

2021 10-Year Assessment Summary

PRESENTED BY

System Planning

November 8, 2021



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businesses running and
communities strong®

Topics

- Messages
- Capital forecast
- Larger projects by zone

Messages

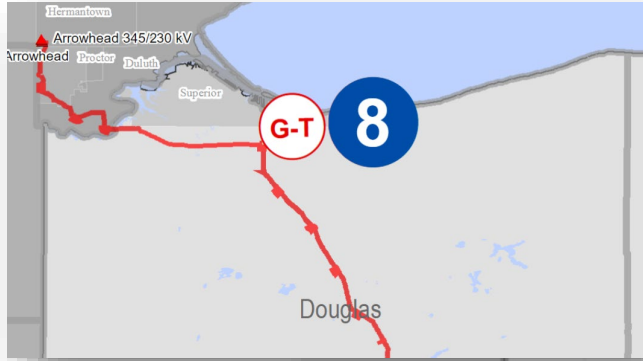
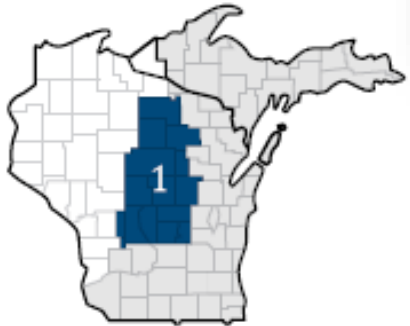
- Load forecast has similar growth rate as the 2020 Assessment
- Changing generation mix
 - 7.3 GW of solar and 1.1 GW of wind in MISO's generation interconnection queue for ATC.
 - Storage in queue increased to 2.2 GW
- Modest amount of new network projects
 - New customer interconnections main reason for new network projects
- Asset Renewal
 - Approximately half of all projects are dedicated to maintaining and reinforcing the system and improving its resiliency

Capital Forecast (10-Year)

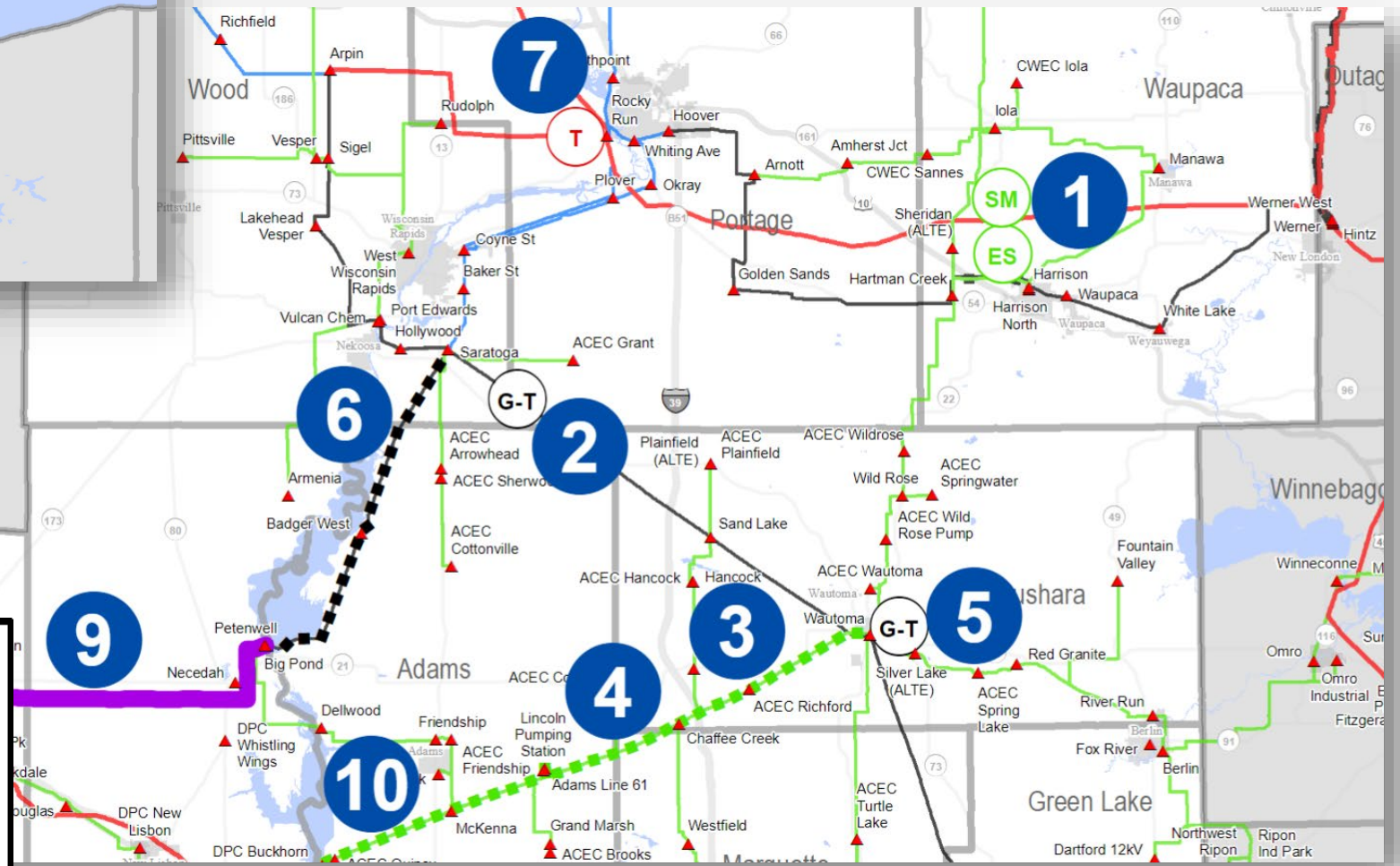
	2017	2018	2019	2020	2021
Specific Network Projects	\$0.7B/\$1.0B	\$0.5B	\$0.4B	\$0.4B	\$0.6B
Regional Multi-Value Projects	\$0.4B	\$0.3B	\$0.2B	\$0.2B	\$0.2B
MISO Long Range Transmission Plan	-	-	-	-	\$0.0B
Asset Maintenance	\$1.4B	\$1.5B	\$1.7B	\$1.8B	\$2.2B
Other Capital Categories	\$0.3B/\$0.8B	\$0.5/\$1.1B	\$0.6B/\$1.3B	\$0.5B/\$1.1B	\$0.5B/\$1.2B
Total 10-Year Capital Cost	\$2.8B/\$3.6B	\$2.8/\$3.4B	\$2.9B/\$3.6B	\$2.9B/\$3.5B	\$3.5B/\$4.2B

- New category: MISO Long Range Transmission Plan

Zone 1



Lines of proposed projects on the map are for illustrative purposes only and do not reflect actual routes. For information on project status and routes, see atc-projects.com.



System Solutions Key

Substation Key	Transmission Line Key	Existing Transmission Lines Key
(C) Capacitor Bank or Reactor	(Solid line) New Transmission Line	(Red wavy) 345 kV
(SS) New Substation	(Dashed line) Rebuilt / Reconductored Transmission Line	(Orange wavy) 230 kV
(SM) Substation Modification	(Dotted line) Line Rating Upgrade	(Purple wavy) 161 kV
(T) Transformer	(Yellow wavy) Voltage Conversion	(Black wavy) 138 kV
(T-D) T-D Interconnection	(Purple wavy) Communication	(Blue wavy) 115 kV
(TL) Transmission Line		(Green wavy) 69 kV
(T-T) T-T Interconnection		(Grey dashed) Multi-Circuit - Color denotes kV
(ES) Energy Storage		(Grey solid) Underground - Color denotes kV
(G-T) G-T Interconnection		(Red diamond) 345 kV Maintained by Others

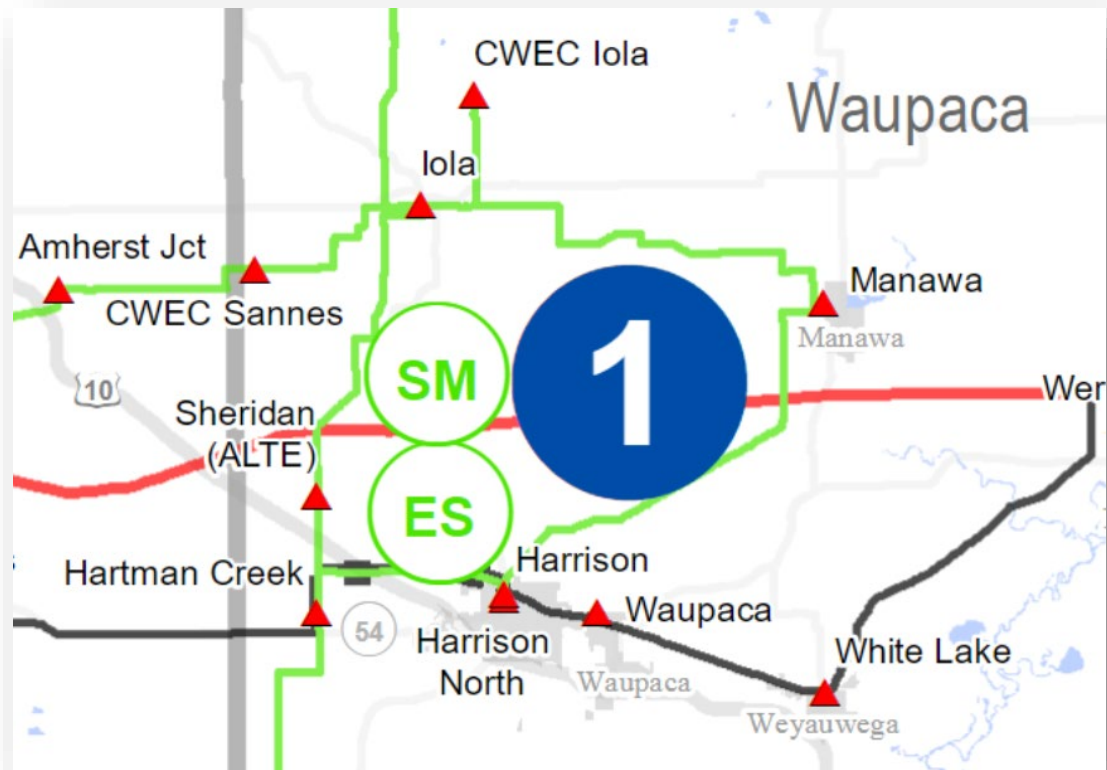
To avoid clutter, map does not show 2026+ and some lower cost projects

Zone 1 Projects

Zone 1 Planned Projects

Project Description	Project #	In-service year	Need driver
Waupaca Area Energy Storage Project	1	2022	Operation Flexibility
J986 7 Mile Creek SS, Generator Interconnection Facilities and Network Upgrades	2	2022	G-T Interconnection
Wautoma–Chaffee Creek 69-kV line (Y-49) rebuild	3	2023	Asset Renewal
Chaffee Creek–Lincoln Pump Station 69-kV line (Y-18) rebuild	4	2023/2024	Asset Renewal
J1002 Wautoma SS Network Upgrades and Interconnection Facilities	5	2023	G-T Interconnection
Petenwell–Saratoga (X-43), Line Rebuild	6	2023	Reliability, Economic
Rocky Run Transformer Replacement	7	2023	Reliability
J732 Superior SS Generator Interconnection Facilities and Network Upgrades	8	2023	G-T Interconnection
Petenwell–Council Creek (X-40), OPGW installation	9	2024	Communication
McKenna–Castle Rock 69-kV line (Y-47) rebuild	10	2025	Asset Renewal

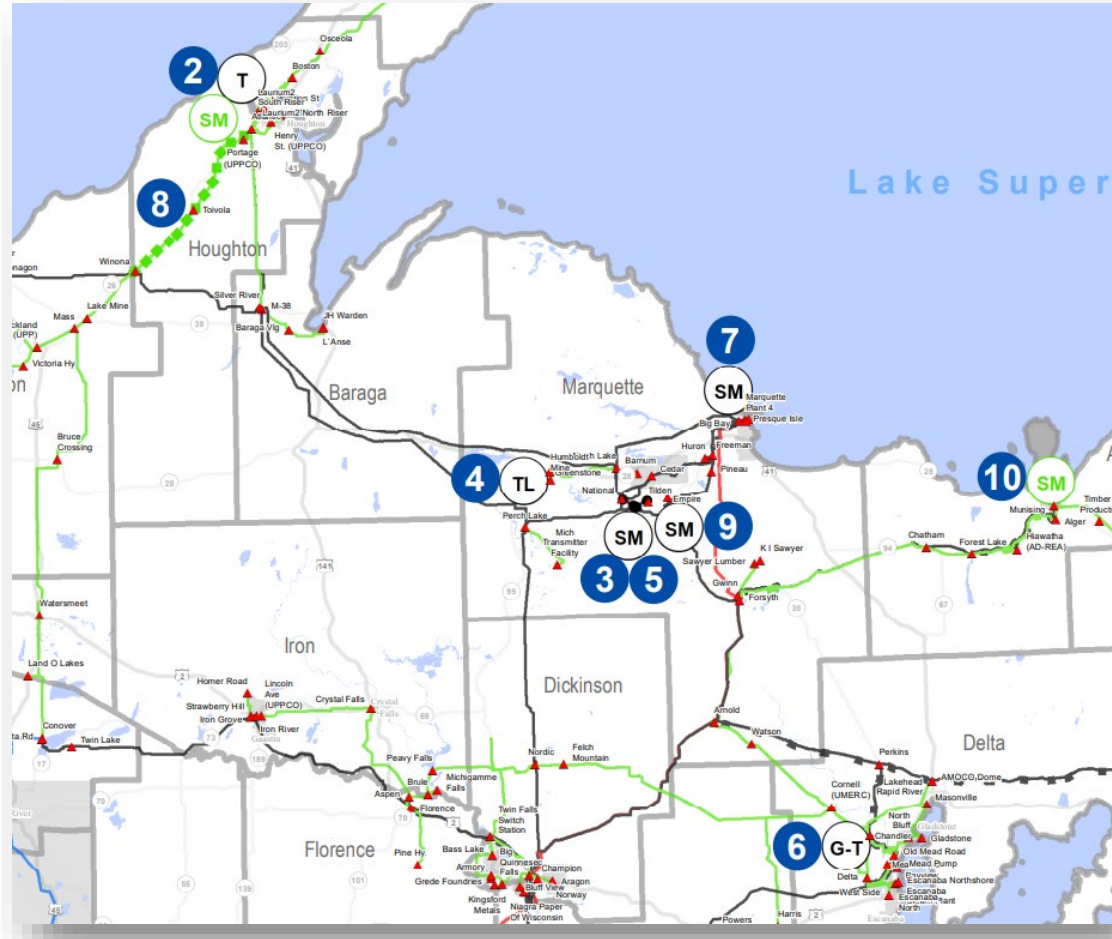
Waupaca Area Storage Project (#1)



- 2022 In-service Date
- MTEP19 Appendix A, ID 15947
- Status: Proposed
- Cost: ~\$8M
- Needs:
 - Reliability, operational flexibility
- Scope:
 - Install 2.5 MW/5 MWh battery at Harrison North substation
 - Install 8 MVAR capacitor bank at Arnott substation
 - Install 6 MVAR capacitor bank at Harrison North substation

Zone 2

Lines of proposed projects on the map are for illustrative purposes only and do not reflect actual routes. For information on project status and routes, see atc-projects.com.

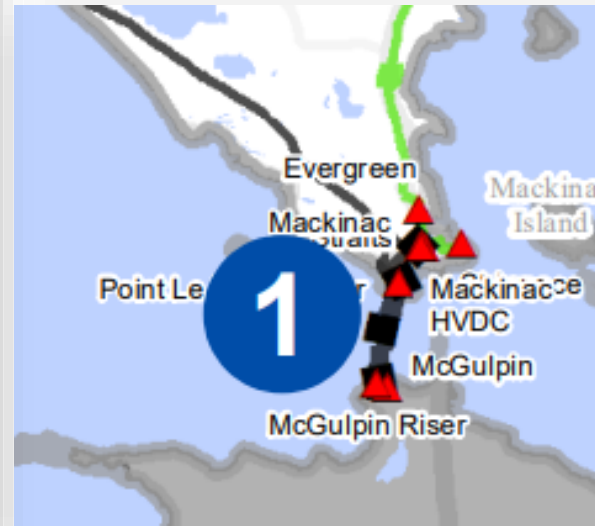


System Solutions Key

Substation Key	Transmission Line Key	Existing Transmission Lines Key
(C) Capacitor Bank or Reactor	▬ New Transmission Line	⚡ 345 kV
(SS) New Substation	▬ Rebuilt / Reconductored Transmission Line	⚡ 230 kV
(SM) Substation Modification	●●●● Line Rating Upgrade	⚡ 161 kV
(T) Transformer	▬ Voltage Conversion	⚡ 138 kV
(T-D) T-D Interconnection	▬ Communication	⚡ 115 kV
(TL) Transmission Line		⚡ 69 kV
(T-T) T-T Interconnection		⚡ Multi-Circuit - Color denotes kV
(ES) Energy Storage		▬ Underground - Color denotes kV
(G-T) G-T Interconnection		⚡ 345 kV Maintained by Others

Color denotes kV for both Substation and Transmission

To avoid clutter, map does not show 2026+ and some lower cost projects



Zone 2 Projects

Zone 2 Planned Projects

Project Description	Project #	In-service year	Need driver
Mackinac–McGulpin 138-kV line (9901 and 9903), submarine cable replacement	1	2021	Asset Renewal
Atlantic SS, 138/69-kV Bus Reconfiguration and Transformer Addition	2	2022	Operational Flexibility
Presque Isle–Tilden 138-kV Line, Loop and Uprate	3	2022	Reliability
NLKG31 Tap–Greenstone 138-kV Line, Construct New Transmission Line	4	2022	Condition and T-D Interconnection
Tilden SS, Control House Replacement and Breaker & Relay Asset Renewal	5	2023	Asset Renewal
J849, Chandler SS Generator Interconnection Facilities and Network Upgrades	6	2023	G-T Interconnection
Winona–Atlantic 69kV (Winona69), rebuild	8	2024	Reliability

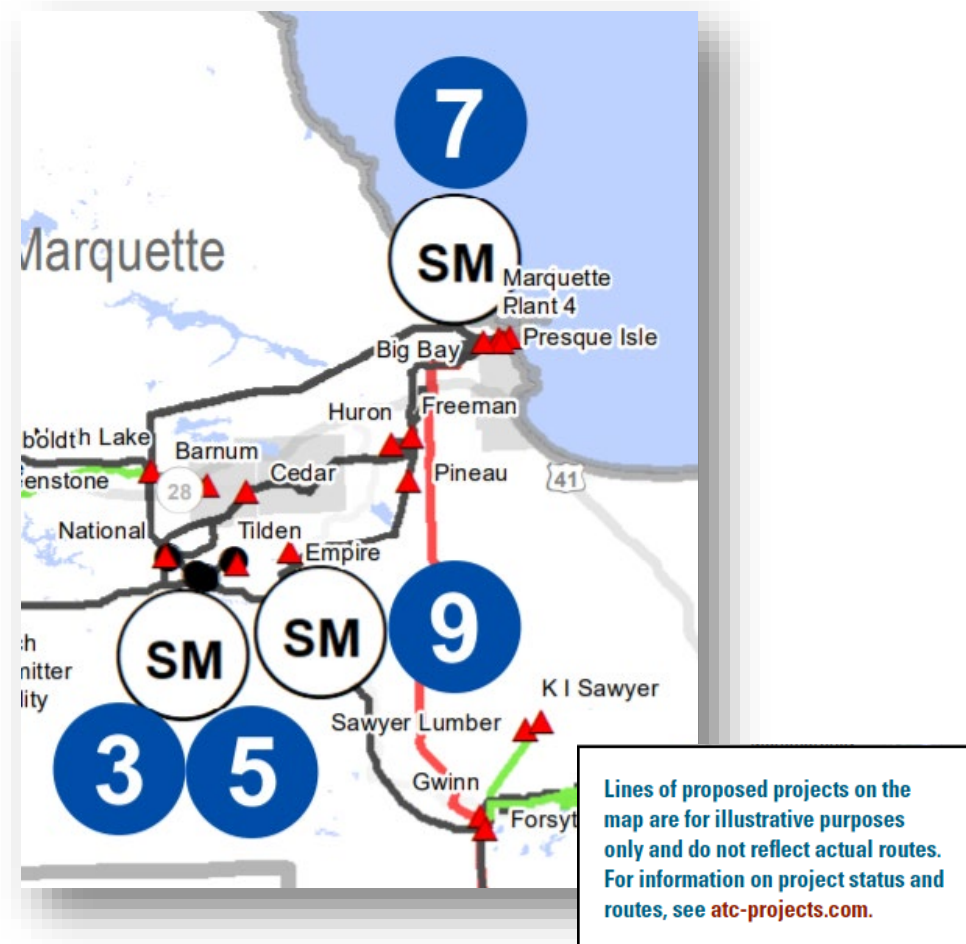
Zone 2 Proposed Projects

Project Description	Project #	In-service year	Need driver
Marquette County Reactive Power Project	7	2024	Reliability

Zone 2 Provisional Projects

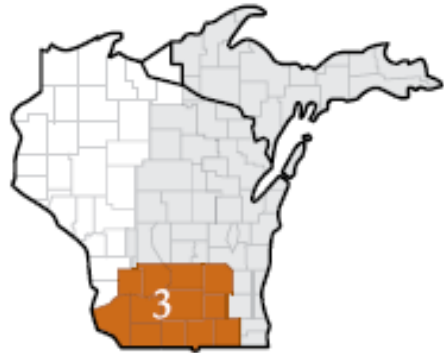
Project Description	Project #	In-service year	Need driver
Empire SS, Control House Replacement and Breaker & Relay Asset Renewal	9	2024	Asset renewal
Munising Area Reactive Power Project	10	2024	Reliability

Marquette County Reactive Power Project: STATCOM at National SS (#7)



- 2024 In-service Date
- MTEP21 Appendix A, ID 19965
- Status: Proposed
- Cost: \$24.2M
- Needs:
 - Reliability
- Scope:
 - Install +/- 50MVAR, 138kV STATCOM at National SS
 - Add spare 138kV transformer
 - Add new 138kV bus and overhead connection from STATCOM to National
 - Install new 138kV circuit breaker and protection package

Zone 3

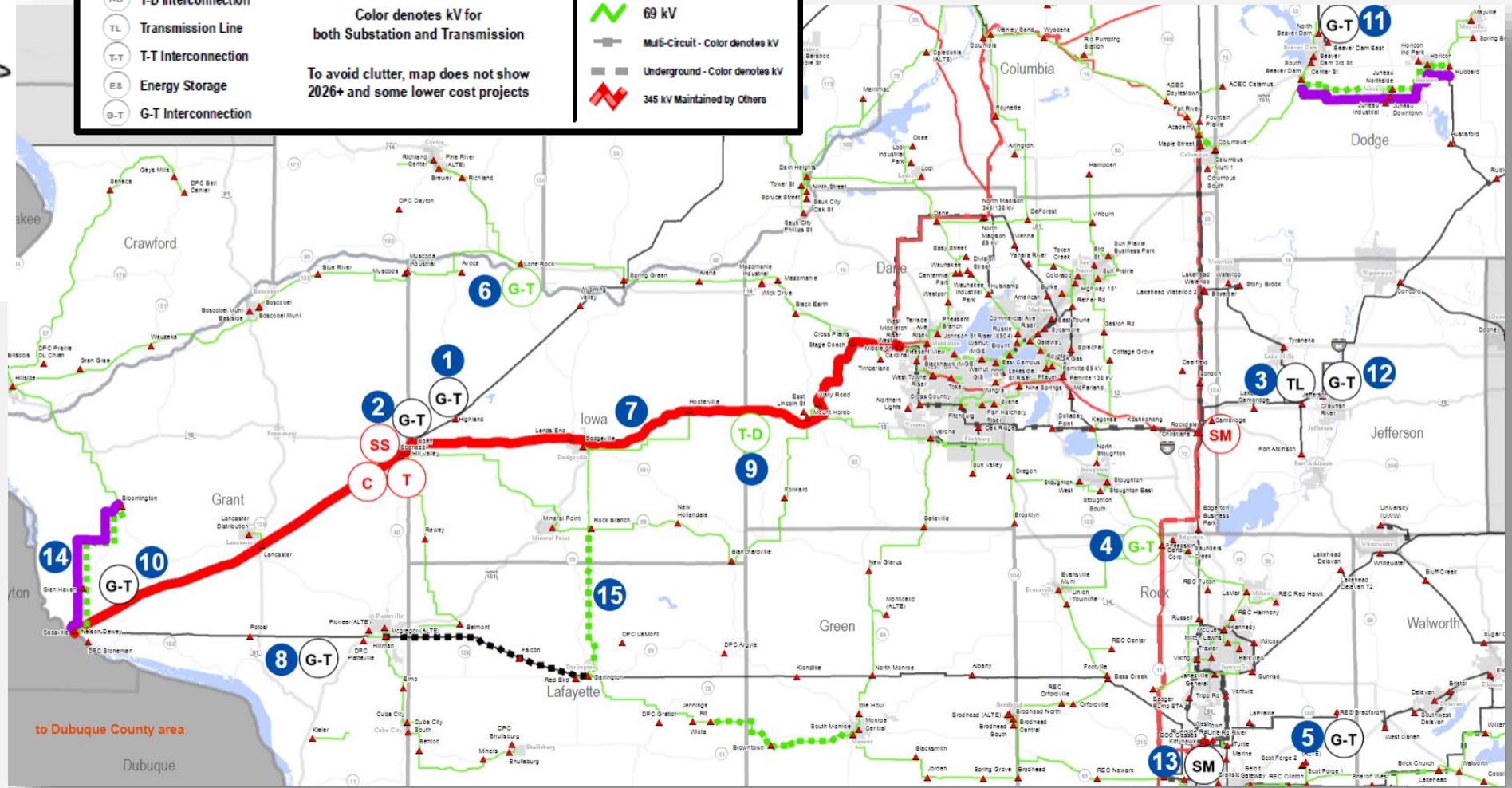


System Solutions Key

Substation Key	Transmission Line Key	Existing Transmission Lines Key
(C) Capacitor Bank or Reactor	— New Transmission Line	↗ 345 kV
(SS) New Substation	▒ Rebuilt / Reconstructed Transmission Line	↘ 230 kV
(SM) Substation Modification	●●●● Line Rating Upgrade	↖ 161 kV
(T) Transformer	▬ Voltage Conversion	↙ 138 kV
(T-D) T-D Interconnection	▬ Communication	↘ 115 kV
(TL) Transmission Line		↖ 69 kV
(T-T) T-T Interconnection		— Multi-Circuit - Color denotes kV
(ES) Energy Storage		▬ Underground - Color denotes kV
(G-T) G-T Interconnection		↗ 345 kV Maintained by Others

Color denotes kV for both Substation and Transmission

To avoid clutter, map does not show 2026+ and some lower cost projects



Lines of proposed projects on the map are for illustrative purposes only and do not reflect actual routes. For information on project status and routes, see atc-projects.com.

to Dubuque County area

Dubuque

Zone 3 Projects

Zone 3 Provisional Projects

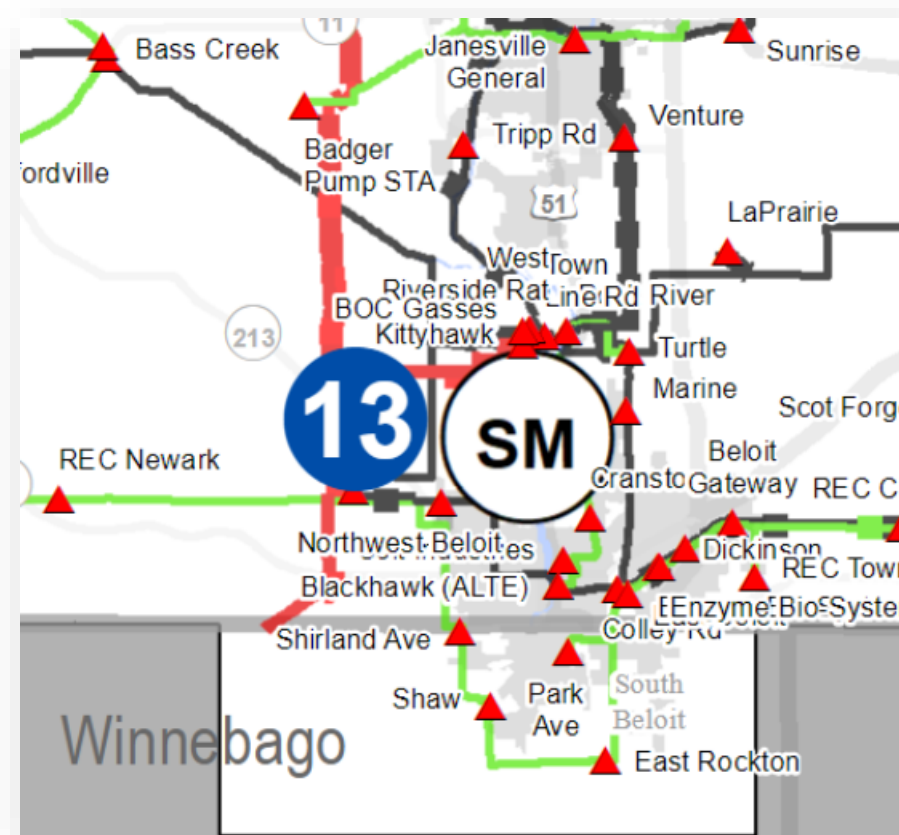
Project Description	Project #	In-service year	Need driver
Rock County Reliability Project	13	2024	Reliability

Zone 3 Planned Projects

Project Description	Project #	In-service year	Need driver
J870/J871 MPFCA Highland Generator Network Upgrades	1	2021	G-T interconnection
J855 GIC Ebenezer SS Generator Interconnection Facilities and Network Upgrades	2	2021	G-T interconnection
J818 Jefferson SS Generation Interconnection Facilities and Network Upgrades	3	2022	G-T interconnection
J1188 Sheepskin SS Network Upgrades and Interconnection Facilities	4	2022	G-T interconnection
J850 North Creek SS, Generator Interconnection Facilities and Network Upgrades	5	2022	G-T interconnection
J864 Lone Rock SS Generator Interconnection Facilities and Network Upgrades	6	2022	G-T interconnection
Cardinal–Hickory Creek 345kV, line construction	7	2023	Reliability, Economic and Policy
J947 Tennyson SS, Generator Interconnection Facilities and Network Upgrades	8	2023	G-T interconnection
Barneveld SS, DIC, New Substation	9	2023	T-D interconnection
J1000 Comet SS Network Upgrades and Interconnection Facilities	10	2023	G-T interconnection
J1003 North Beaver Dam SS Network Upgrades and Interconnection Facilities	11	2023	G-T interconnection
J1154 Crawfish River Solar Network Upgrades	12	2023	G-T interconnection
Nelson Dewey–Bloomington 69-kV (Y-184), rebuild & OPGW	14	2025	Asset Renewal
Darlington–Rock Branch 69-kV (Y-109), rebuild	15	2025	Asset Renewal

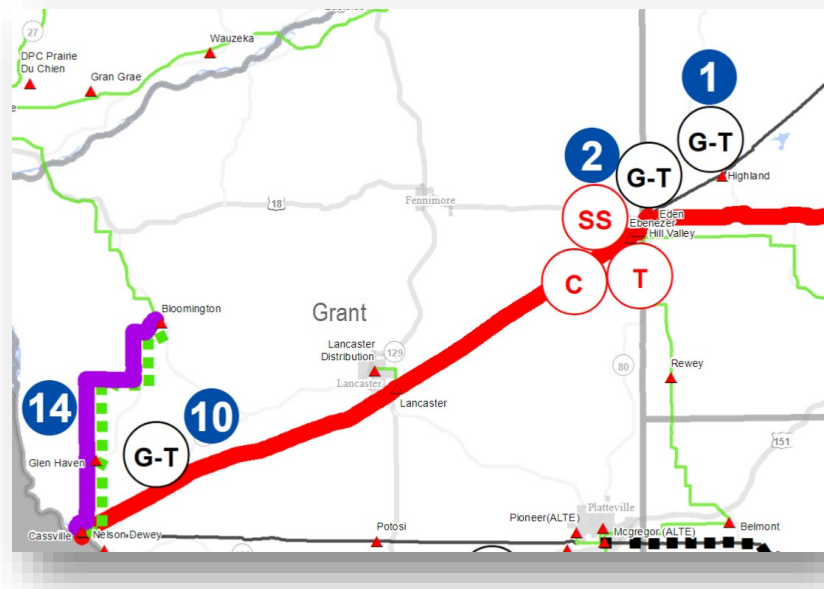
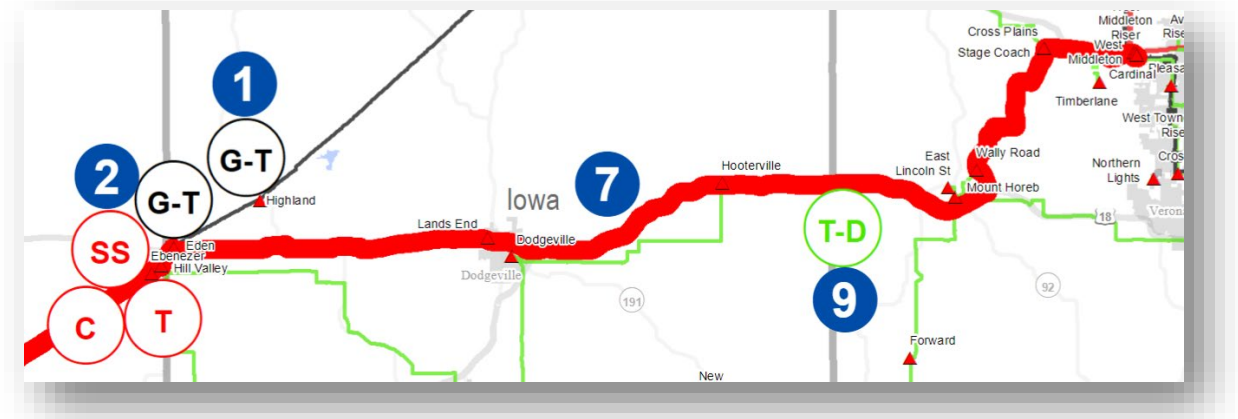
Rock County Reliability Project (#13)

- In-service Date: December 2024
- Estimated Project Cost: \$49.72 M
- Need:
 - Mitigates Risk of Load Shed (168 MW)
 - Reduces need for decreasing West Riverside dispatch and uneconomical dispatch
 - Increases West Riverside and Riverside Stability
 - Reduces cost of future asset renewal projects
 - Helps with proposed and future area interconnections
- Scope:
 - Add connections between 138kV Townline Road and 345kV Kittyhawk substations



Cardinal - Hickory Creek 345-kV, line construction (#7)

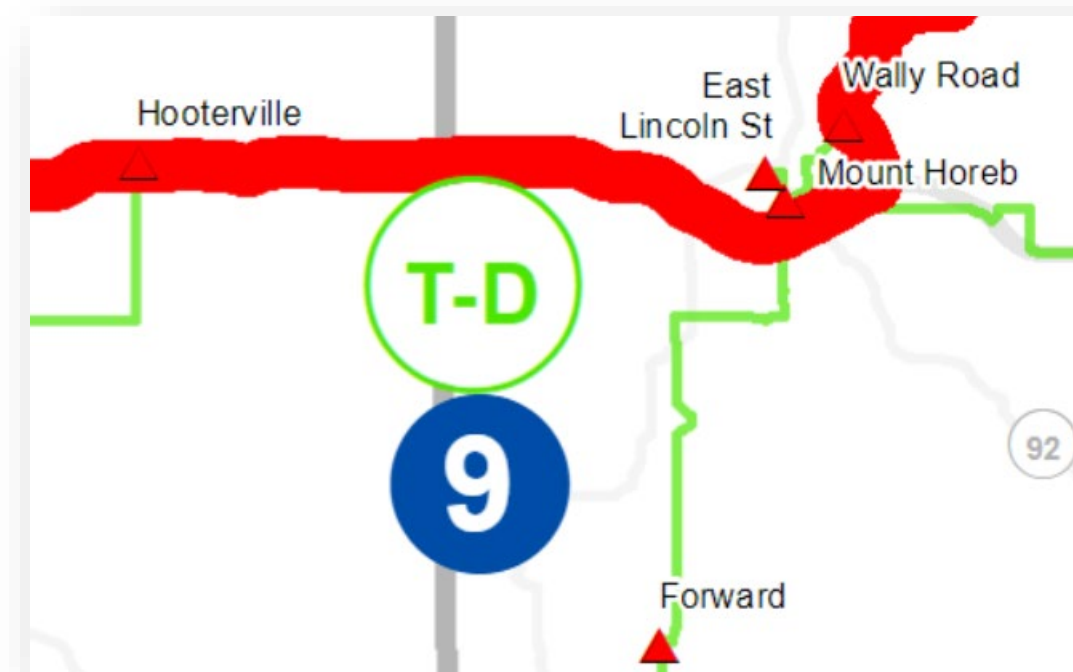
- 2023 In-service Date
- MTEP Appendix A, ID 3127
- Status: Planned
- Cost: \$492M
- Scope:
 - Hickory Creek – Hill Valley – Cardinal 345 kV line (~102 miles).
 - New Hill Valley 345/138 kV Substation.



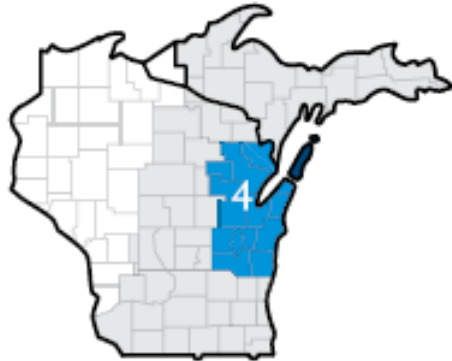
- Benefits:
 - Enable up to 30 gigawatts of cost effective, renewable energy to be delivered across the region
 - Providing \$23 million to \$350 million in net economic benefits to Wisconsin customers
 - Improve local and regional electric system reliability.
- Other Information:
 - ATC, ITC Midwest, and Dairyland Power Cooperative project.

Barneveld SS, DIC, new substation (#9)

- 2023 In-service Date
- MTEP20 Appendix A, ID 18052
- Status: Proposed
- Cost: \$14.1 M
- Need:
 - Transmission to Distribution (T-D) interconnection
- Scope:
 - New 69 kV line from Hooterville to Mount Horeb
 - ◆ In CHC open tower position
 - New 69 kV Barneveld Substation with line breakers (Alliant)
 - New 69 kV Military Ridge Substation tap (Mount Horeb Utilities)

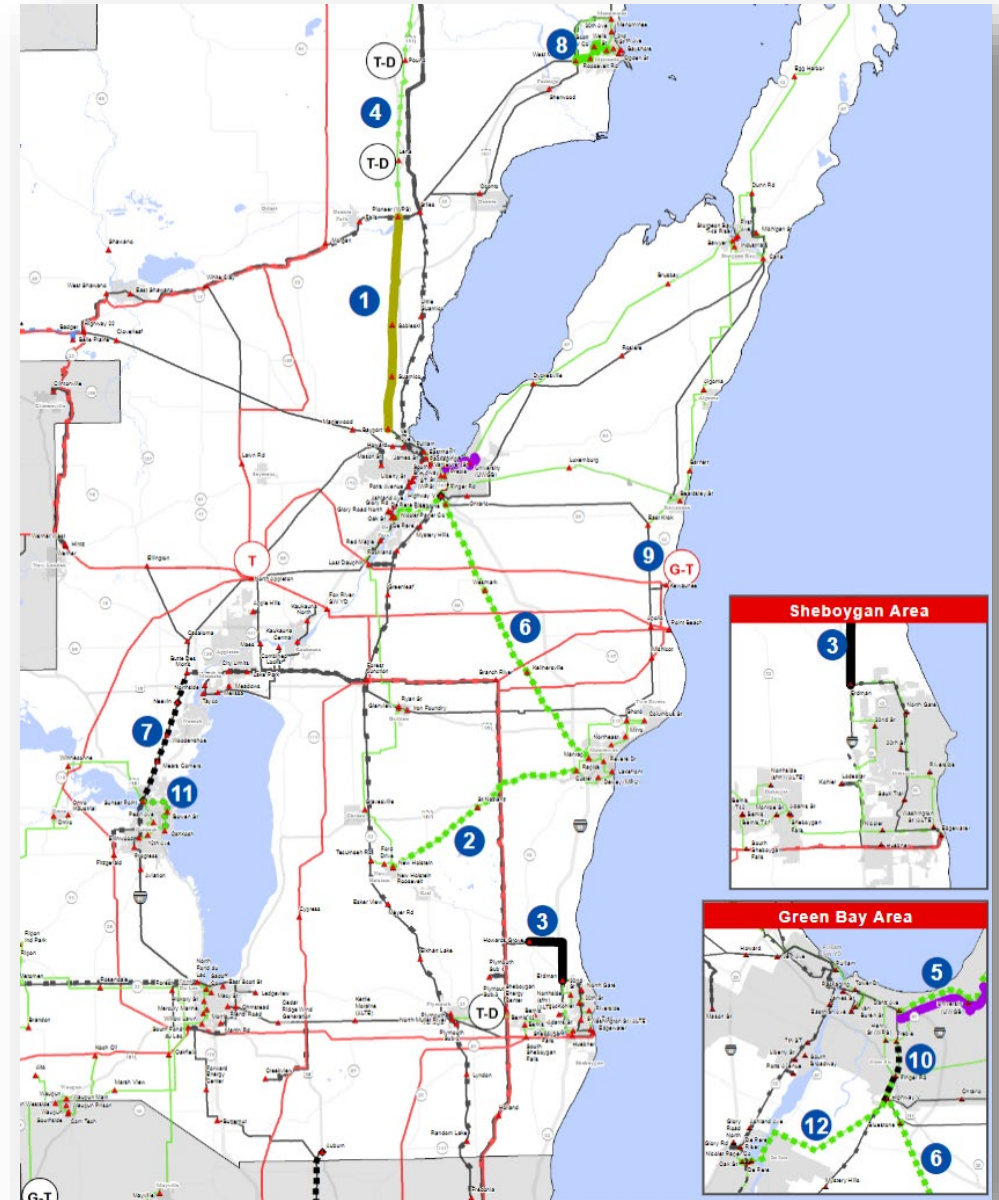


Zone 4



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System Solutions Key		
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(SS) New Substation	(Dashed Grey) Rebuilt / Reconductored Transmission Line	(Orange) 230 kV
(SM) Substation Modification	(Grey Circle) Line Rating Upgrade	(Purple) 161 kV
(T) Transformer	(Green) Voltage Conversion	(Black) 138 kV
(T-D) T-D Interconnection	(Purple) Communication	(Blue) 115 kV
(TL) Transmission Line		(Green) 69 kV
(T-T) T-T Interconnection	Color denotes kV for both Substation and Transmission	(Grey) Multi-Circuit - Color denotes kV
(ES) Energy Storage	To avoid clutter, map does not show 2026+ and some lower cost projects	(Grey) Underground - Color denotes kV
(G-T) G-T Interconnection		(Red) 345 kV Maintained by Others



Zone 4 Projects

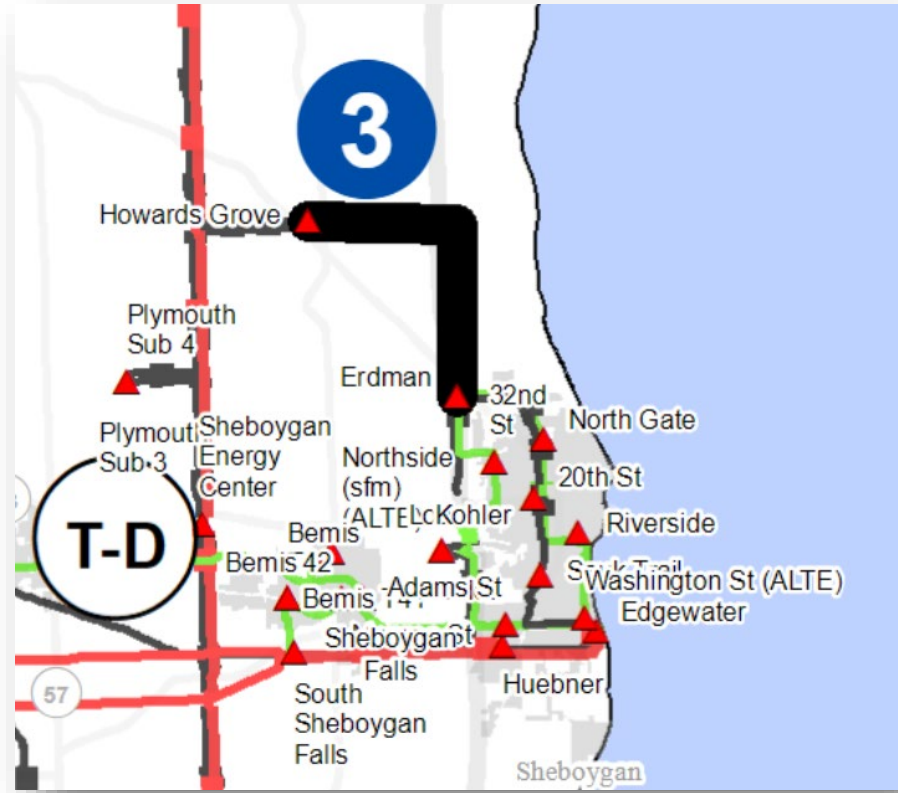
Zone 4 Planned Projects

Project Description	Project #	In-service year	Need driver
Bayport–Pioneer 138-kV, rebuild as a double-circuit	1	2022	Reliability
New Holstein–Custer 69-kV line (P-68), rebuild	2	2022	Asset Renewal
Pioneer–Crivitz 138-kV Line (E-83/B-2), Retire 69-kV and Reconfigure Load to 138-kV	4	2022	Asset Renewal, T-D interconnection
Finger Road SW STA–Wesmark- Rapids, 69-kV line (FIRY11/R-44), rebuild	6	2023/2024	Asset Renewal
Butte Des Morts–Sunset Point (40321, 80952, A-79, MCRG21) 138-kV line, rebuild	7	2023	Asset Renewal
J1101 Kewaunee SS Interconnection Facilities and Network Upgrades	9	2023	G-T interconnection
Highway V–Preble 138-kV (X-154), reconductor	10	2023	Reliability
Sunset Point–Bowen Street (E-5), 69-kV, uprate	11	2023	Reliability
Oak St - Hwy V 69-kV line (Z-26), rebuild	12	2025	Asset renewal

Zone 4 Proposed Projects

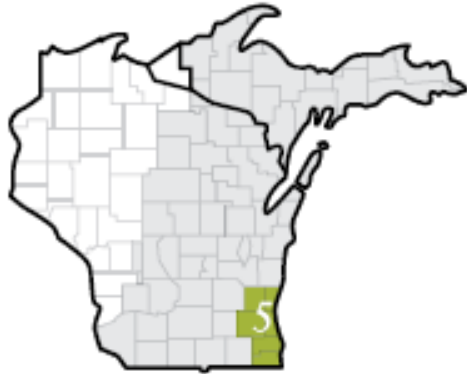
Project Description	Project #	In-service year	Need driver
Howards Grove–Erdman 138-kV line, new	3	2022	Reliability
Danz Ave. SW STA–University (WPS) 69-kV line (O-15), underground rebuild & OPGW	5	2023	Asset Renewal
Wells St. DIC - new West Marinette–Wells St. 69-kV line	8	2023	Load Interconnection

Howards Grove-Erdman 138 kV line (#3)



- December 2022 In-service Date
- MTEP20 Appendix A, ID 18568
- Status: Proposed
- Cost: \$25M
- Needs:
 - Reliability, generation retirement
- Scope:
 - Construct new 6.6-mile 138 kV line from Howards Grove Substation to Erdman Substation
 - Expand Howards Grove Substation to a 4-position ring bus
 - Substation modifications at Erdman to accommodate new line

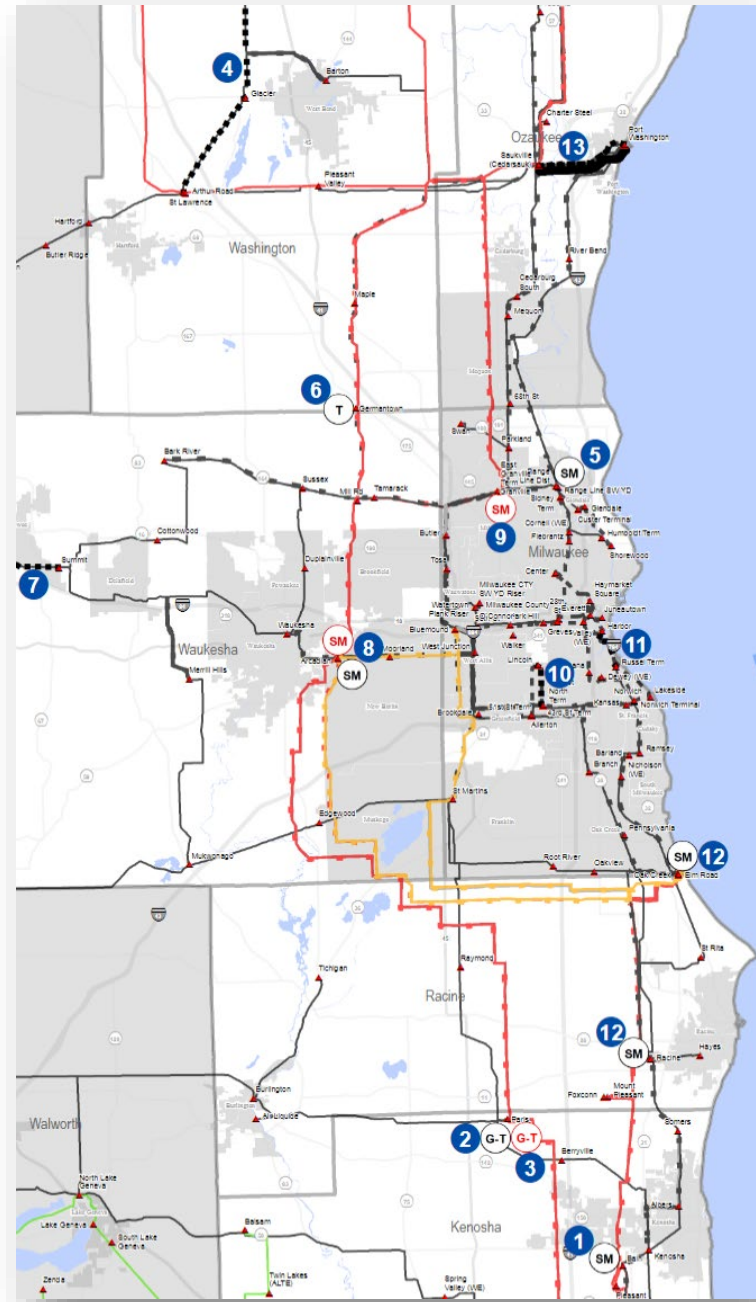
Zone 5



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System Solutions Key

Substation Key <ul style="list-style-type: none"> Capacitor Bank or Reactor New Substation Substation Modification Transformer T-D Interconnection Transmission Line T-T Interconnection Energy Storage G-T Interconnection 	Transmission Line Key <ul style="list-style-type: none"> New Transmission Line Rebuilt / Reconductored Transmission Line Line Rating Upgrade Voltage Conversion Communication <p style="text-align: center;">Color denotes kV for both Substation and Transmission</p> <p>To avoid clutter, map does not show 2026+ and some lower cost projects</p>	Existing Transmission Lines Key <ul style="list-style-type: none"> 345 kV 230 kV 161 kV 138 kV 115 kV 69 kV Multi-Circuit - Color denotes kV Underground - Color denotes kV 345 kV Maintained by Others
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Zone 5 Projects

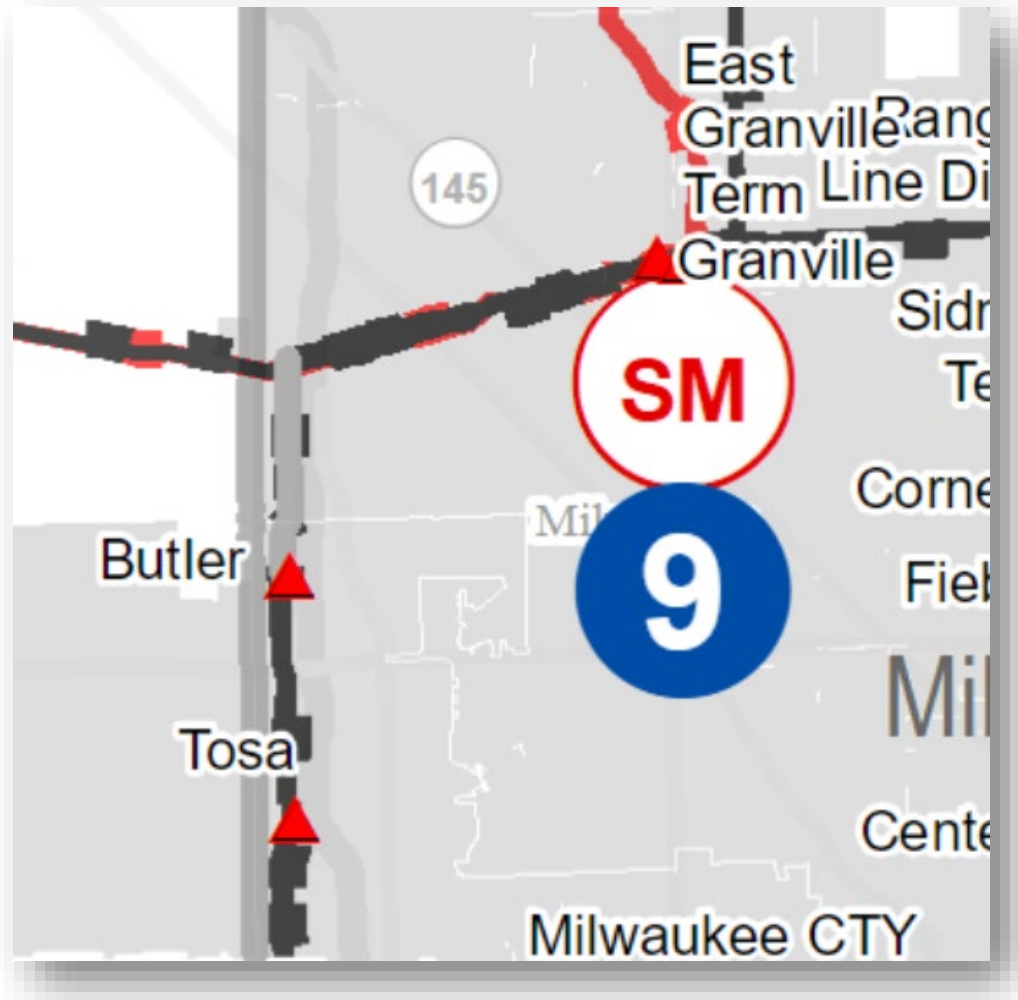
Zone 5 Planned Projects

Project Description	Project #	In-service year	Need driver
Bain SS, Control House and Breaker Asset Renewal	1	2021	Asset Renewal
J878 Paris SS Generator Interconnection Facilities and Network Upgrades	2	2022	G-T interconnection
J850/J878 MPFCA East Paris New Substation	3	2022	G-T interconnection
St. Lawrence–Barton–Auburn 138-kV lines (8032/9752), partial rebuild	4	2022	Asset Renewal
Range Line SW STA, Control House Replacement and Asset Renewal	5	2022	Asset Renewal
Germantown SS DIC, install additional transformer	6	2022	Load Interconnection
Summit–Cooney 138-kV line (6431), rebuild	7	2022	Asset Renewal
Arcadian SS, power transformer and control house replacement and asset renewal	8	2023	Asset Renewal
Granville SS, Control House and Relay Replacement Asset Renewal	9	2024	Asset Renewal
Lincoln–Bluemound (43rd St) 138-kV (5053), replace underground cable	10	2024	Asset Renewal

Zone 5 Provisional Projects

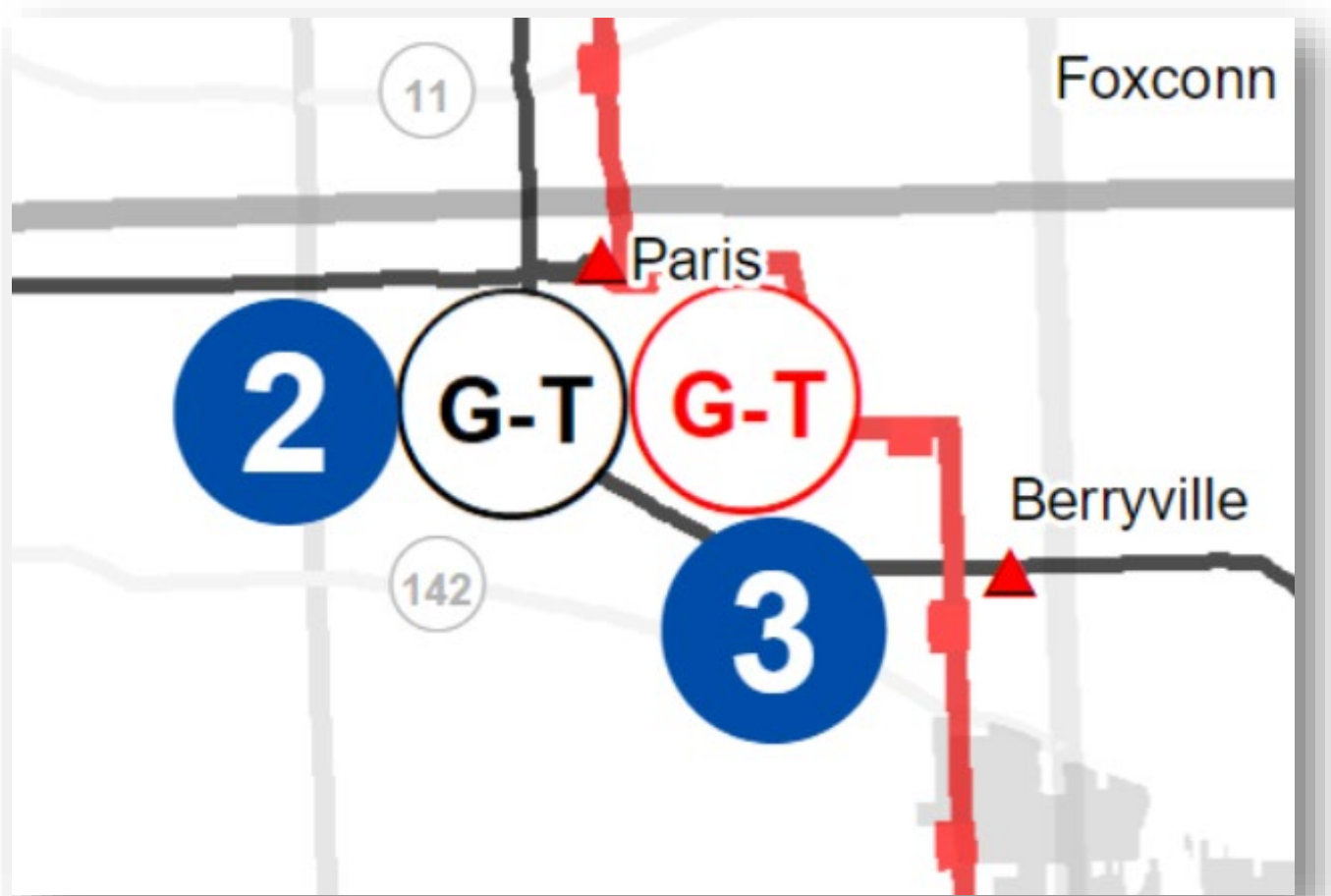
Project Description	Project #	In-service year	Need driver
Norwich–Harbor 138-kV (893K11), underground line replacement	11	2025	Asset Renewal
Oak Creek, Racine SS and Remote Ends, Control Buildings and Relaying Asset Renewal	12	2025	Asset Renewal
Port Washington–Saukville 138-kV (X-132/X-133), partial rebuild	13	2025	Reliability

Granville - 345kV Bus Reconfiguration, Replace Control House, Breaker Asset Renewal (#9)



- 2024 – early 2025 In-service Date
- MTEP21 Appendix A, ID 16490
- Status: Planned
- Cost: \$29M
- Needs: Condition and performance, reliability
- Scope:
 - Replace a significant quantity of 345-kV and 138kV yard equipment and relay/control equipment that is poorly-performing and/or obsolete
 - Replace 138kV underground HPFF cables
 - Reconfigure the 345-kV bus from a straight bus to a ring bus design
 - Reconfigure transmission line terminals to interface with the new 345-kV bus configuration

J850/J878 new Paris 345 kV SS and 345/138kV transformer (#2)



- Q4 2022 In-service Date
- MTEP20 Appendix A, ID 18985
- Status: Approved
- Cost: \$25.5M
- Need:
 - G-T interconnection
- Scope:
 - Build new 345 kV Substation east of existing Paris 138 kV Substation
 - Add a 138/345 kV transformer to connect existing and new substations
 - Reconfigure transmission line 2222 to connect both line terminals to the new substation



For More Information

Visit the ATC 10-Year Assessment website:
www.atc10yearplan.com

Or contact

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