacement

Transmission Related Facilities

- ATC Owned Substation
- Joint Owned Substation - Assets Conveyed
- Joint Owned Substation - Assets Retained
- 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 3

AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

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

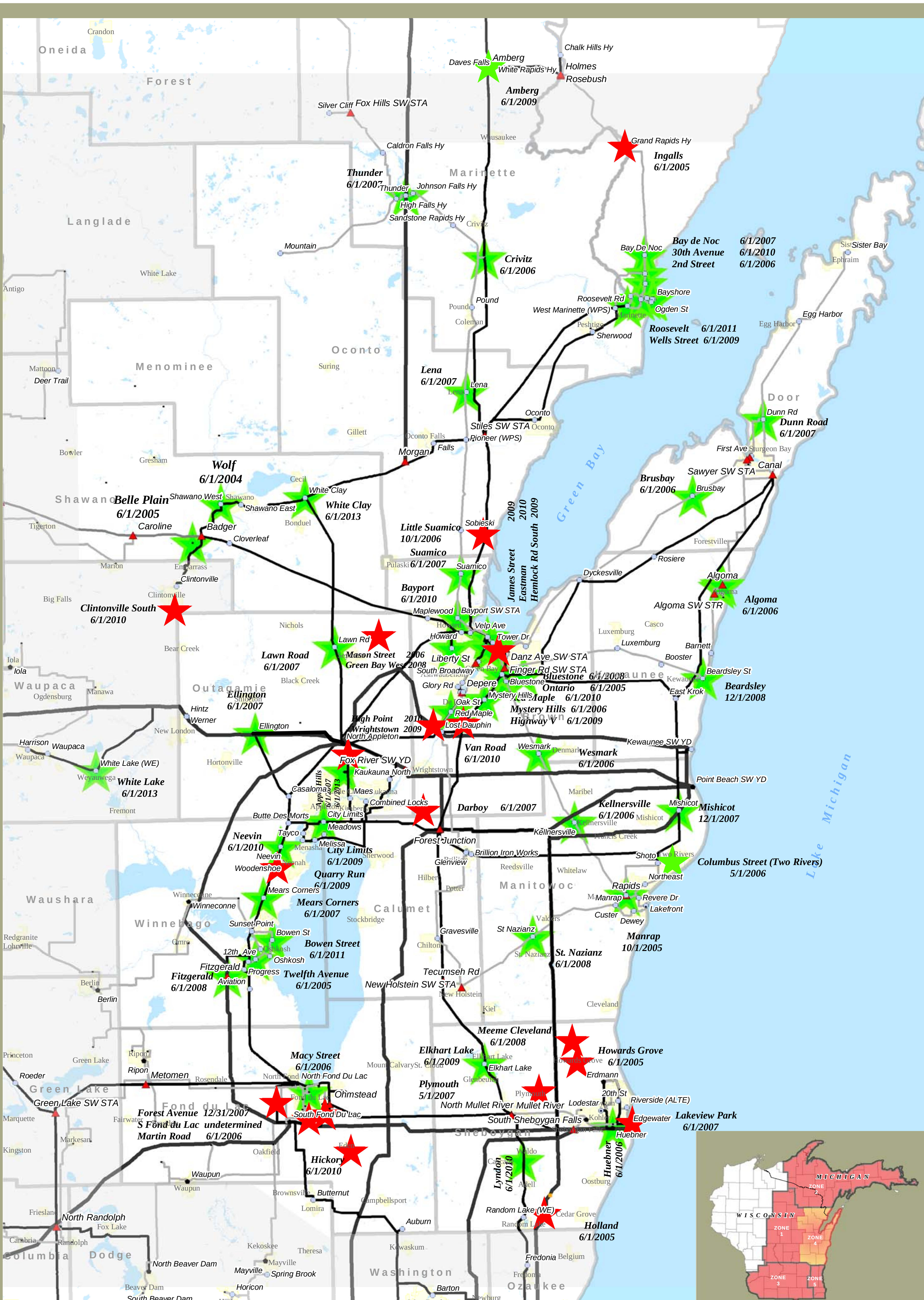
- *Approximately 8900 miles of transmission lines*
- *98 wholly owned substations*
- *358 jointly owned substations*
- *ATC offices in Madison (2), Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, MI*

New Substation Interconnection Request

Transformer Addition/Replacement

Transmission Related Facilities

- ATC Owned Substation
- Joint Owned Substation - Assets Conveyed
- Joint Owned Substation - Assets Retained
- Proposed/Design/Construction
- ATC Office Location
- Generation
- Other Facility



Transmission-Distribution Interconnection Requests

PLANNING ZONE 4

AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

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

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

New Substation Interconnection Request

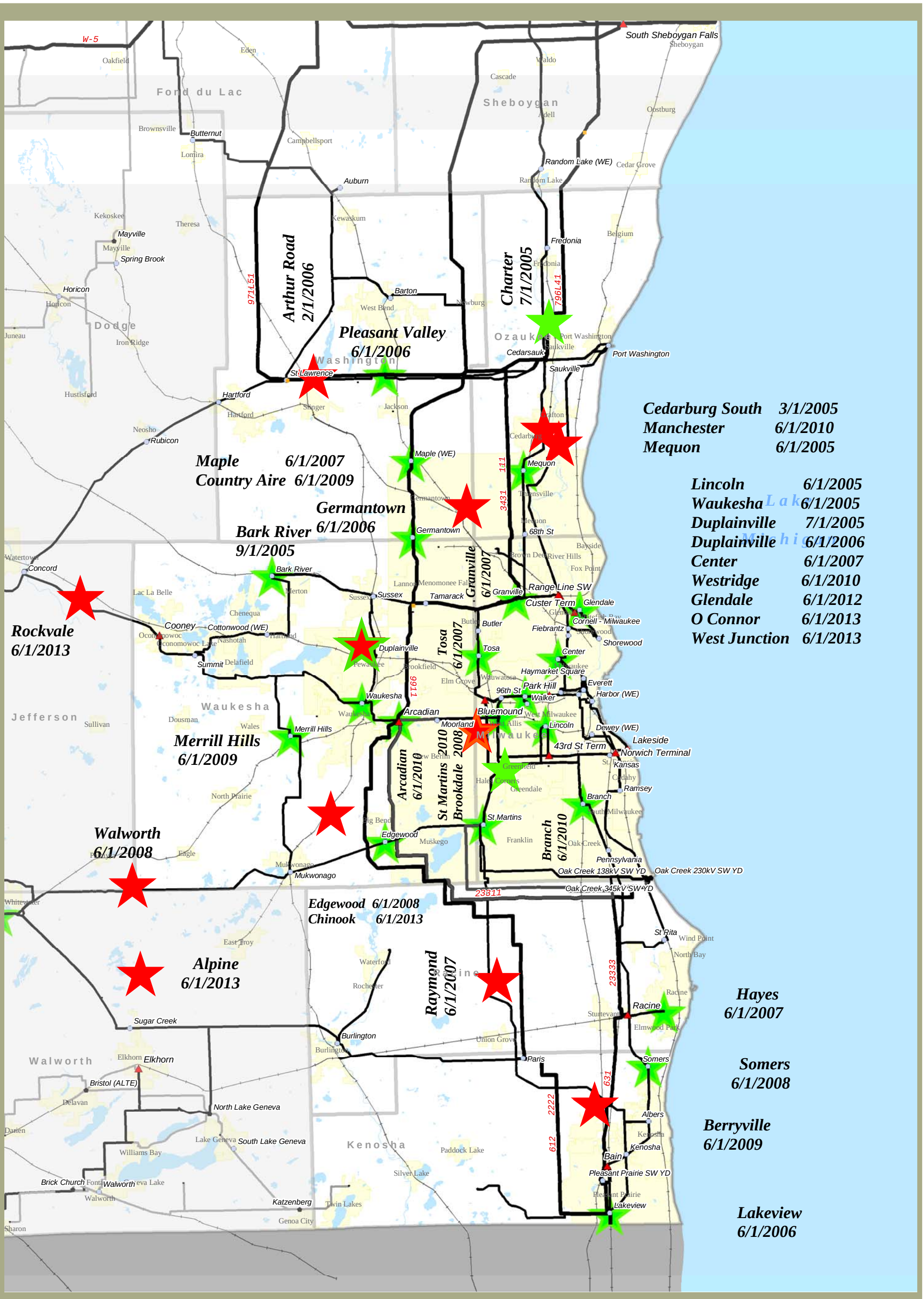
Transformer Addition/Replacement

Transmission Related Facilities

ATC Owned Substation
Joint Owned Substation - Assets Conveyed
Joint Owned Substation - Assets Retained
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.

Zone4 11x17.mxd Modified: Nov 21, 2003



AMERICAN TRANSMISSION COMPANY
THE ENERGY ACCESS COMPANY

Transmission-Distribution Interconnection Requests
PLANNING ZONE 5

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

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

New Substation Interconnection Request

Transformer Addition/Replacement

Transmission Related Facilities

- ATC Owned Substation
- Joint Owned Substation - Assets Conveyed
- Joint Owned Substation - Assets Retained
- Proposed/Design/Construction
- ATC Office Location
- Generation
- Other Facility