Zone 1 overview

Zone 1 includes the Wisconsin counties of:

- Adams
- Forest (southwestern portion)
- Fond du Lac (northwest portion)
- Green Lake
- Juneau
- Langlade
- Lincoln
- Marathon
- Marquette
- Monroe (eastern portion)
- Oneida
- Portage
- Shawano (western portion)
- Vernon (eastern portion)
- Vilas (southern portion)
- Waupaca
- Waushara
- Winnebago (western portion)
- Wood

The physical boundaries of Zone 1 and transmission facilities located in Zone 1 are shown in Figure ZS-22.

Land use in Zone 1 is largely rural, including agricultural and forested areas.

Zone 1 typically experiences peak electric demands during the summer months, with some winter peaks appearing in the northern portion. Primary electricity users in Zone 1 include a number of large paper mills and food processing plants.

The major population center in the area is Wausau

Demographics

Historical and Projected Population

The population of the counties in Zone 1 grew at an annual rate of 0.2% from 2001 to 2010. The highest growth rate occurred in Juneau County, which grew at 1.0, while the highest increase in population occurred in Marathon County, which increased 6,200 people over the period.

Population in Zone 1 is projected to grow at 0.6% annually for the 2011 to 2020 period. Marathon County will realize the largest increase in population (6,900), while Adams County will have the highest growth rate of about 1.8%.

Historical and Projected Employment

During the historical period of 2001 to 2010, the annual employment growth rate was 0.1%. The highest growth rate occurred in Adams County (1.9%), while the largest increase in employment occurred in Portage County of over 3,100.

Employment in Zone 1 is projected to grow at 0.9% annually between 2011 and 2020. From 2011 to 2020, Marathon County is projected to realize the largest increase in employment of about 7,100, while Adams County is projected to have the highest growth rate (1.5%).

Employment			
Annual Growth Rate			
	2001-2010		2011-2020
Zone 1	0.1	Zone 1	0.9
Adams, WI	1.9	Adams, WI	1.5
Total Increase			
	2001-2010		2011-2020
Zone 1	2,675	Zone 1	26,496
Portage, WI	3,134	Marathon, WI	7,127

Population			
Annual Growth Rate			
	2001-2010		2011-2020
Zone 1	0.2	Zone 1	0.6
Juneau,WI	1.0	Adams, WI	1.8
Total Increase			
	2001-2010		2011-2020
Zone 1	9,164	Zone 1	29,471
Marathon, WI	6,187	Marathon, WI	6,852

Zone 1 environmental considerations

Zone 1 covers the central and north-central portions of Wisconsin and spans a wide range of ecological landscapes varying from the Northern Highland and North Central Forest regions in the northern part of the zone through the Forest Transition, Central Sand Plains and Central Sand Hills regions to the Western Coulee and Ridges region in the southern portions of the zone. Descriptions of the characteristics of each of these ecological landscapes may be found on the Wisconsin Department of Natural Resources Web site: http://dnr.wi.gov/landscapes/

The northern portion of the zone contains numerous lakes and woodlands, while the southern portion is more agricultural in nature. Lands in this zone primarily are located in the Upper and Central Wisconsin River drainage basins with smaller portions of the zone located in the Fox and Wolf River drainage basins. The Necedah and Fox River National Wildlife Refuges, a small portion of the Nicolet National Forest and several Indian reservations are located in this planning zone.

Zone 1 electricity demand and generation

The coincident peak load forecasts for Zone 1 for 2012, 2016, 2021 and 2026 are shown in Table ZS-11. The table also shows existing generation, proposed generation based on projected in-service year, and resultant capacity margins (with and without the proposed generation).

The table shows that load in Zone 1 is projected to grow at roughly 0.66 percent annually from 2012 through 2021. Comparing load with generation (at maximum output) within the zone indicates that Zone 1 is a net importer of power during peak load periods.

Key Zone 1 transmission facilities

Key transmission facilities in Zone 1 include:

- East-west 345-kV line from Arpin Substation through Stevens Point extending to the Appleton area,
- 345-kV line extending from Wausau to northeastern Minnesota,
- 345-kV line extending from Wausau to Stevens Point to eastern Outagamie County (Highway 22),
- 115-kV network in the northern portion of the zone, and
- 138-kV and 69-kV network in the southern portion of the zone.

Key system performance issues in Zone 1 include:

- Sensitivity of the 69-kV transmission corridor in the central part of Monroe County to a west-to-east system bias

- Metomen 138/69-kV transformer has the potential to overload with an intact system and under contingency
- Thermal overloads under contingency in the central Juneau and southeast Woods County areas
- Voltage issues in the Ripon, Berlin, Omro, and Winneconne areas under contingency.
- Several projects in past 10-Year Assessments found low voltage and thermal overload issues which did not appear in the 2011 TYA. The in-service dates of these projects were retained for now until it can be determined in future assessments that these voltage and thermal issues no longer exist.

Zone 1 - 2012 Study Results

Refer to Table ZS-1 and Figure ZS-1

Summary of key findings

- Sensitivity of the 69-kV transmission corridor in the central part of Monroe County to a west-to-east system bias, and
- Thermal overloads under contingency along the Petenwell to Saratoga line with a west-to-east bias.

The 138-kV bus voltages at the Petenwell, Council Creek and ACEC Badger West substations fall below ATC Planning Criteria under certain contingencies during high loads. The low voltages can be addressed by manually adjusting LTCs on local 138/69-kV transformers. This issue does not occur in the off-peak sensitivity models.

The planned distribution interconnection (Woodmin Substation) in the Minocqua area will require a new 115-kV transmission line to be installed by June 2012. The Public Service Commission of Wisconsin (PSCW) granted a certificate of public convenience and necessity in October of 2010, authorizing ATC to construct the facilities described in our application.

Projects whose "Need date" precedes the "In-service date"

- None

Projects whose "In-service date" precedes the "Need date"

- None

Zone 1 - 2016 study results

Refer to Table ZS-2 and Figure ZS-2

Summary of key findings

- The 69-kV transmission corridor in the central part of Monroe County and the 138-kV facilities in central Juneau County and southeast Wood County are sensitive to west-to-east system biases,
- Petenwell 138/69-kV transformer overloads under system intact and single contingency conditions, and
- Maintenance and voltage issues exist in the greater Berlin and Ripon areas that need to be addressed.

Low voltages and overloads on the transmission facilities can occur around the Tomah area. The 69-kV transmission corridor in the central part of Monroe County is particularly sensitive to a west-to-east system bias. Thus, this area will require reinforcements to be implemented to reliably serve load in the future. Several potential reinforcements have been evaluated to address the low voltage and thermal overload issues in the Tomah area. Furthermore, there is a need for periodic separation of the ATC and Dairyland Power Cooperative facilities at the Council Creek Substation to prevent overloads. ATC worked in cooperation with Dairyland Power Cooperative and Xcel Energy to develop a more comprehensive long term solution to address reliability issues in the Tomah area as well as the limitations along the Monroe County to Council Creek transmission corridor. The proposed solution is to replace the existing 69-kV circuit between the Monroe County and Council Creek Substations with a new 161/69-kV double circuit line in 2014. This solution addresses Planning Criteria driven needs, reduces system losses and provides economic benefits to customers.

The loading on the Petenwell 138/69-kV transformer exceeds its summer normal rating under system intact conditions and exceeds its summer emergency rating under single contingency conditions. A proposed project to upgrade this transformer is currently scheduled for 2015. To improve operating flexibility, this project also includes the reconfiguration of the Petenwell 138-kV bus. Dispatching generation and distribution load bridging will be utilized as an interim mitigation measure to alleviate potential loading issues. This issue does not occur in the off-peak sensitivity models.

Low voltages around the greater Berlin area will necessitate additional capacitors to be installed at Ripon Substation. This issue does not occur in the off-peak sensitivity models.

No performance limits were exceeded for Category A conditions for all 2016 analysis except the high voltage at Council Creek 138-kV bus in the 2016 minimum load model. The

Council Creek high voltage issue can be addressed by adjusting the Council Creek 138/69-kV transformer LTC settings.

The lead times necessary to implement the corrective plans that are scheduled for 2012 through 2016 were considered and taken into account prior to assigning an in-service date for each associated project. All of the projects scheduled for the near term planning horizon have an "In-service date" that matches the "Need date", except the following projects:

Projects whose "Need date" precedes the "In-service date"

- None

Projects whose "In-service date" precedes the "Need date"

- Upgrade and install capacitor banks at Ripon 69-kV substation

Zone 1 - 2021 study results

Refer to Table ZS-3 and Figure ZS-3

Summary of key findings

- Two transformers serving the 69-kV system are overloaded under single contingency and/or under an intact system,
- Additional reinforcement on the 69-kV line system in central Juneau County is needed due to overloads under contingency, and
- Potential voltage issues in the Ripon-Berlin and Omro –Winneconne areas begin to appear under contingency.

The Metomen 138/69-kV transformer loading is approaching its summer emergency rating under contingency conditions. The Metomen transformer 69-kV breaker was replaced in 2009 and the existing 47 MVA Metomen 138/69-kV transformer will be replaced with a 100 MVA transformer in 2017.

As discussed in the 2016 study results, the Petenwell 138/69-kV transformer loading exceeds its summer normal rating under system intact conditions and exceeds its summer emergency rating under single contingency conditions. The transformer needs to be replaced in 2015. Dispatching generation and distribution load bridging will be utilized as an interim mitigation measure to alleviate potential thermal problems.

Maintenance and voltage issues exist in the greater Berlin and Ripon areas that need to be addressed. To address these issues in the greater Berlin/Ripon area, a reconfiguration of the North Randolph - Ripon 69-kV line is proposed. A new 69-kV line will connect the

Fairwater and Mackford Prairie substations forming a new 69-kV line from North Randolph to Metomen Substation. The northern portion of the existing Mackford Prairie Tap - Ripon 69-kV line will then be extended into a vacant terminal position at Metomen Substation, creating a second Ripon-Metomen 69-kV line. This will allow for the retirement of a portion of the North Randolph-Ripon circuit between Metomen and Mackford Prairie substations which is where a significant portion of the maintenance issues are located.

No performance limits were exceeded for Category A conditions for all 2021 analysis except the high voltage at Council Creek 138-kV bus in the 2021 minimum load model and overload of the Petenwell 138/69-kV transformer in the 2021 summer peak model. The Council Creek high voltage issue can be addressed by adjusting the Council Creek 138/69-kV transformer LTC settings. The Petenwell transformer overloading issue is addressed by replacing the transformer in 2015.

The lead times necessary to implement the corrective plans that are scheduled for 2017 through 2021 were considered and taken into account prior to assigning an in-service date for each associated project. All of the projects scheduled for the longer term planning horizon have an “In-service date” that matches the “Need date”, except the following projects:

Projects whose “Need date” precedes the “In-service date”

- None

Projects whose “In-service date” precedes the “Need date”

- None

Zone 1 - 2026 study results

Refer to Table ZS-4 and Figure ZS-4

Summary of key findings

- Voltage and thermal issues remain in Zone 1 under contingency conditions. The results of the 2026 contingency analysis (NERC Category B or TPL-002 conditions) performed on Zone 1 can be found in Table ZS-4. Please note that because this is a 15-year projected scenario, new projects were not necessarily added to the Assessment based upon these results. However, we will continue to monitor these situations in future scenarios to determine which project(s) may solve these potential issues.

Assessment of Steady State Compliance with NERC Standards

The mitigation plans comprised of planned, proposed, and provisional project as well as appropriate system adjustments identified for Zone 1 in this Assessment will allow the ATC system in Zone 1 to meet the steady state portions of NERC standards TPL-001 and TPL-002 in each of the five years 2012-2016, and for the 2017-2021 planning horizon.

Table ZS-1
2012 Limitations and Performance Criteria Exceeded

Planning Zone	Criteria Exceeded/Need	2012 Summer Peak Case		2012 Minimum Load Case		Facility Outage(s)
		% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	
1	Base case loading criteria exceeded	FALSE	--	FALSE	--	System Intact
1	Base case voltage criteria exceeded	--	FALSE	--	FALSE	System Intact
1	Council Creek 138-kV bus	--	89.1% - 89.2%	--	--	Council Creek - Petenwell 138-kV line ACEC Badger West - Saratoga 138 KV line ACEC Badger West - Petenwell 138 KV line Saratoga - Petenwell 138-KV line
1	Badger West 138-kV bus	--	89.3%	--	--	ACEC Badger West - Saratoga 138 KV line
1	Petenwell 138-kV bus	--	89.3%	--	--	ACEC Badger West - Saratoga 138 KV line ACEC Badger West - Petenwell 138 KV line Saratoga - Petenwell 138-KV line
2	Base case loading criteria exceeded	FALSE	--	FALSE	--	System Intact
2	Base case voltage criteria exceeded	--	FALSE	--	TRUE	System Intact
2	M38 – Atlantic 69-kV line	94.6%	--	--	--	M38 – Atlantic 138-kV line M38 – Atlantic 138-kV line[5]
2	Chandler – Lakehead Tap 69-kV line Masonville – Lakehead Tap 69-kV line Gladstone – North Bluff 69-kV line Madonville – Gladstone 69-kV line	108.5% 104.3% 97.3% 97.2%	--	--	--	Delta – Mead 69-kV line
2	Delta – Mead 69-kV line	97.3%	--	--	--	Chandler – Lakehead 69-kV line
2	Engadine, Newberry, LouPac, Newberry Hospital, Newberry Village, Roberts 69-kV buses	--	90.9 - 91.3%	--	--	Hiawatha – Engadine 69-kV line
2	North Bluff, Bay View, Mead, Gladstone, Masonville and Lakehead 69-kV buses	--	84.2 - 89.1%	--	--	Delta – Mead 69-kV line
2	Mead and Bay View 69-kV buses	--	--	--	90.4-91.0%	Delta – Mead 69-kV line
2	Alger Delta, Munising, Alger 69-kV buses	--	--	--	105.4-105.5%	System Intact
2	Atlantic 138-kV bus	--	--	--	113.7%	Atlantic – M38 138-kV line
3	Base Case Loading Criteria Exceeded	FALSE	--	FALSE	--	System Intact
3	Base Case Voltage Criteria Exceeded	--	FALSE	--	TRUE	System Intact
3	Royster – AGA Gas Tap 69-kV line	109.0%	--	--	--	Fitchburg – Syene 69-kV line
3	Royster – Sycamore 69-kV line	95.5%	--	--	--	Femrite 138/69-kV transformer
3	Darlington 138-kV bus	--	--	--	105.2%	System Intact
3	Huiskamp 138-kV bus	--	90.5%	--	114.8%	Huiskamp – North Madison 138-kV line
3	Verona 138-kV bus	--	90.9%	--	114.6%	Verona – Oak Ridge 138-kV line

Table ZS-1
2012 Limitations and Performance Criteria Exceeded

Planning Zone	Criteria Exceeded/Need	2012 Summer Peak Case		2012 Minimum Load Case		Facility Outage(s)
		% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	
3	Hubbard and Hustisford 138-kV buses	--	87.5% 88.1% 88.1%	--	90.1% 90.2% 90.2%	Rubicon – Hustisford 138-kV line Hustisford – Hubbard 138-kV line Rubicon – Hustisford – Hubbard 138-kV line
4	Base case loading criteria exceeded	FALSE	--	FALSE	--	System Intact
4	Base case voltage criteria exceeded	--	FALSE	--	FALSE	System Intact
4	Sunset Point – Pearl Avenue 69-kV line	106.7% 106.4%	--	--	--	Ellinwood – 12th Avenue 69-kV line Ellinwood 138/69-kV transformer[3]
5	Base Case Loading Criteria Exceeded	FALSE	--	FALSE	--	System Intact
5	Base Case Voltage Criteria Exceeded	--	FALSE	--	TRUE	System Intact
5	Albers, Allerton, Hayes, Kenosha, Nicholson, Oak Creek, Pennsylvania, Racine, Ramsey, St. Rita, and Somers 138-kV buses	--	--	--	105-106.1%	System Intact
5	Maple and Germantown 138-kV buses	--	91.7% 91.2%	--	--	Maple – Saukville 138-kV line
5	Bain 345/138-kV transformer #5	108.3% 158.2%	--	--	--	Split Pleasant Prairie 345-kV bus 34 Split Pleasant Prairie 345-kV bus 23
5	Oak Creek 345/230-kV transformer T895	104% 100.1%	--	--	--	Split Oak Creek 230-kV bus 78 Split Oak Creek 230-kV bus 67
5	Arcadian4 – Waukesha1 138-kV line	98.8%	--	--	--	Arcadian6 – Waukesha3 138-kV line
5	Arcadian6 – Waukesha3 138-kV line	95.7%	--	--	--	Arcadian4 – Waukesha1 138-kV line Split Waukesha 138-kV bus 12
5	Harbor – Kansas 138-kV line	94.8%	--	--	--	Kansas – Norwich 138-kV line

Table ZS-2
2016 Limitations and Performance Criteria Exceeded

Planning Zone	Criteria Exceeded/Need	2016 Summer Peak Case		2016 70% Load Case		2016 90% Load Case		2016 105% Load Case		2016 65% High W-E Case		Facility Outage(s)
		% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	
1	Base case loading criteria exceeded	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	System Intact
1	Base case voltage criteria exceeded	--	FALSE	--	FALSE	--	TRUE	--	FALSE	--	TRUE	System Intact
1	Council Creek 138-kV bus	--	104.9%	--	--	--	105.3%	--	--	--	105.4%	System Intact
1	Dartford 69-kV bus	--	91.2 - 91.4%	--	--	--	--	--	--	--	--	Ripon - Northwest Ripon Tap 69-KV line Metomen - Ripon 69-KV line
1	Petenwell 138/69 KV transformer	98.0 - 95.2%	--	--	--	--	--	98.1%	--	115.5%	--	Castle Rock - Quincy ACEC 69-KV line Hilltop - Buckhorn Tap 69-KV line Castle Rock - McKenna 69-kV line[1] McKenna - Quincy ACEC 69-KV line
1	ACEC Badger West - Saratoga 138-kV line	--	--	95.2 - 96.8%	--	--	--	--	--	95.8 - 100.9%	--	Arpin - Eau Claire 345-kV line King - Eau Claire - Arpin 345-kV line[5]
1	ACEC Badger West - Petenwell 138-kV line	--	--	98.2 - 99.8%	--	--	--	--	--	95.8 - 103.9%	--	Arpin - Eau Claire 345-kV line King - Eau Claire - Arpin 345-kV line[5]
2	Base case loading criteria exceeded	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	System Intact
2	Base case voltage criteria exceeded	--	FALSE	--	TRUE	--	FALSE	--	FALSE	--	FALSE	System Intact
2	Mead and Chandler 69-kV buses	--	--	--	--	--	--	--	--	--	95.1 - 95.9%	System Intact
2	Munising, Alger, Alger-Delta 69-kV buses	--	--	--	105-105.5%	--	--	--	--	--	--	System Intact
2	Lakota Road 115-kV bus	--	--	--	105.30%	--	--	--	--	--	--	System Intact
2	Indian Lake 69-kV bus	--	--	--	--	--	--	--	--	--	92.0% 91.1% 91.6% 91.7%	Pleasant Prairie – Zion 345-kV line Pleasant Prairie – Zion 345-kV line[27] Indian Lake 69-kV capacitor bank Perkins 138-kV capacitor bank
2	Indian Lake 138/69-kV transformer #1 Indian Lake 138/69-kV transformer #2	--	--	--	--	--	--	--	--	97.2-98.2%	--	Indian Lake 138/69-kV transformer #2 Indian Lake 138/69-kV transformer #1
2	Delta – Mead 69-kV line	102.3% 97.4% 97.1%	--	--	--	--	--	101.7% 96.8% 96.7%	--	--	--	Chandler – Lakehead Tap 69-kV line Masonville – Lakehead Tap 69-kV line Chandler - Lakehead - Masonville 69-kV line[26]
2	Chandler – Lakehead Tap 69-kV line Masonville – Gladstone 69-kV line Masonville – Lakehead Tap 69-kV line	112.8% 96.9% 108.5%	--	101.8% 90.7% 98.8%	--	108.6% 94.3% 104.7%	--	114.8% 97.9% 110.2%	--	103.9% 93.4% 101.1%	--	Delta – Mead 69-kV line
2	M38 – Atlantic 69-kV line	--	--	--	--	--	--	96.3% 96.5% 100%	--	--	--	M38 – Atlantic 138-kV line Atlantic 138/69-kV transformer M38 – Atlantic 69-kV line[23]
2	Engadine, Newberry, Newberry Hospital, Roberts, LouPac, Newberry Village, Hulbert and Eckerman 69-kV buses	--	90.3-90.7%	--	--	--	91.5-91.9%	--	91.3-91.7%	--	--	Hiawatha – Engadine 69-kV line
2	North Bluff, Bay View, Mead, Gladstone, Lakehead, Masonville 69-kV buses	--	84.7-91.8%	--	85.5-90.1%	--	84.9-89.6%	--	83.7-91.6%	--	82.3-90.5%	Delta – Mead 69-kV line
2	Empire - Presque Isle 138-kV line	--	--	--	--	--	--	--	--	100.6%	--	Split Empire 138-kV bus #23
2	Escanaba and West 69-kV buses	--	91.4-91.9%	--	--	--	--	--	--	--	--	Delta - West Tap 69-kV line
2	Nordic – Mountain 69-kV line	--	--	--	--	--	--	--	--	102.0% 110.5%	--	Empire – Forsyth 138-kV line Plains – Arnold 138-kV line

Table ZS-2
2016 Limitations and Performance Criteria Exceeded

Planning Zone	Criteria Exceeded/Need	2016 Summer Peak Case		2016 70% Load Case		2016 90% Load Case		2016 105% Load Case		2016 65% High W-E Case		Facility Outage(s)
		% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	
3	Base case loading criteria exceeded	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	System Intact
3	Base case voltage criteria exceeded	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	System Intact
	Royster – Sycamore 69-kV line	98.2%	--	--	--	--	--	--	104.5%	--	--	Femrite 138/69-kV transformer
3	Verona 138-kV bus	--	89.4%	--	--	--	89.9%	--	88.8%	--	--	Verona – Oak Ridge 138-kV line
3	Huiskamp 138-kV bus	--	89.9%	--	91.7%	--	90.4%	--	89.9%	--	91.7%	Huiskamp – North Madison 138-kV line
3	Darlington – North Monroe 138-kV line	--	--	--	--	--	--	--	--	102.0 – 95%	--	Paddock 345/138-kV transformer Darlington 138/69-kV transformer Darlington – DPC Gratiot 69-kV line
3	Eden – Mineral Point 69-kV line	--	--	--	--	--	--	--	--	95.3%	--	Darlington – Lafayette Wind 138-kV line
3	South Monroe – Browntown 69-kV line	--	--	--	--	--	--	--	--	97.0%	--	Darlington – North Monroe 138-kV line
3	Concord 138-kV bus	--	--	--	--	--	--	--	96.0%	--	--	System Intact
3	Hubbard and Hustisford 138-kV buses	--	87.5% 88.2% 88.2%	--	87.1% 87.4% 87.4%	--	87.2% 86.5% 86.5%	--	--	--	87.2% 87.9% 87.9%	Rubicon – Hustisford 138-kV line Hustisford - Hubbard 138kV line Rubicon - Hustisford - Hubbard 138kV line
4	Base case loading criteria exceeded	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	System Intact
4	Base case voltage criteria exceeded	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	System Intact
4	Manrap – Custer 69-kV line	--	--	--	--	--	--	95.4%	--	--	--	Dewey – Lakefront 69-kV line
4	Lau Road – Elkhart Lake 138-kV line	--	--	--	--	--	--	--	--	95.6% 95.6% 95.6%	--	Sheboygan Energy Center – Grandville 345-kV line Point Beach – Sheboygan Energy Center 345-kV line Point Beach 345-kV bus tie 1 - 2
4	Elkhart Lake – Saukville 138-kV line	--	--	--	--	--	--	--	--	106.7% 106.7% 106.6% 103.4% 102.9% 101.9 – 95.0%	--	Point Beach 345-kV bus tie 1 - 2 Point Beach – Sheboygan Energy Center 345-kV line Sheboygan Energy Center – Granville 345-kV line Cypress – Arcadian 345-kV line Edgewater – Cedarsauk 345-kV line Plus other less severe contingencies
4	Gravesville - Glenview 138-kV line	96.7% 96.7% 96.6% -- --	--	--	--	--	--	102.9% 102.9% 102.9% 96.0% 96.0%	--	--	--	Tecumseh Road 138/69 kV Transformer* Tecumseh Road 138/69 kV Transformer Tecumseh Road - Ford Drive tap 69-kV line Ford Drive tap - New Holstein 69-kV line Tecumseh Road - New Holstein 69-kV line*
4	Sunset Point – Pearl Avenue 69-kV line	107.9% 107.9%	--	--	--	97.0% 96.9%	--	113.6% 113.4%	--	--	--	Ellinwood – 12th Avenue 69-kV line Ellinwood 138/69-kV transformer*
5	Base case loading criteria exceeded	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	System Intact
5	Base case voltage criteria exceeded	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	System Intact
5	Bain 345/138-kV transformer #5	158.6% 111.4%	--	142.5% --	--	158.8% --	--	158.3% 106.4%	--	142.6% 127.1%	--	Split Pleasant Prairie 345-kV bus 34 Split Pleasant Prairie 345-kV bus 23
5	Oak Creek 345/230-kV transformer T895	104.2% 101.5%	--	--	--	104.4% --	--	104.3% 101.9%	--	--	--	Split Oak Creek 230-kV bus 78 Split Oak Creek 230-kV bus 67
5	Arcadian4 – Waukesha1 138-kV line	97.9%	--	114.1%	--	130.4%	--	98.5%	--	--	--	Arcadian6 – Waukesha3 138-kV line
5	Arcadian6 – Waukesha3 138-kV line	94.7% --	--	110.5% 100.4%	--	126.3% 112.7%	--	95.4% --	--	--	--	Arcadian4 – Waukesha1 138-kV line Split Waukesha 138-kV bus 12

Table ZS-2
2016 Limitations and Performance Criteria Exceeded

Planning Zone	Criteria Exceeded/Need	2016 Summer Peak Case		2016 70% Load Case		2016 90% Load Case		2016 105% Load Case		2016 65% High W-E Case		Facility Outage(s)
		% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	
5	Arcadian 345/138-kV transformer #3	--	--	--	--	96.2% 99.6% 94.9%	--	--	--	--	--	Split Arcadian 345-kV bus 12 Arcadian 345-kV bus outage Arcadian 345/138-kV transformer #1
5	Bain – Kenosha 138-kV line	--	--	--	--	--	--	--	--	100.3%	--	Pleasant Prairie – Zion 345-kV line
5	Pleasant Prairie – Zion 345-kV line	--	--	--	--	--	--	--	--	96.8%	--	Zion – Arcadian 345-kV line[27]
5	Granville 345/138-kV transformer #1	--	--	--	--	108.2%	--	--	--	--	--	Split Granville 345-kV bus 23
5	Harbor – Kansas 138-kV line	--	--	110.4% 105.3% 102.5% 101.7%	--	100.0% -- -- --	--	--	--	--	--	Kansas – Norwich 138-kV line Dewey – Norwich 138-kV line Split Dewey 138-kV bus Dewey – Montana 138-kV line Plus Other Less Severe Outages
5	Albers – Kenosha 138-kV line	--	--	107.2%	--	105.6%	--	--	--	--	--	Albers – Bain 138-kV line
5	Edgewood – St. Martins 138-kV line	--	--	98.1%	--	--	--	--	--	--	--	Merrill Hills – Waukesha 138-kV line
5	Oak Creek – Ramsey 138-kV line Kansas – Ramsey 138-kV line Nicholson – Ramsey 138-kV line	--	--	--	--	101.0% 96.1% 95.1%	--	--	--	--	--	Oak Creek – Pennsylvania 138-kV line
5	Waukesha 138-kV bus 12	--	--	--	--	99.7%	--	--	--	--	--	Arcadian6 – Waukesha3 138-kV line
5	Kenosha – Lakeview 138-kV line	--	--	--	--	--	--	96.2%	--	126.9%	--	Pleasant Prairie – Zion 345-kV line
5	Lakeview – Zion 138-kV line	--	--	--	--	--	--	--	--	129.9%	--	Pleasant Prairie – Zion 345-kV line

Table ZS-3
2021 Limitations and Performance Criteria Exceeded

Planning Zone	Criteria Exceeded/Need	2021 Summer Peak Case		2021 Minimum Load Case		2021 70% Shoulder Case		2021 90% E-W Bias Case		2021 65% High W-E Bias Case		Facility Outage(s)
		% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	
1	Base case loading criteria exceeded	TRUE	--	FALSE	--	FALSE	--	FALSE	--	TRUE	--	System Intact
1	Base case voltage criteria exceeded	--	FALSE	--	TRUE	--	FALSE	--	FALSE	--	FALSE	System Intact
1	Dartford,Ripon Industrial Park, Northwest Ripon and Ripon 69-kV buses	--	90.5 - 91.9% 90.6 - 91.9% 91.6%	--	--	--	--	--	--	--	--	Ripon - NW Ripon Tap 69-KV line Metomen - Ripon 69-KV line NW Ripon Tap - Dartford Tap 69-KV line
1	Winneconne, Omro and Omro Industrial Park 69-kV buses	--	90.8 - 91.4%	--	--	--	--	--	--	--	--	Winneconne - Sunset Point 69-kV line
1	Council Creek 161-kV bus	--	91.2%	--	--	--	--	--	--	--	--	Monroe County - La Crosse 161-kV line
1	Council Creek 138-kV bus	--	--	--	105.5%	--	--	--	--	--	--	System Intact
1	Metomen 138/69 KV transformer	95.6%	--	--	--	--	--	--	--	--	--	System Intact
1	Petenwell 138/69 KV transformer	101.7% 106.2% 104.1% 103.5% 101.4 - 103.3%	--	--	--	95.6 - 104.2%	--	--	--	119.2%	--	System Intact Castle Rock - Quincy ACEC 69-KV line Hilltop - Buckhorn Tap 69-KV line Castle Rock - McKenna 69-kV line[14] Plus other less severe contingencies
1	Castle Rock - ACEC Quincy 69-KV line	98.8% 98.8% 98.7%	--	--	--	--	--	--	--	--	--	Petenwell - Big Pond 69-KV line Petenwell 138/69-kV Transformer Necedah Tap - Big Pond 69-KV line
1	ACEC Badger West - Petenwell 138-kV line	--	--	--	--	96.9 - 135.9%	--	--	--	96.1 - 103.8%	--	Arpin - Eau Claire 345-kV line King - Eau Claire 345-kV line Arpin 345/138-kV transformer Arrowhead - Stone Lake 345-kV line Plus other less severe contingencies
1	ACEC Badger West - Saratoga 138-kV line	--	--	--	--	97.1 - 132.7%	--	--	--	100.5%	--	Arpin - Eau Claire 345-kV line King - Eau Claire 345-kV line Arpin 345/138-kV transformer Arrowhead - Stone Lake 345-kV line Plus other less severe contingencies
2	Base case loading criteria exceeded	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	System Intact
2	Base case voltage criteria exceeded	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	System Intact
2	Engadine, Newberry, Newberry Hospital, Roberts, LouPac, Newberry Village, Hulbert, Eckerman 69-kV buses	--	84.4-90.4% --	--	--	--	--	--	88.5-89.0% 89.5-89.8%			Hiawatha-Engadine 69-kV line Engadine-Newberry 69-kV line
3	Base case loading criteria exceeded	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	System Intact
3	Base case voltage criteria exceeded	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	System Intact
3	Darlington – North Monroe 138-kV line	--	--	--	--	--	--	--	--	118.8 – 98.8%	--	Paddock 345/138-kV transformer Darlington 138/69-kV transformer Darlington – DPC Gratiot 69-kV line Eden – Wyoming Valley 138-kV line Eden – Wyoming Valley – Spring Green 138-kV line plus other less severe contingencies
3	Eden – Mineral Point 69-kV line	--	--	--	--	--	--	--	--	111.3 – 98.5%	--	Darlington – Lafayette Wind 138-kV line
3	South Monroe – Browntown – Jennings Road – Wiote 69-kV line	--	--	--	--	--	--	--	--	110.8 – 101.2%	--	Darlington – North Monroe 138-kV line
3	Nelson Dewey 161/138-kV transformer	--	--	--	--	96.0%	--	--	--	--	--	System Intact
3	Nelson Dewey 161/138-kV transformer	--	--	--	--	103.1 – 99.4%	--	--	--	--	--	Nelson Dewey Unit 2 Pleasant Praire Unit 1 Pleasant Praire Unit 2 Edgewater Unit 5 plus other less severe contingencies
3	Royster – Sycamore 69-kV line	106.3%	--	--	--	--	--	96.3%	--	--	--	Femrite 138/69-kV transformer

Table ZS-3
2021 Limitations and Performance Criteria Exceeded

Planning Zone	Criteria Exceeded/Need	2021 Summer Peak Case		2021 Minimum Load Case		2021 70% Shoulder Case		2021 90% E-W Bias Case		2021 65% High W-E Bias Case		Facility Outage(s)
		% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	% of Facility Rating	% of Nominal Bus Voltage	
3	Westport – Wanakee Muni#2 69-kV line	98.1%	--	--	--	--	--	--	--	--	--	West Middleton – Pheasant Branch 69-kV line
3	Verona 138-kV bus	--	87.9%	--	--	--	90.8%	--	88.8%	--	91.4%	Verona – Oak Ridge 138-kV line Verona 138/69-kV transformer
3	Huiskamp 138-kV bus	--	89.4%	--	114.8%	--	90.1%	--	90.4%	--	91.4%	Huiskamp – North Madison 138-kV line
3	Hubbard and Hustisford 138-kV bus	--	87.5% 88.1% 88.1%	--	87.5% 87.6% 87.6%	--	86.9% 87.3% 87.3%	--	88.1% 88.1% 88.1%	--	87.2% 87.2% 87.1%	Rubicon – Hustisford 138-kV line Hustisford – Hubbard 138-kV line Rubicon – Hustisford – Hubbard 138-kV line
3	Paddock – Townline 138kV line	--	--	--	--	102.8% 101.8% 101.1%	--	--	--	--	--	NW Neloit – Paddock 138-kV line Paddock – NW Beloit – Blackhawk 138-kV line NW Beloit – Blackhawk 138-kV line
3	NW Beloit – Paddock 138kV line	--	--	--	--	96.9%	--	--	--	--	--	Paddock – Townline 138-kV line
4	Base case loading criteria exceeded	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	System Intact
4	Base case voltage criteria exceeded	--	FALSE	--	TRUE	--	FALSE	--	FALSE	--	FALSE	System Intact
4	Manrap – Custer 69-kV line	99.3%	--	--	--	--	--	--	--	--	--	Dewey – Lakefront 69-kV line
4	Glenview – Gravesville 69-kV line	103.7% 103.7% 103.7% 97.0% 97.0%	--	--	--	--	--	--	--	--	--	Tecumseh Road 138/69 kV Transformer* Tecumseh Road 138/69 kV Transformer Tecumseh Road - Ford Drive tap 69-kV line Ford Drive tap - New Holstein 69-kV line Tecumseh Road - New Holstein 69-kV line*
4	Sunset Point – Pearl Avenue 69-kV line	110.5% 110.4%	--	--	--	--	--	98.9% 98.9%	--	--	--	Ellinwood 138/69-kV transformer* Ellinwood – 12th Avenue 69-kV line
4	Morgan – Falls 138-kV line	--	--	--	--	101.8%	--	--	--	--	--	Morgan – Plains 345-kV line
4	Elkhart Lake – Saukville 138-kV line	--	--	--	--	--	--	--	--	97.9%	--	Barnhart – Cedarsauk 345-kV line
4	Kewaunee 138-kV bus	--	--	--	103.6%	--	--	--	--	--	--	System Intact
5	Base case loading criteria exceeded	FALSE	--	FALSE	--	FALSE	--	FALSE	--	FALSE	--	System Intact
5	Base case voltage criteria exceeded	--	FALSE	--	TRUE	--	FALSE	--	FALSE	--	FALSE	System Intact
5	Oak Creek 345/230-kV transformer T895	104.3% 102.5%	--	--	--	--	--	104.4% 102.5%	--	102.7% 99.8%	--	Split Oak Creek 230-kV bus 78 Split Oak Creek 230-kV bus 67
5	Bain 345/138-kV transformer #5	158.4% 104.6%	--	--	--	--	--	--	--	--	--	Split Pleasant Prairie 345-kV bus 34 Split Pleasant Prairie 345-kV bus 23
5	Arcadian4 – Waukesha1 138-kV line	98.4%	--	--	--	110.2%	--	120.4%	--	--	--	Arcadian6 – Waukesha3 138-kV line
5	Arcadian6 – Waukesha3 138-kV line	95.3% --	--	--	--	106.8% 95.8%	--	116.6% 102.0%	--	--	--	Arcadian4 – Waukesha1 138-kV line Split Waukesha 1-2 bus
5	Arcadian 345/138-kV transformer #3	--	--	--	--	--	--	95.9%	--	--	--	Arcadian 345/138-kV transformer #1
5	Pleasant Prairie – Zion 345-kV line	--	--	--	--	--	--	--	--	108.2% 101.1% 98.8%	--	Zion – Arcadian 345-kV line Zion - Arcadian 345-kV line[14] System Intact
5	Lakeview – Zion 138-kV line Arcadian – Zion 345-kV line Kenosha - Lakeview 138-kV line	96.8% -- 99.6%	--	--	--	--	--	--	--	144% 108.1% 141.9%	--	Pleasant Prairie – Zion 345-kV line
5	Bain – Kenosha 138-kV line	--	--	--	--	--	--	--	--	107.8%	--	Pleasant Prairie – Zion 345-kV line
5	Albers – Kenosha 138-kV line	--	--	--	--	100.4%	--			--	--	Albers – Bain 138-kV line
5	Maple and Germantown 138-kV buses	--	--	--	--	--	--	--	89.7-90.3%	--	--	Saukville – Maple 138-kV line

Table ZS-4
2026 Limitations and Performance Criteria Exceeded

Planning Zone	Criteria Exceeded/Need	2026 Summer Peak Case		Facility Outage(s)
		% of Facility Rating	% of Nominal Bus Voltage	
1	Base case loading criteria exceeded	TRUE	--	System Intact
1	Base case voltage criteria exceeded	--	TRUE	System Intact
1	Silver Lake, ACEC Spring Lake, Redgranite, Fountain Valley, River Run, Berlin and Fox River 69-kV buses	--	90.0 - 91.7% 91.0 - 91.2% 91.2 - 91.4% 91.8 - 91.9%	Wautoma – Silver Lake Tap 69-kV line Ripon - Northwest Ripon Tap 69-KV line Metomen – Ripon 69-kV line Silver Lake – ACEC Spring Lake 69-kV line
1	Dartford,Ripon Industrial Park, Northwest Ripon and Ripon 69-kV buses	--	96.4% 88.3 - 89.8% 88.5 - 89.9% 90.4 - 91.8%	System Intact Ripon - Northwest Ripon Tap 69-KV line Metomen – Ripon 69-kV line Northwest Ripon Tap - Dartford Tap 69-KV line
1	Winneconne, Omro and Omro Industrial Park 69-kV buses	--	89.4 - 90.0%	Winneconne – Sunset Point 69-kV line
1	Castle Rock – ACEC Quincy 69-kV line	101.1%	--	Necedah Tap – Big Pond 69-kV line Petenwell – Big Pond 69-kV line Petenwell 138/69-kV transformer
1	Metomen 138/69 KV transformer	100.5% 101.4% 100.0%	--	System Intact North Fond du Lac 138/69-kV transformer North Fond du Lac – Rosendale Tap 69-kV line
1	Petenwell 138/69-kV transformer	106.2% 110.2% 107.9% 107.5% 107.3% 98.6 - 106.2%	--	System Intact Castle Rock – Quincy ACEC 69-kV line McKenna – Quincy ACEC 69-kV line Hilltop – Buckhorn Tap 69-kV line Castle Rock - McKenna 69-kV line[25] Plus other less severe contingencies
1	Wautoma - ACEC Wautoma Tap 69-kV line	96.9%	--	Harrison North - Harrison 69-kV line
2	Base case loading criteria exceeded	FALSE	--	System Intact
2	Base case voltage criteria exceeded	--	FALSE	System Intact
2	Hulbert, Eckermann, Lou-Pac, Newberry Village, Roberts, Talantino 69-kV buses	--	83.5 - 89.4% 88.1 - 91.5% 86.4 - 90.8% 86.7 - 91.2%	Engadine – Newberry 69-kV line Newberry – Newberry Hospital 69-kV line Newberry Hospital – Roberts 69-kV line Hiawatha – Roberts 69-kV line 6911[24]
3	Base case loading criteria exceeded	FALSE	--	System Intact
3	Base case voltage criteria exceeded	--	FALSE	System Intact
3	Timberlane Tap – West Middleton 69-kV line	95.6%	--	Spring Green 138/69-kV transformer
3	West Middleton – Pheasant Branch 69-kV line	107.8 – 96.5%	--	Waunakee Switching – Waunakee Municipal 2 69-kV line Westport – Waunakee Municipal 2 69-kV line
3	West Middleton 138/69-kV transformer		--	West Middleton 138/69-kV transformer
3	Westport – Waunakee Muni2 69-kV line	114.7%	--	West Middleton – Pheasant Branch 69-kV line
3	Waunakee Industrial Park – Huiskamp 69-kV line	95.7%	--	West Middleton – Pheasant Branch 69-kV line
3	Royster – Sycamore 69-kV line	115.0%	--	Femrite 138/69-kV transformer
3	Huiskamp 138-kV bus	--	88.7%	Huiskamp – North Madison 138-kV line
3	Verona 138-kV bus	--	86.0%	Verona – Oak Ridge 138-kV line
3	Hubbard and Hustisford 138-kV bus	--	87.0% 87.7% 87.7%	Rubicon – Hustisford 138-kV line Hustisford – Hubbard 138-kV line Rubicon – Hustisford – Hubbard 138-kV line
3	Alto 69-kV bus	--	96.8%	System Intact
4	Base case loading criteria exceeded	FALSE	--	System Intact
4	Base case voltage criteria exceeded	--	FALSE	System Intact
4	Manrap – Custer 69-kV line	106.2%	--	Dewey – Lakefront 69-kV line

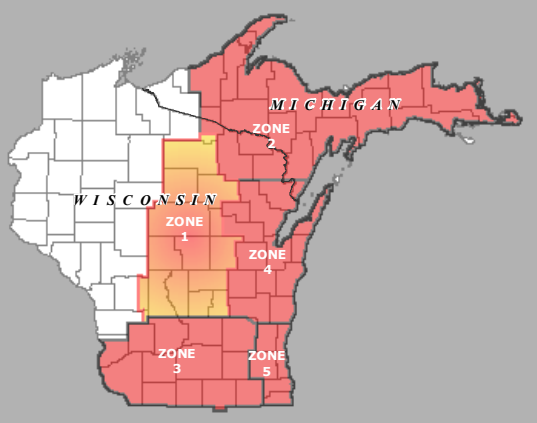
Table ZS-4
2026 Limitations and Performance Criteria Exceeded

Planning Zone	Criteria Exceeded/Need	2026 Summer Peak Case		Facility Outage(s)
		% of Facility Rating	% of Nominal Bus Voltage	
4	Glenview – Gravesville 69-kV line	101.5% 101.5% 101.5%	--	Tecumseh Road 138/69-kV transformer[24] Tecumseh Road 138/69-kV transformer Tecumseh Road – Ford Drive 69-kV
4	Sunset Point – Pearl Avenue 69-kV line	113.2% 112.9%	--	Ellinwood – 12th Avenue 69-kV line Ellinwood 138/69-kV transformer[20]
5	Base Case Loading Criteria Exceeded	FALSE	--	System Intact
5	Base Case Voltage Criteria Exceeded	--	FALSE	System Intact
5	Bluemound 230-kV buses #1, #2 and #3	--	95.8%	System Intact
5	Brookdale East, Allerton 138-kV buses	--	95.5 - 95.9%	System Intact
5	Bain 345/138-kV transformer #5	158.9% 99.5%	--	Split Pleasant Prairie 345-kV bus 34 Split Pleasant Prairie 345-kV bus 23
5	Oak Creek 345/230-kV transformer T895	102.4% 104.7%	--	Split Oak Creek 230-kV bus 67 Split Oak Creek 230-kV bus 78
5	Kenosha – Lakeview 138-kV line	103.0%	--	Pleasant Prairie – Zion 345-kV line
5	Lakeview – Zion 138-kV line	99.3%	--	Pleasant Prairie – Zion 345-kV line
5	Pennsylvania 138-kV bus	--	91.6%	Oak Creek – Pennsylvania 138-kV line
5	Arcadian – Waukesha 138-kV line	--	96.8%	Arcadian – Waukesha 138-kV line

Table ZS-8
Zone 1 Load and Generation

Zone 1	2012	2016	2021	2026
Peak Forecast (megawatts)	1657	1692.1	1758	1819.8
Average Peak Load Growth	N/A	0.53%	0.77%	0.69%
Existing Generation Capacity (megawatts)	1284.5	1284.5	1284.5	1284.5
Existing Capacity Less Load (megawatts)	-372.5	-407.6	-473.5	-535.3
Existing Generation Capacity plus Modeled Generating Capacity Additions (megawatts)	1284.5	1284.5	1284.5	1284.5
Modeled Capacity Less Load (megawatts)	-372.5	-407.6	-473.5	-535.3

Figure ZS-1



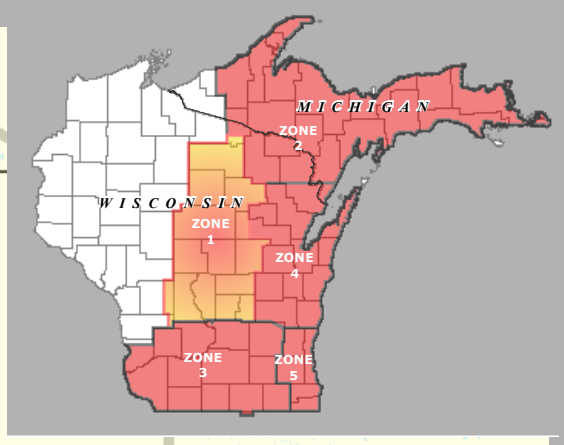
Currently, ATC owns or operates transmission facilities in Wisconsin, Illinois, Minnesota, and the Upper Peninsula of Michigan. Facilities include:

* Approximately 9440 miles of transmission lines
* 96 wholly owned substations
* 419 jointly owned substations
* ATC offices in Madison, Cottage Grove, Pewaukee, DePere, and Kingsford, MI

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.

Updated June 20, 2011

Figure ZS-2



Performance Criteria Exceeded and Other Constraints (2013-2016)

PLANNING ZONE 1

Currently, ATC owns or operates transmission facilities in Wisconsin, Illinois, Minnesota,and the Upper Peninsula of Michigan. Facilities include:

* Approximately 9440 miles of transmission lines
* 96 wholly owned substations
* 419 jointly owned substations
* ATC offices in Madison, Cottage Grove, Pewaukee, DePere, and Kingsford, MI

High or Low Bus Voltage

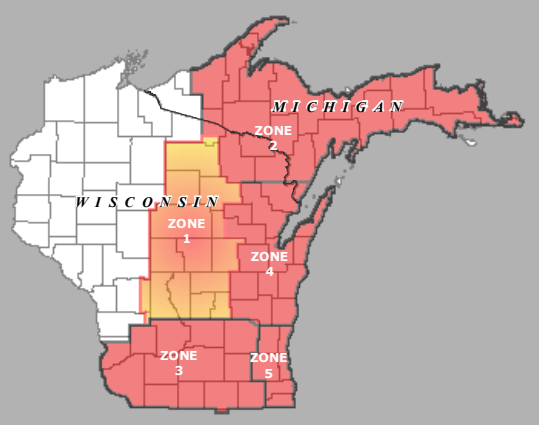
Overloaded Facility

Existing Transmission Facilities

- ATC Office Location
- ATC Substation, Switchyard or Terminal
- Non-ATC Substation, Switchyard or Terminal
- Generation
- ATC Transmission Line (width = voltage)
- Non-ATC Transmission Line

Updated June 20, 2011

Figure ZS-3



Performance Criteria Exceeded and Other Constraints (2017-2021)

PLANNING ZONE 1

AMERICAN TRANSMISSION COMPANY®

Currently, ATC owns or operates transmission facilities in Wisconsin, Illinois, Minnesota,and the Upper Peninsula of Michigan. Facilities include:

* Approximately 9440 miles of transmission lines
* 96 wholly owned substations
* 419 jointly owned substations
* ATC offices in Madison, Cottage Grove, Pewaukee, DePere, and Kingsford, MI

High or Low Bus Voltage

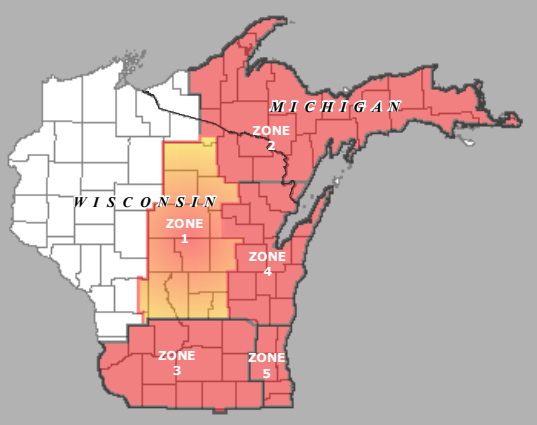
Overloaded Facility

Existing Transmission Facilities

- ATC Office Location
- ATC Substation, Switchyard or Terminal
- Non-ATC Substation, Switchyard or Terminal
- Generation
- ATC Transmission Line (width = voltage)
- Non-ATC Transmission Line

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

Updated June 20, 2011



Performance Criteria Exceeded and Other Constraints (2022-2026)

PLANNING ZONE 1

Currently, ATC owns or operates transmission facilities in Wisconsin, Illinois, Minnesota,and the Upper Peninsula of Michigan. Facilities include:

* Approximately 9440 miles of transmission lines
* 96 wholly owned substations
* 419 jointly owned substations
* ATC offices in Madison, Cottage Grove, Pewaukee, DePere, and Kingsford, MI

High or Low Bus Voltage

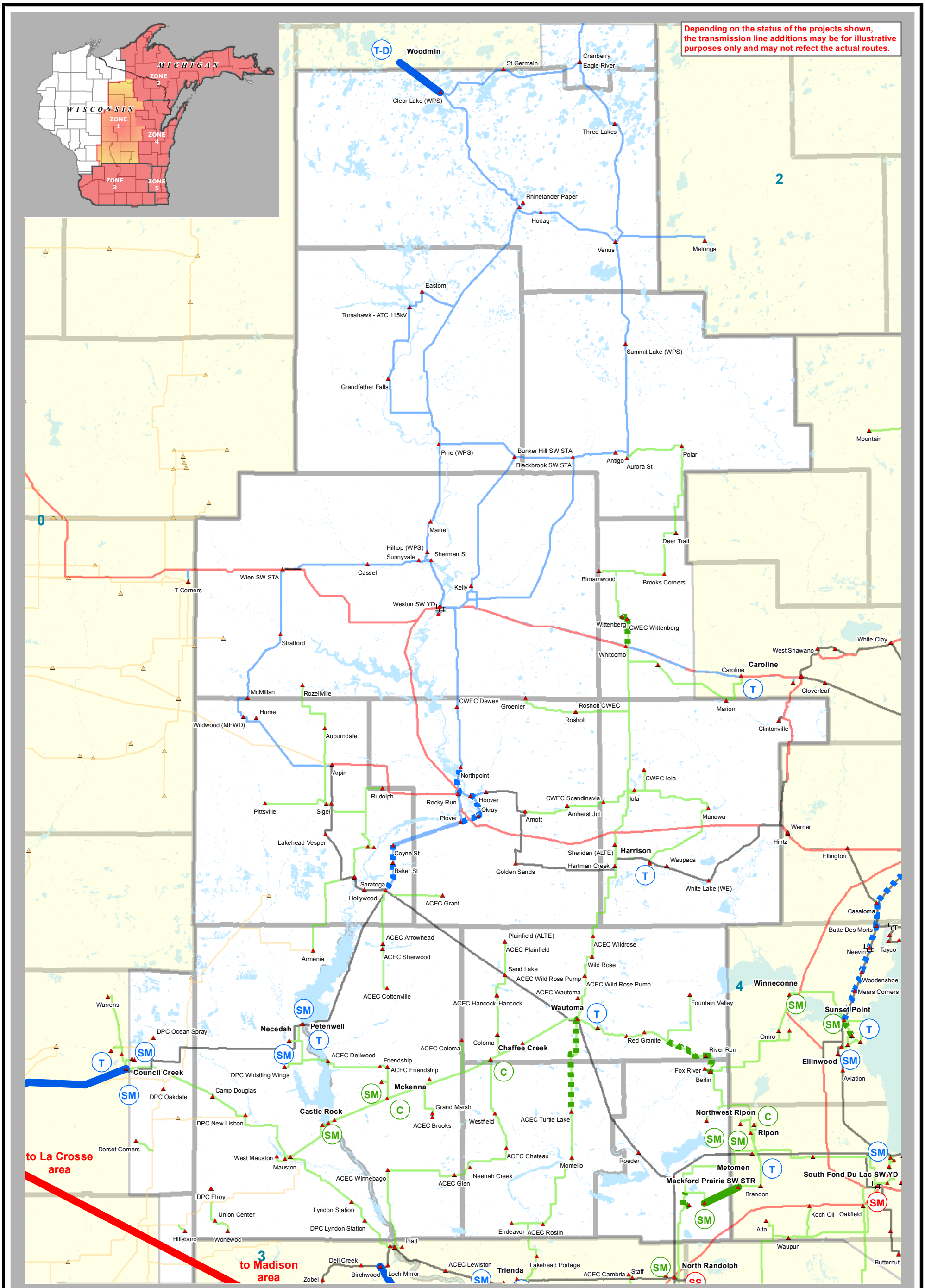
Overloaded Facility

Existing Transmission Facilities

- ATC Office Location
- ATC Substation, Switchyard or Terminal
- Non-ATC Substation, Switchyard or Terminal
- Generation
- ATC Transmission Line (width = voltage)
- Non-ATC Transmission Line

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

Figure PR-1



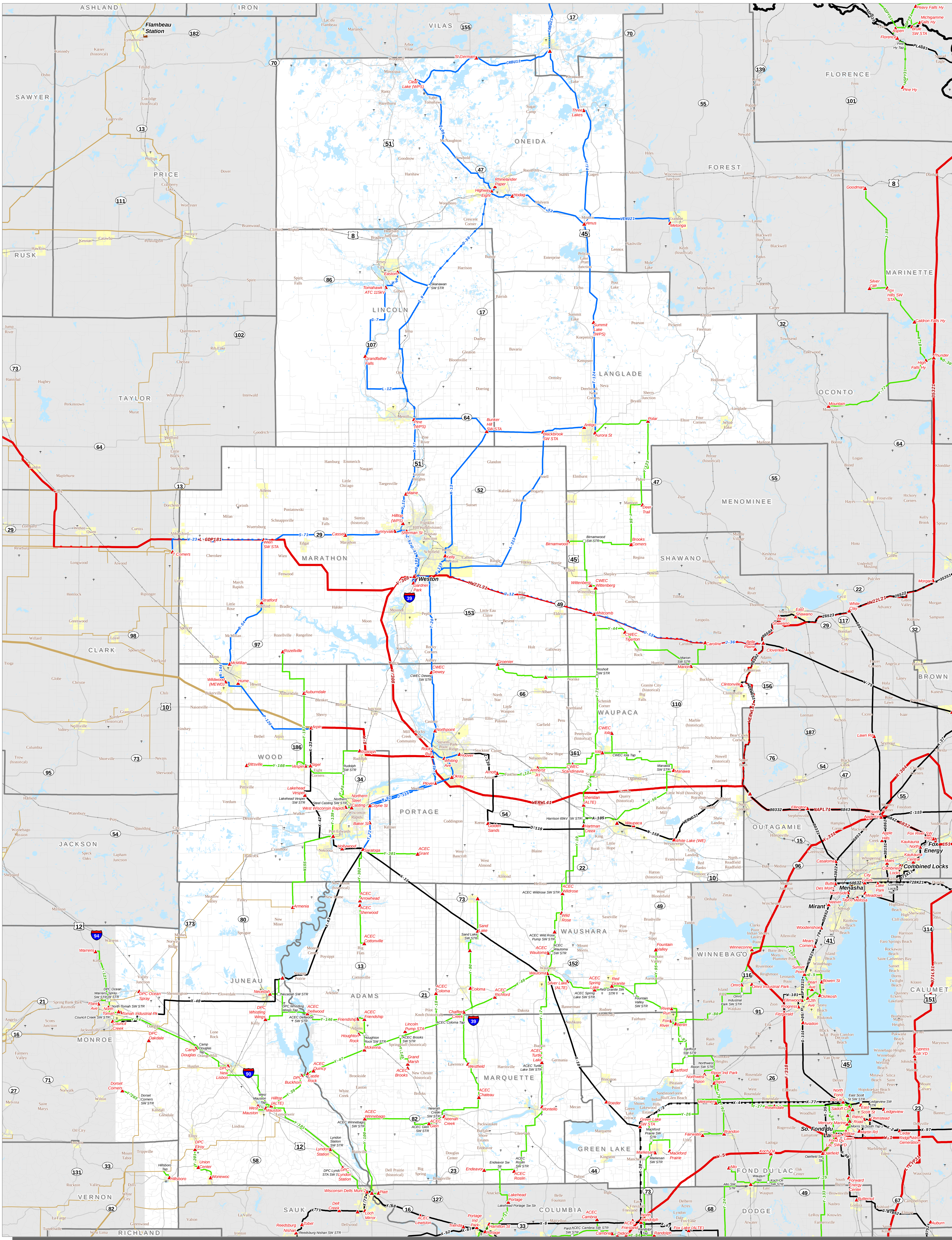
Updated July 29,2011

Figure ZS-22

AMERICAN TRANSMISSION COMPANY ®

Transmission Network and Substations

PLANNING ZONE 1



Electric Transmission and Related Facilities

Substation or Switchyard
Tap or Switching Structure
Generation
ATC Office Location
Airport, Airfield or Helicopter Landing Site

69 kV
115 kV
138 kV
230 kV
345 kV

69 kV Double Circuit
115 kV Double Circuit
138 kV Double Circuit
230 kV Double Circuit
345 kV Double Circuit
Mixed voltage multiple circuit lines drawn with each line color corresponding to the appropriate voltage.

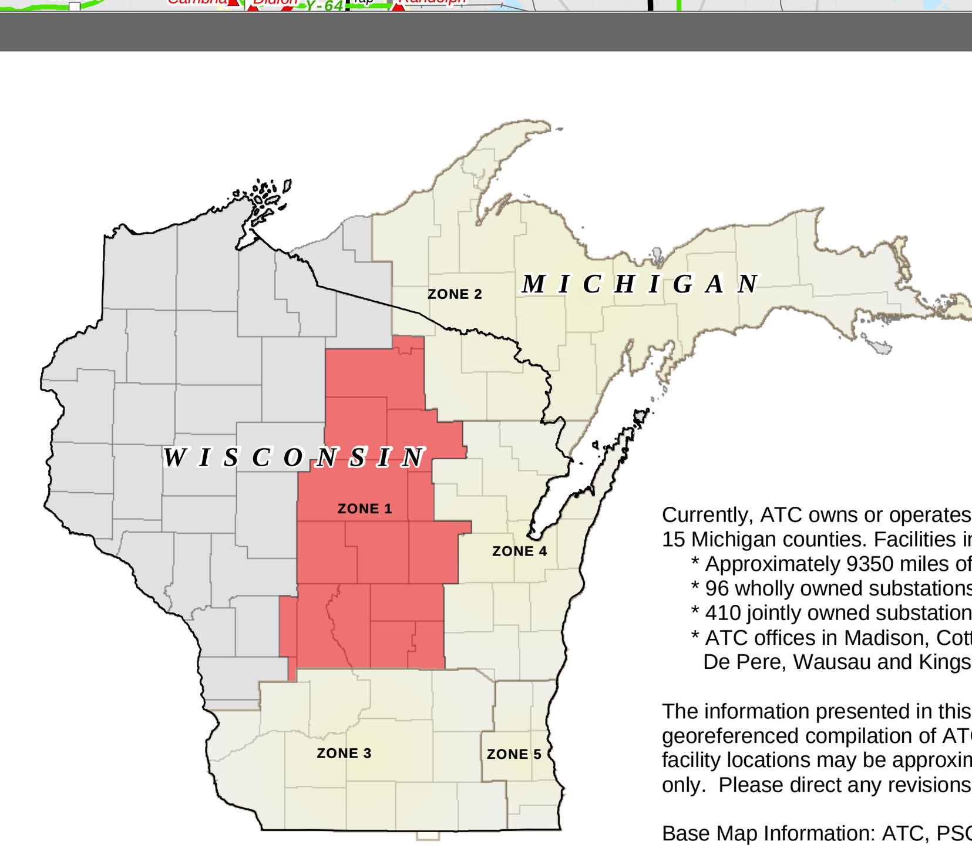
69 kV Underground
115 kV Underground
138 kV Underground

Non-ATC

69 kV
88 kV
115 kV
161 kV
345 kV

Miles

10 0 10 20



Currently, ATC owns or operates transmission facilities in 50 Wisconsin counties and in 15 Michigan counties. Facilities include:
* Approximately 9350 miles of transmission lines
* 96 wholly owned substations
* 410 jointly owned substations
* ATC offices in Madison, Cottage Grove, Pewaukee, De Pere, Wausau and Kingsford, MI

The information presented in this map document represent the most current and accurate georeferenced compilation of ATC owned and operated transmission facilities available - some facility locations may be approximate. This map is advisory and intended for reference purposes only. Please direct any revisions or corrections to ATC Asset Applications and GIS Group.

Base Map Information: ATC, PSCW, MiDNR, WDNR

Revised: Feb 2011

G:\WORKSPACE\ArcMap Templates\Zone Maps\Zone1.mxd Modified: Feb 11, 2011