

2021 10-Year Assessment Summary

PRESENTED BY

System Planning

November 8, 2021



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Topics

- Messages
- Capital forecast
- Larger projects by zone

Messages

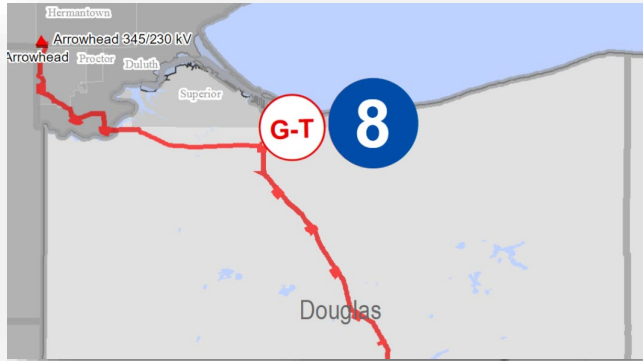
- Load forecast has similar growth rate as the 2020 Assessment
- Changing generation mix
 - 7.3 GW of solar and 1.1 GW of wind in MISO's generation interconnection queue for ATC.
 - Storage in queue increased to 2.2 GW
- Modest amount of new network projects
 - New customer interconnections main reason 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

- C Capacitor Bank or Reactor
- SS New Substation
- SM Substation Modification
- T Transformer
- T-D T-D Interconnection
- TL Transmission Line
- T-T T-T Interconnection
- ES Energy Storage
- G-T G-T Interconnection

Transmission Line Key

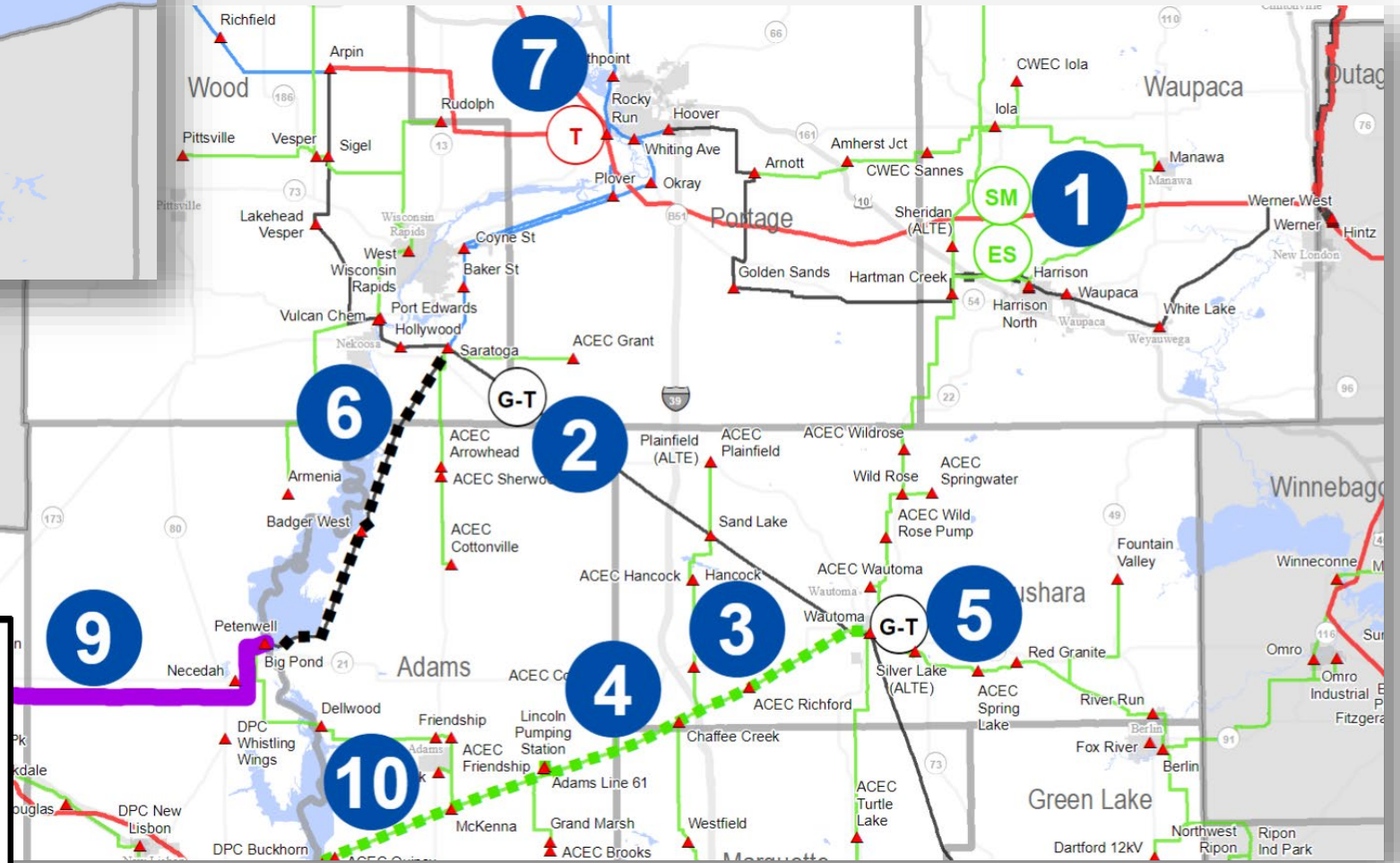
- New Transmission Line
- Rebuilt / Reconductored Transmission Line
- Line Rating Upgrade
- Voltage Conversion
- Communication

Color denotes kV for both Substation and Transmission

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

Existing Transmission Lines Key

- 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

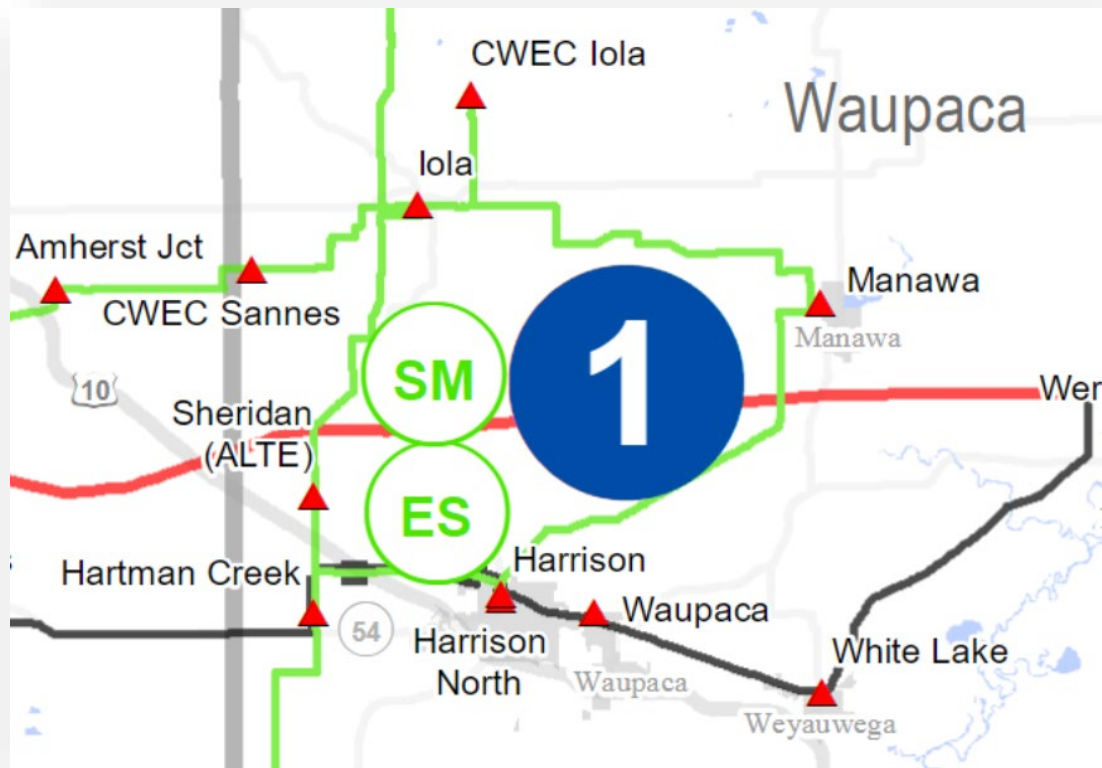


Zone 1 Projects

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

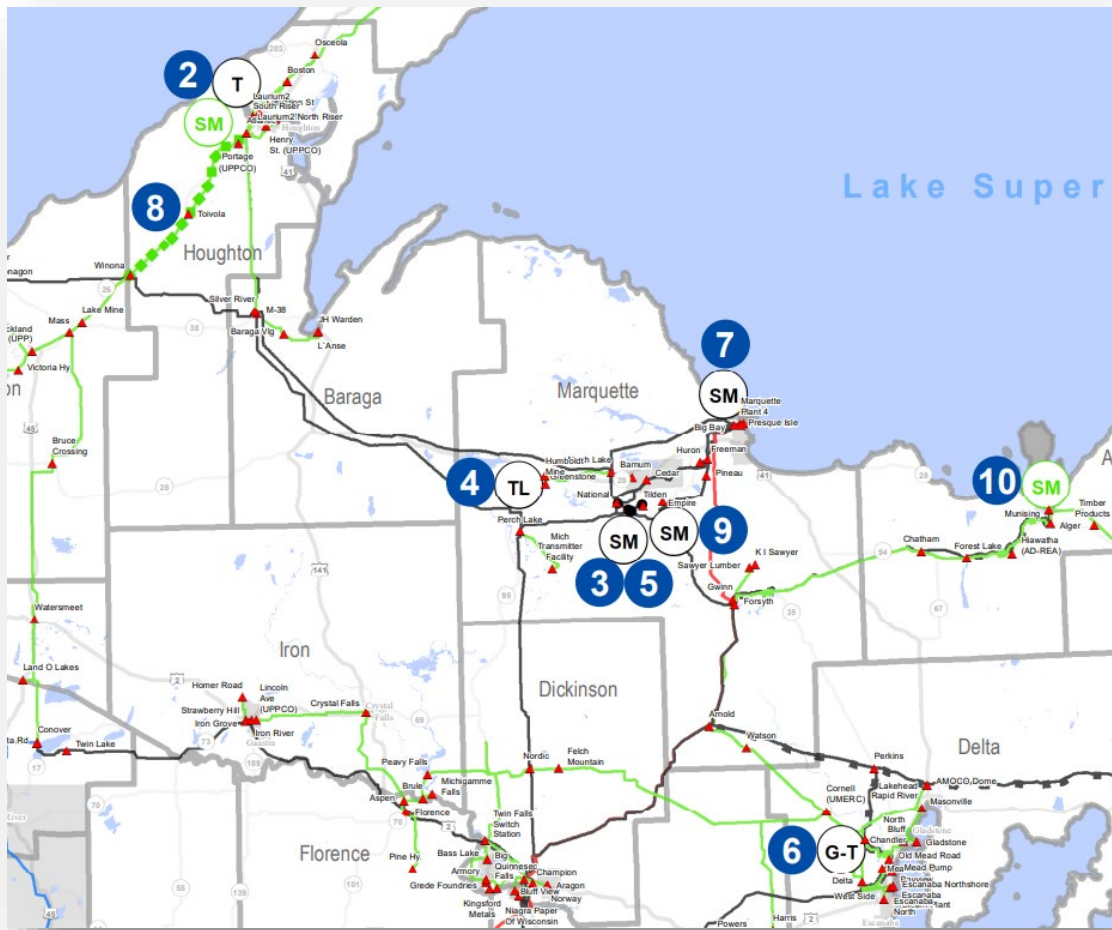
Waupaca Area Storage Project (#1)



- 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

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System Solutions Key

Substation Key

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- T-T T-T Interconnection
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- G-T G-T Interconnection

Transmission Line Key

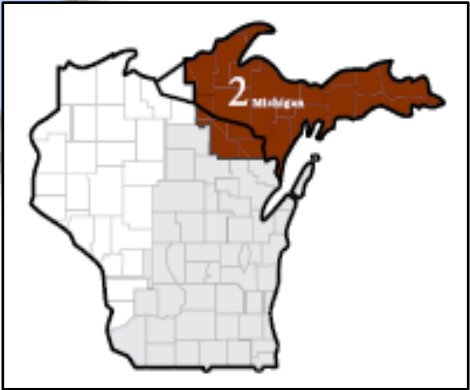
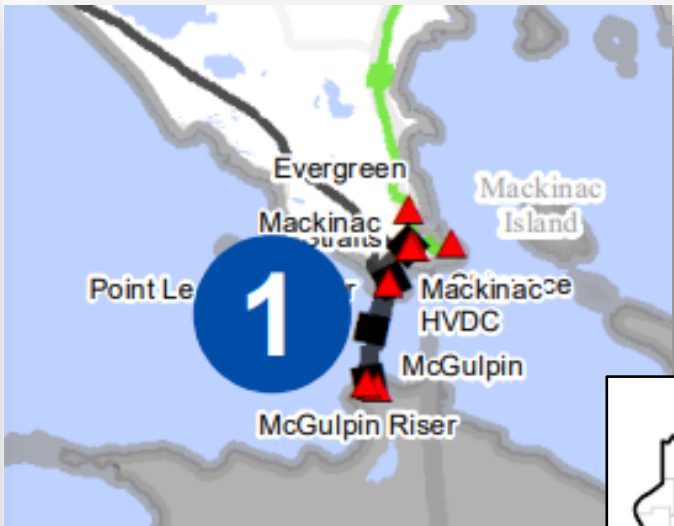
- New Transmission Line
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- Line Rating Upgrade
- Voltage Conversion
- Communication

Color denotes kV for both Substation and Transmission

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Existing Transmission Lines Key

- 345 kV
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- 115 kV
- 69 kV
- MUS-Circuit - Color denotes kV
- Underground - Color denotes kV
- 345 kV Maintained by Others



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

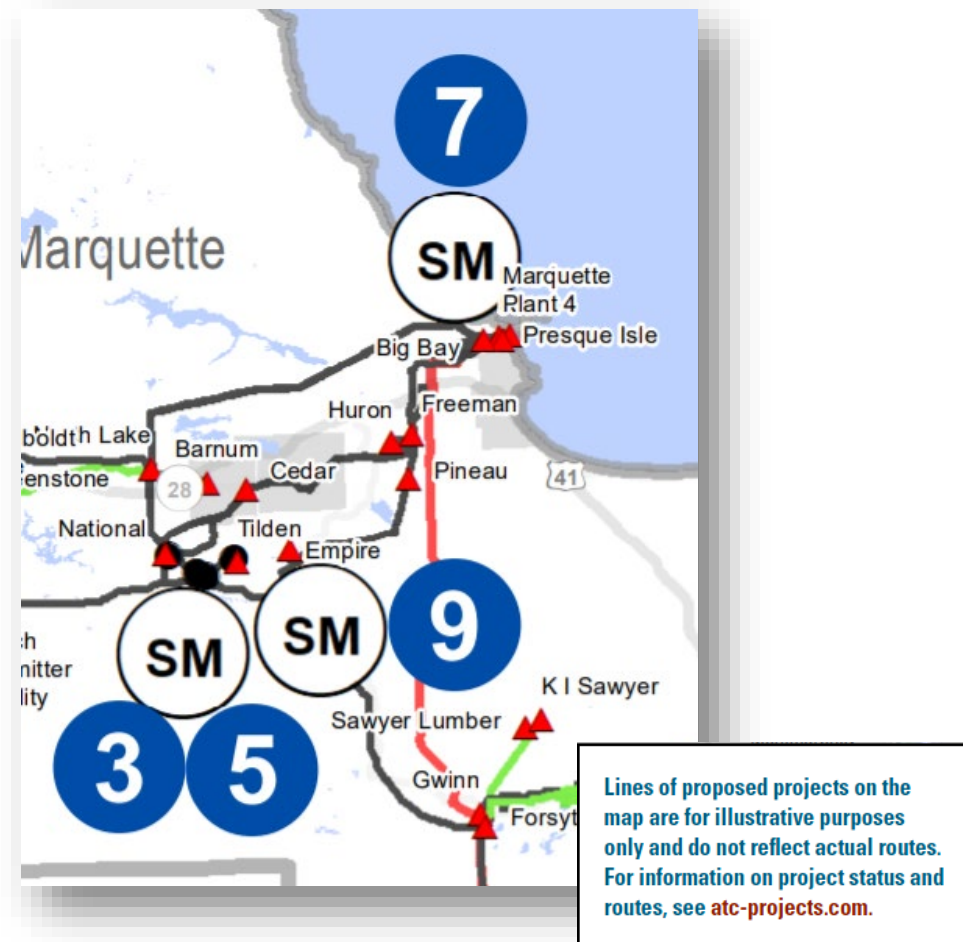
Zone 2 Proposed Projects

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

Zone 2 Provisional Projects

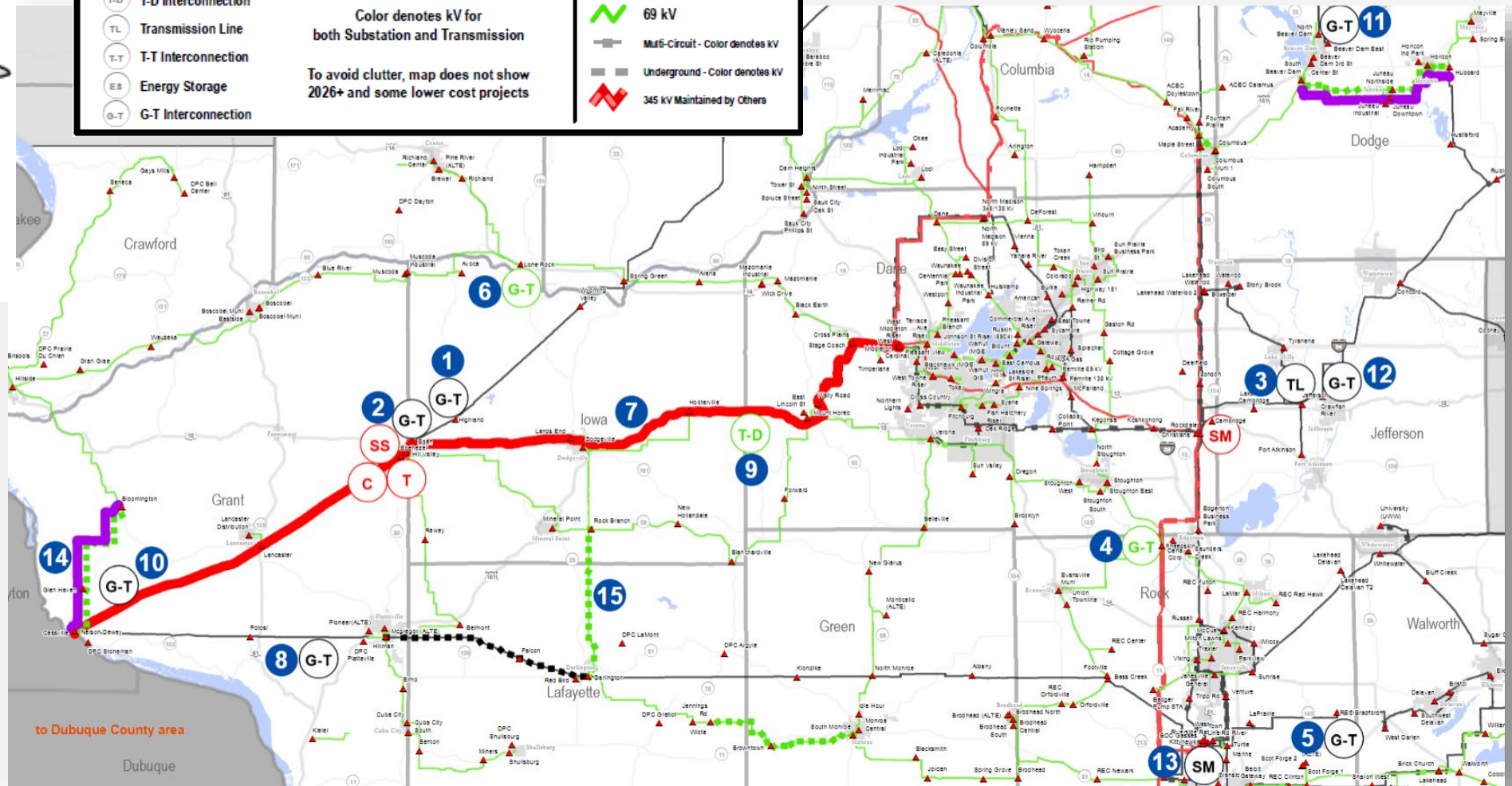
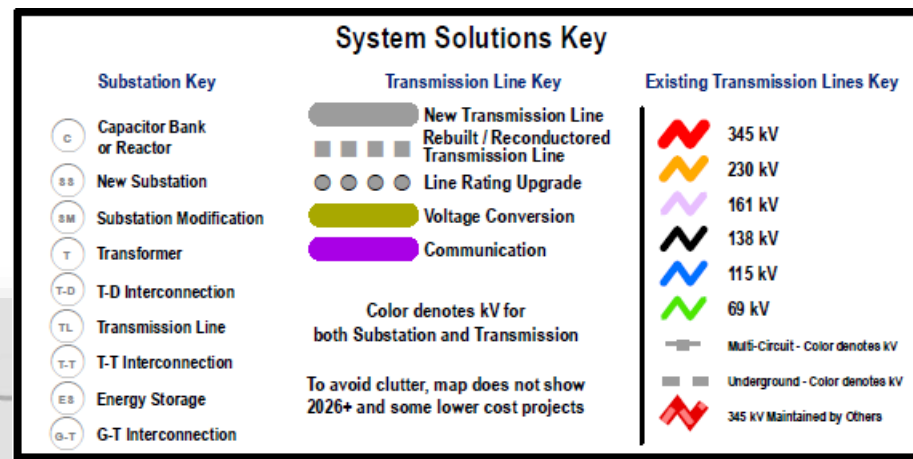
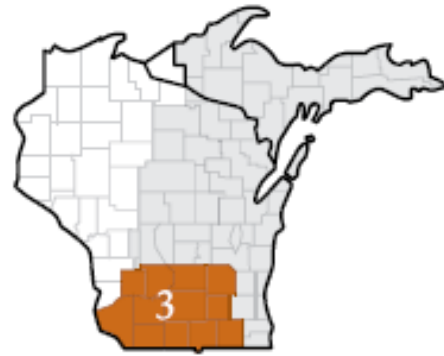
Project Description	Project #	In-service year	Need driver
Empire SS, Control House Replacement and Breaker & Relay Asset Renewal	9	2024	Asset renewal
Munising Area Reactive Power Project	10	2024	Reliability

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



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Zone 3 Projects

Zone 3 Provisional Projects

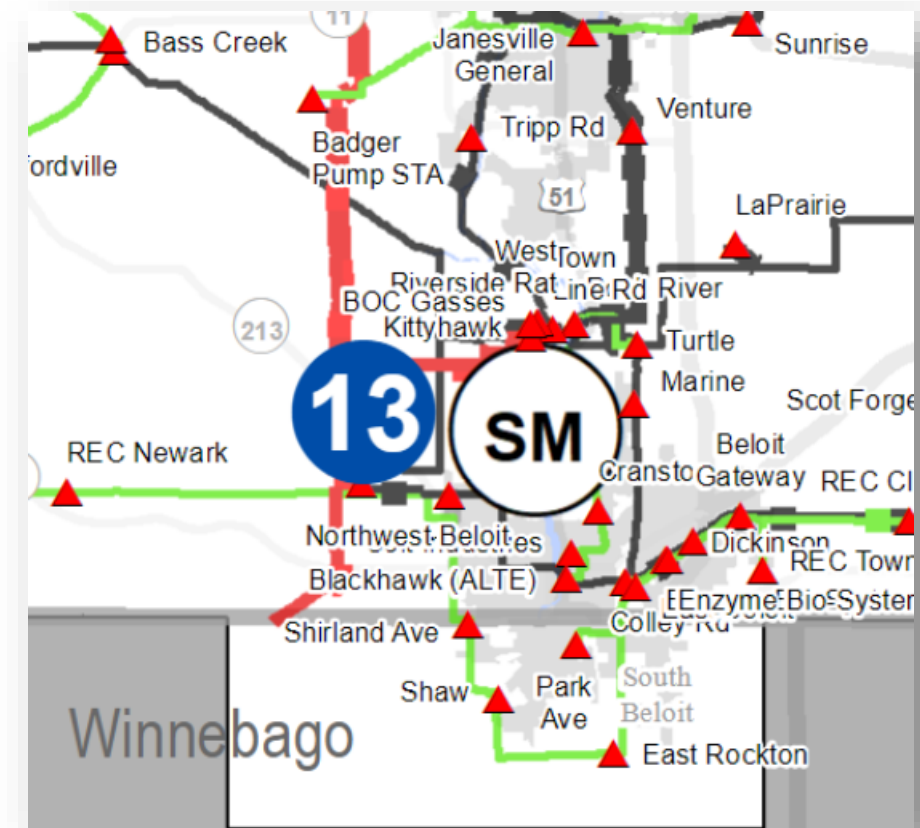
Project Description	Project #	In-service year	Need driver
Rock County Reliability Project	13	2024	Reliability

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

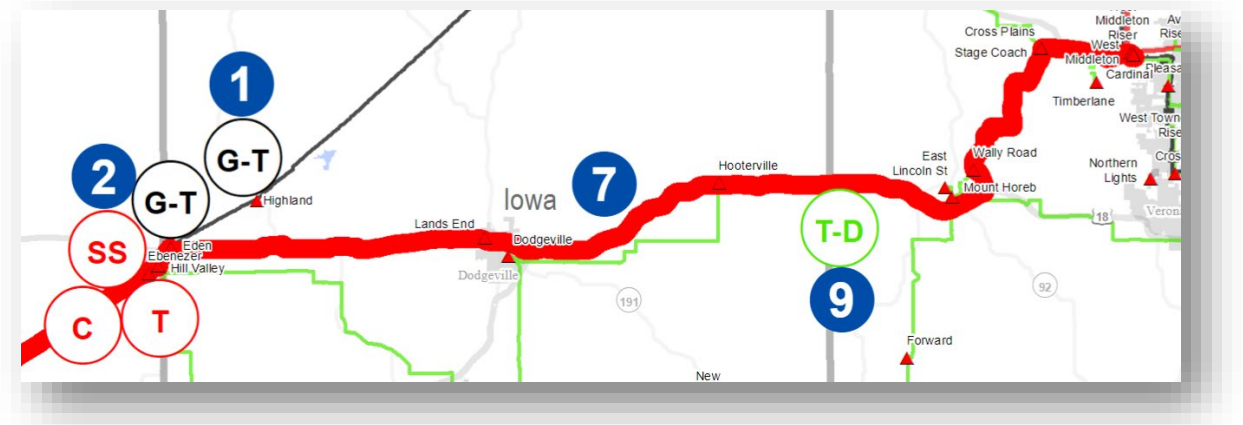
Rock County Reliability Project (#13)

- 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

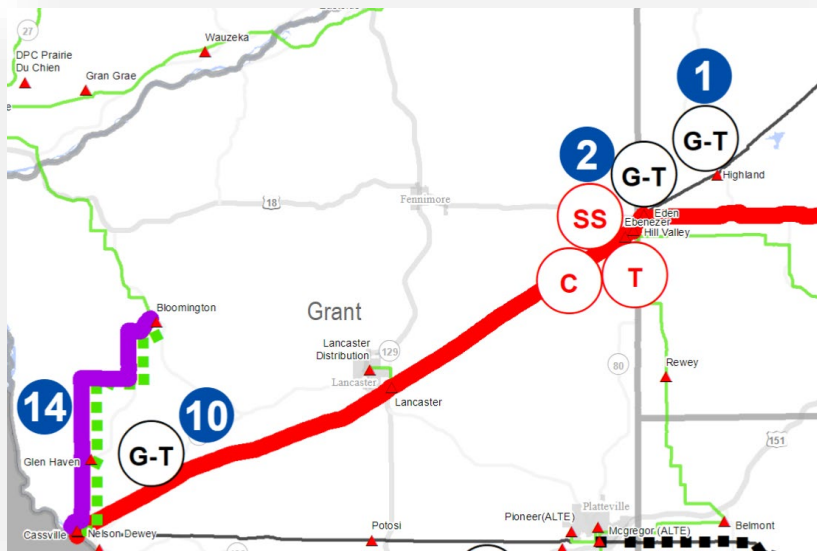


Cardinal - Hickory Creek 345-kV, line construction (#7)

- 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.

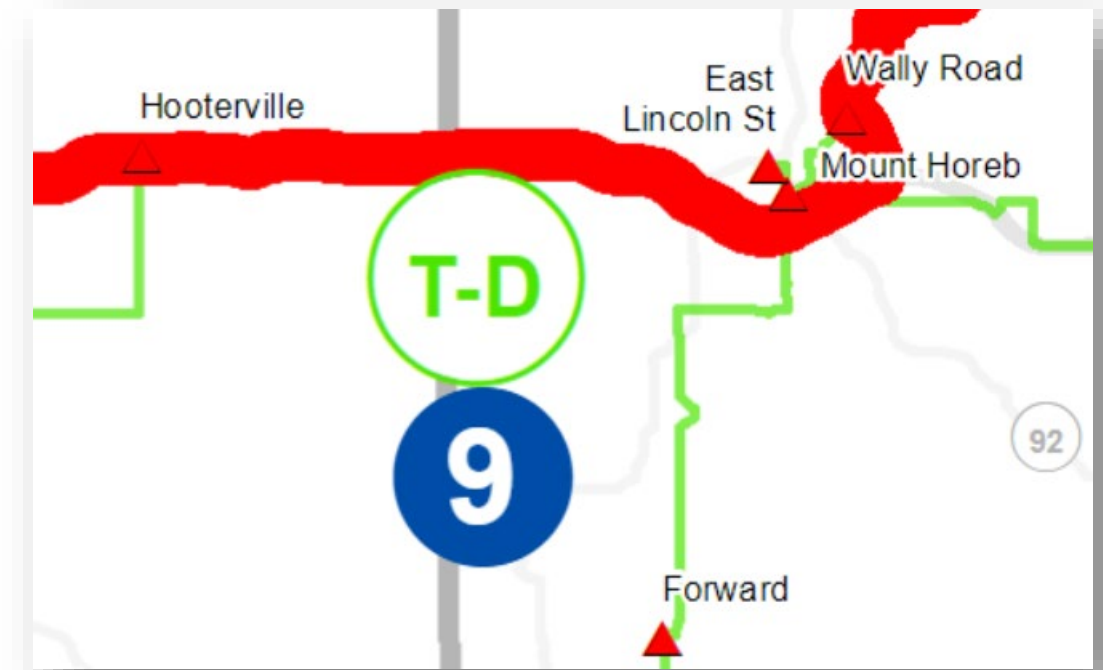


- Benefits:
 - Enable up to 30 gigawatts of cost effective, renewable energy to be delivered across the region
 - Providing \$23 million to \$350 million in net economic benefits to Wisconsin customers
 - Improve local and regional electric system reliability.
- Other Information:
 - ATC, ITC Midwest,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

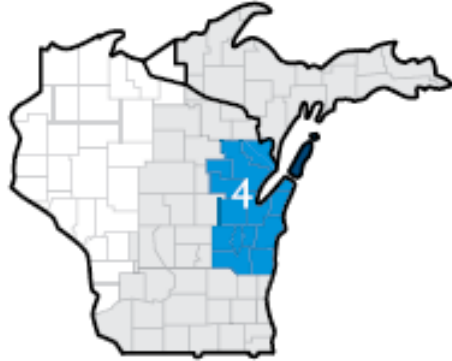


Barneveld SS, DIC, new substation (#9)

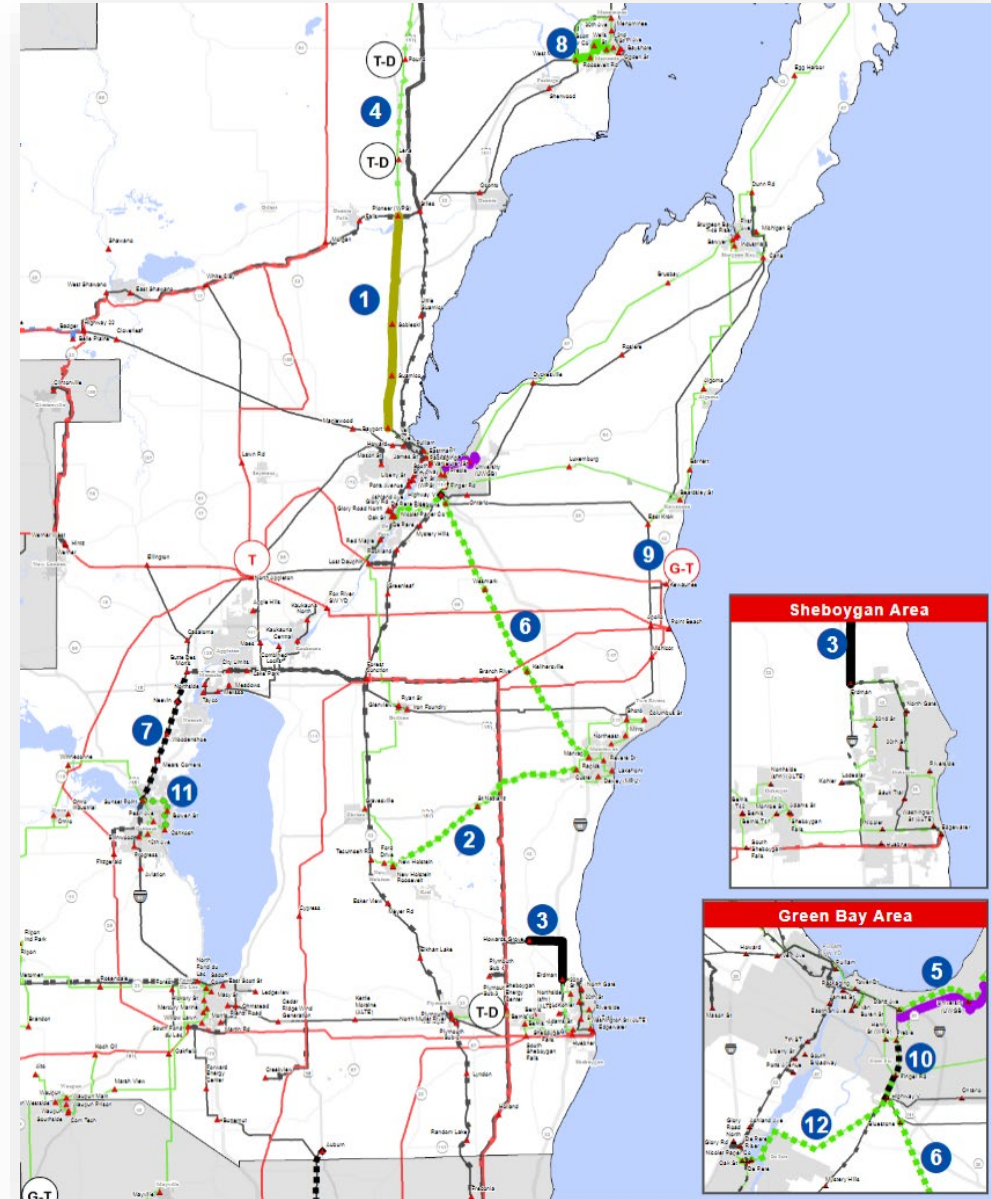
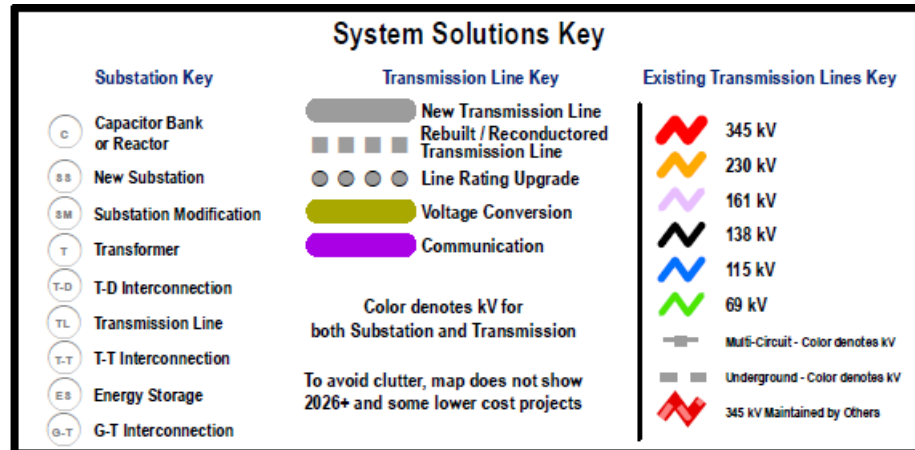
- 2023 In-service Date
- MTEP20 Appendix A, ID 18052
- Status: Proposed
- Cost: \$14.1 M
- Need:
 - Transmission to Distribution (T-D) interconnection
- Scope:
 - New 69 kV line from Hooterville to Mount Horeb
 - ◆ In CHC open tower position
 - New 69 kV Barneveld Substation with line breakers (Alliant)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



Zone 4



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Zone 4 Projects

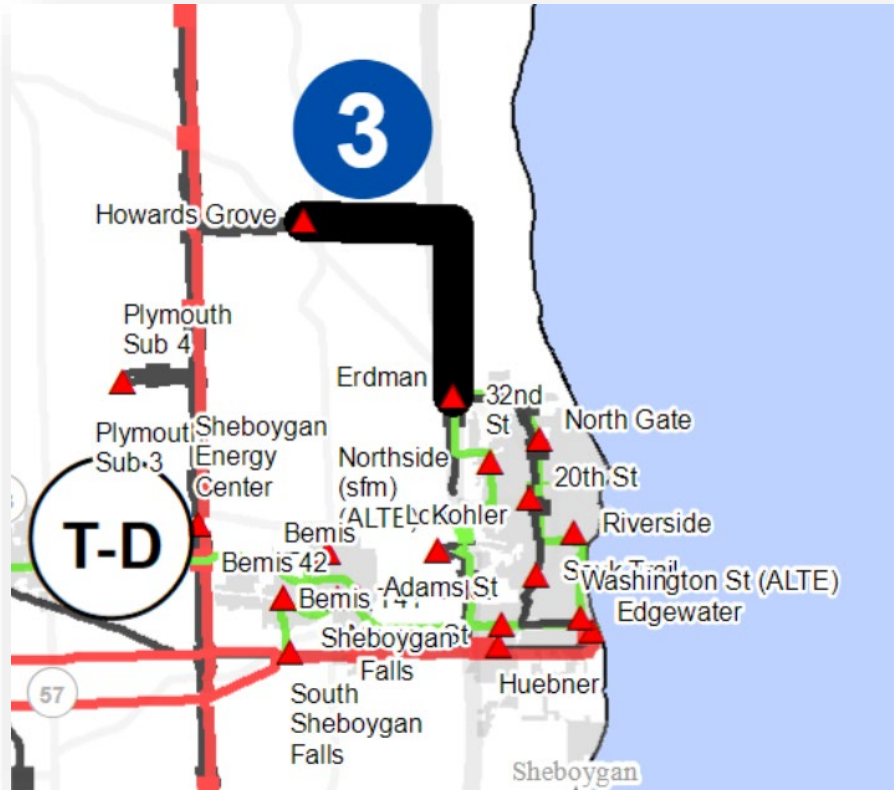
Zone 4 Planned Projects

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

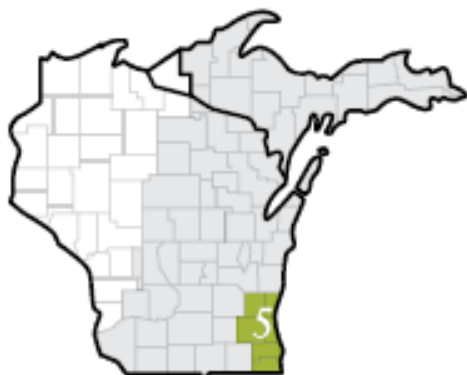
Project Description	Project #	In-service year	Need driver
Howards Grove–Erdman 138-kV line, new	3	2022	Reliability
Danz Ave. SW STA–University (WPS) 69-kV line (O-15), underground rebuild & OPGW	5	2023	Asset Renewal
Wells St. DIC - new West Marinette–Wells St. 69-kV line	8	2023	Load Interconnection

Howards Grove-Erdman 138 kV line (#3)

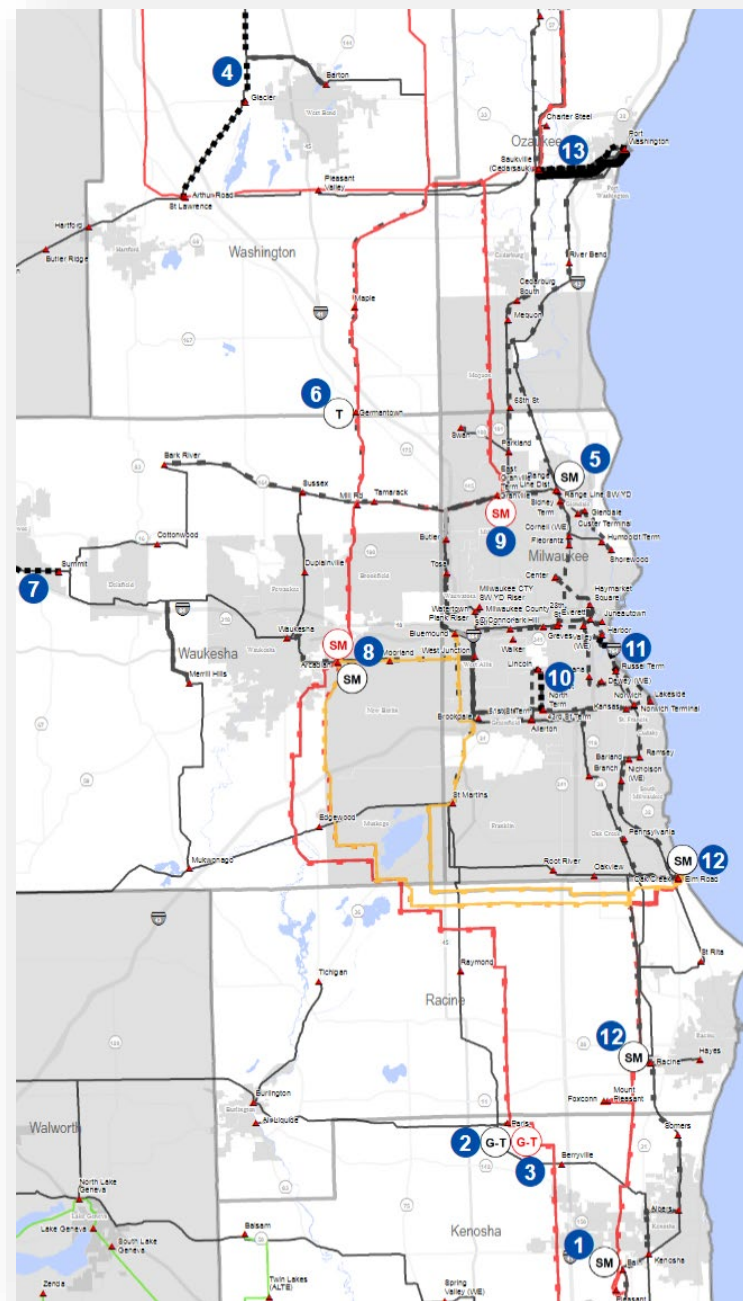
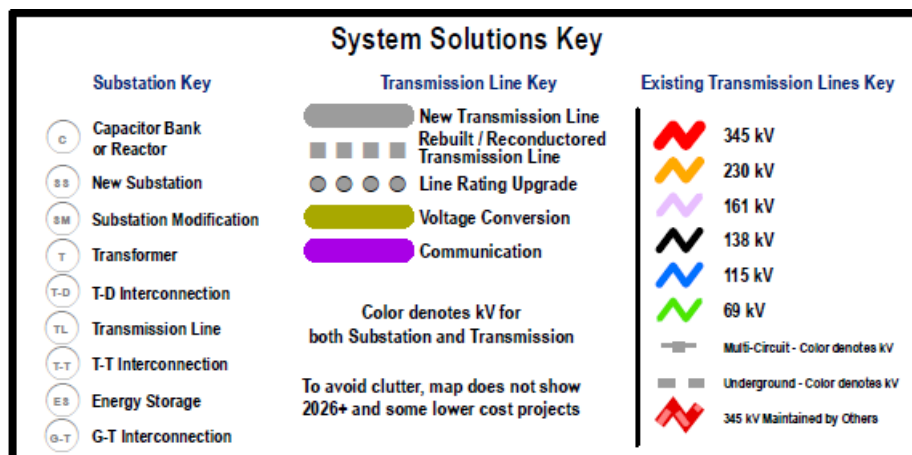


- December 2022 In-service Date
- MTEP20 Appendix A, ID 18568
- Status: Proposed
- Cost: \$25M
- Needs:
 - Reliability, generation retirement
- Scope:
 - Construct new 6.6-mile 138 kV line from Howards Grove Substation to Erdman Substation
 - Expand Howards Grove Substation to a 4-position ring bus
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

Zone 5



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Zone 5 Projects

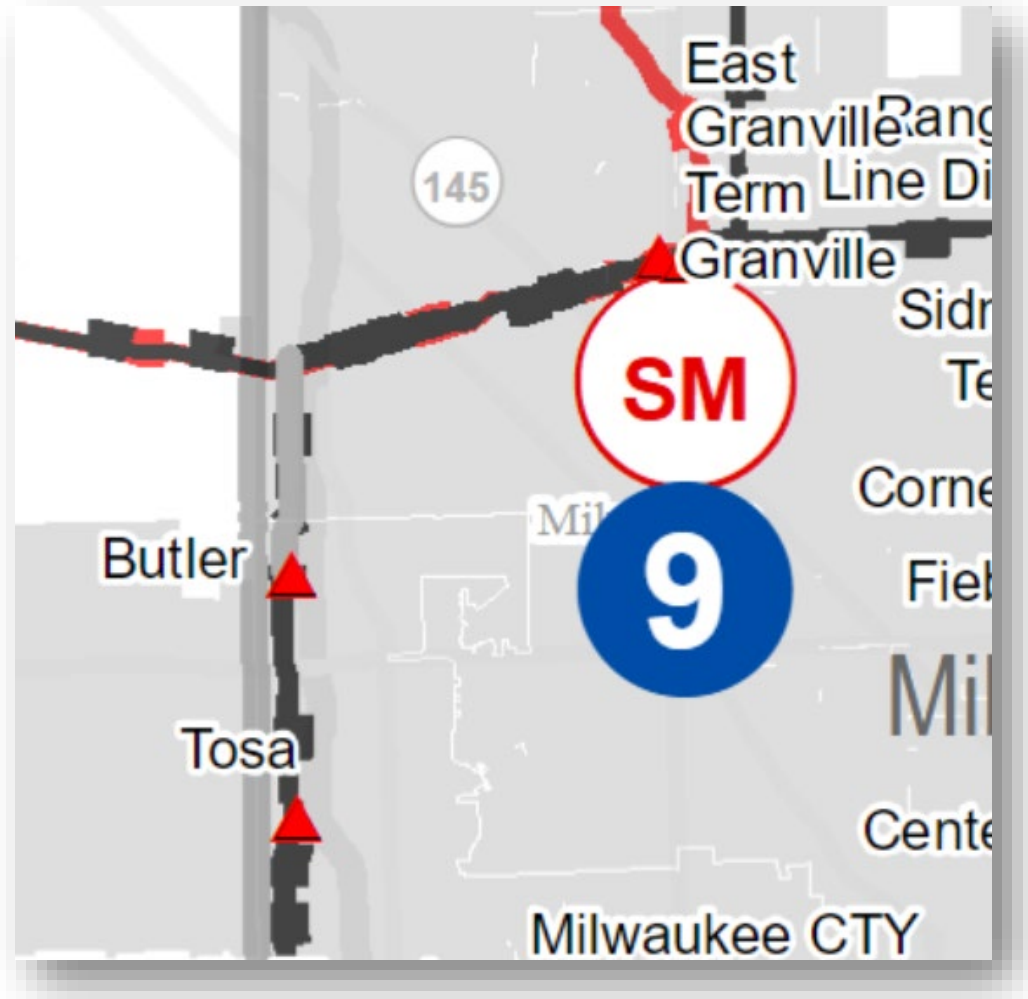
Zone 5 Planned Projects

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

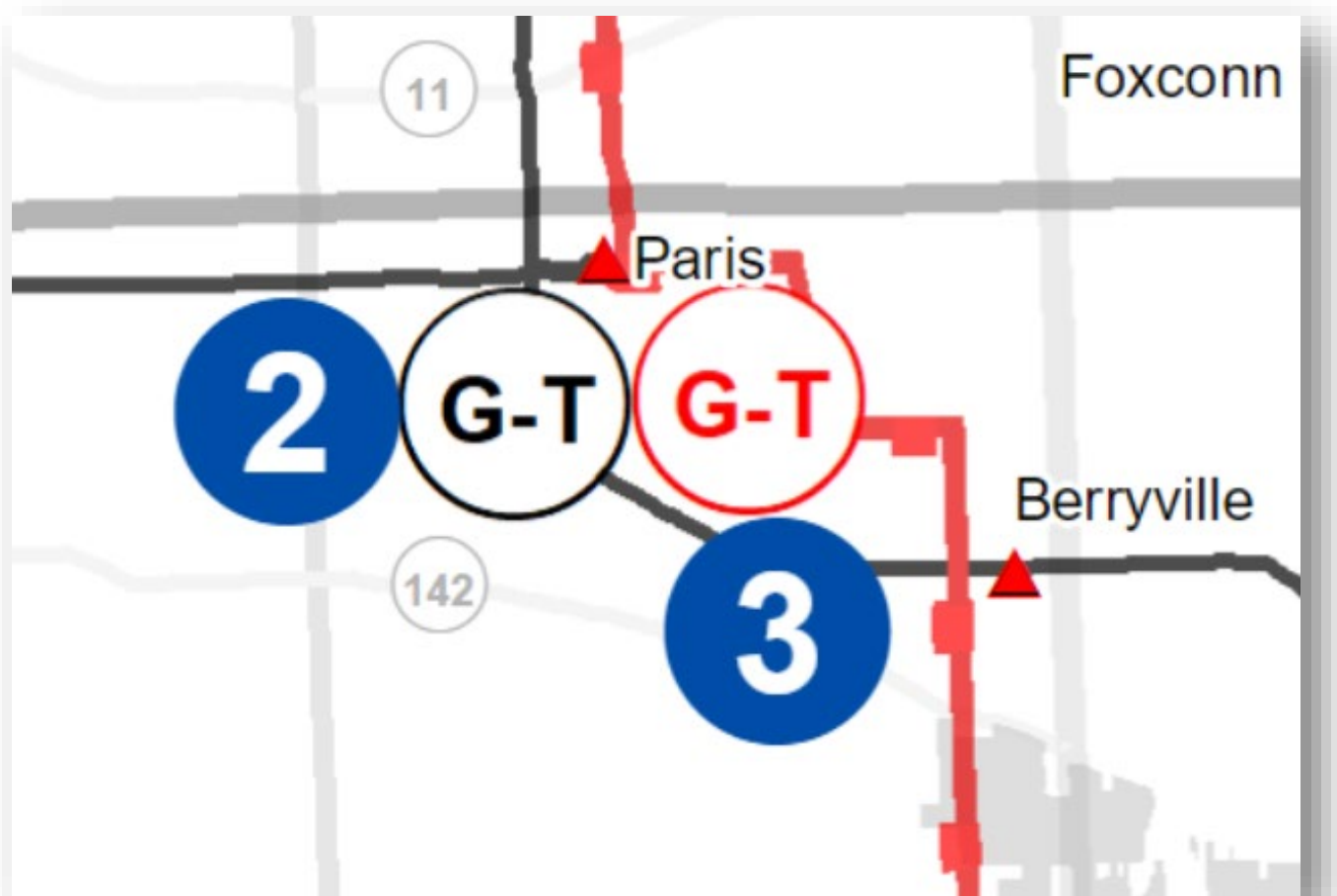
Project Description	Project #	In-service year	Need driver
Norwich–Harbor 138-kV (893K11), underground line replacement	11	2025	Asset Renewal
Oak Creek, Racine SS and Remote Ends, Control Buildings and Relaying Asset Renewal	12	2025	Asset Renewal
Port Washington–Saukville 138-kV (X-132/X-133), partial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