2022 Economic Planning Study Results

PRESENTED BY

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AMERICAN TRANSMISSION COMPANY®

Introduction

- Process Overview and Timeline
- MTEP21 Futures
- Study Area Results
- Next Steps

ATC Process Overview and Timeline

- ATC Economic Project Planning – Per ATC Tariff
  - **During February** – we hold an initial stakeholder meeting to review the market congestion summary and potential fixes and to discuss economic study scenarios, drivers, ranges, and assumptions.
  - **By March 1** – we work with stakeholders to request and prioritize new/other economic studies and recommend study assumptions.
  - **By April 15** – we identify preliminary areas of economic study, study assumptions and models and solicit further comments from stakeholders.
  - **By May 15** – we finalize areas of economic study, study assumptions and models to be used in analysis.
  - **By November 15** – we provide a summary of the results of the economic analyses to our stakeholders.

MISO MTEP21 Futures

Future 1

- Load Growth
  - Consistent with recent trends
    - Energy (Watt-hours): 0.48%
    - Demand (Watts): 0.60%
    - Electrification: 2% of growth
- Carbon Reduction: 40%
  - 63% realized in results
- Wind/ Solar Gen: 26%
- Gen Retirements: 77.1 GW
  - Longer life-spans used
- Gen Additions: 129.5 GW

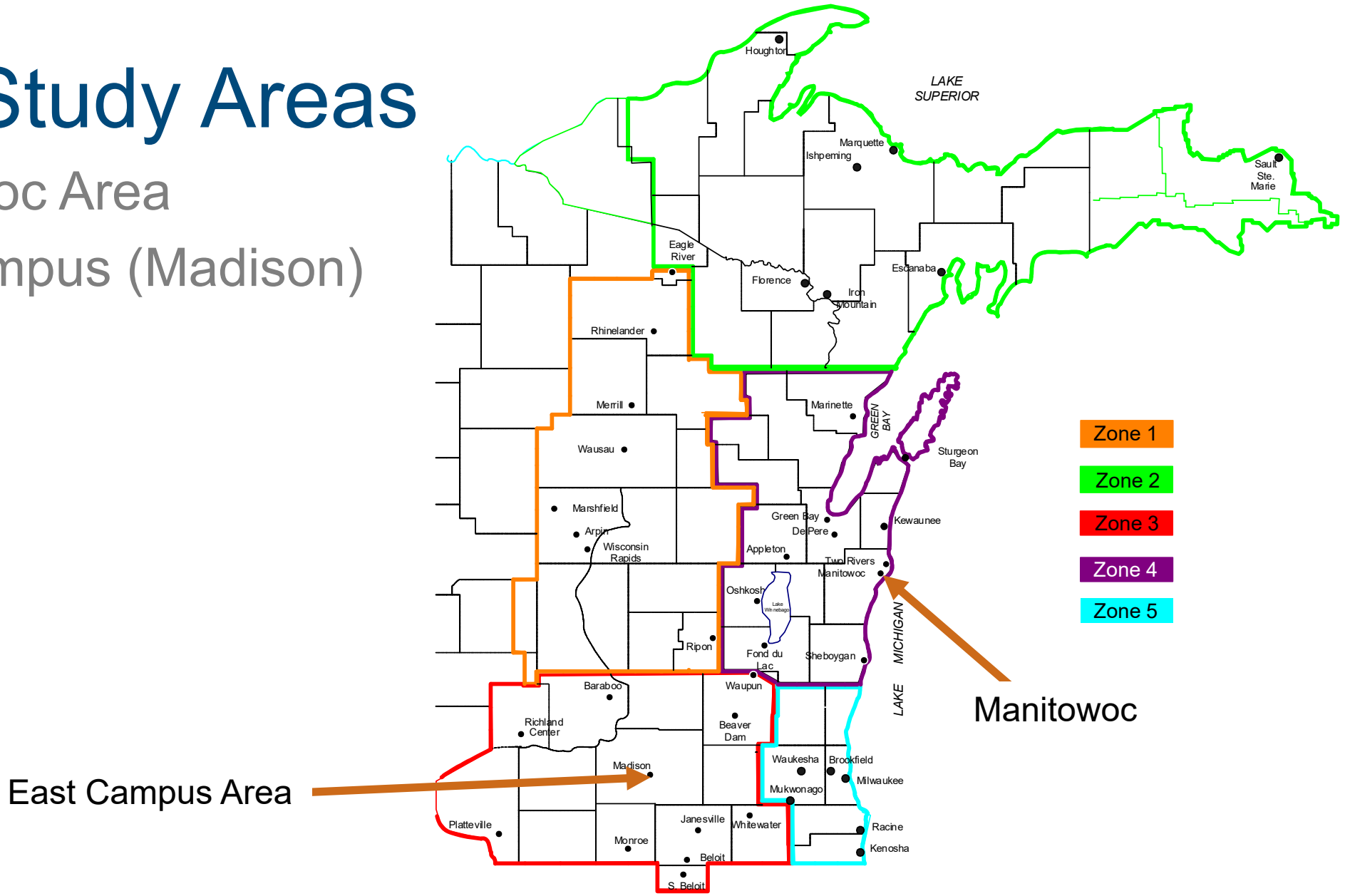
Future 2

- Load Growth
  - 30% increase by 2040
    - Energy (Watt-hours): 1.09%
    - Demand (Watts): 0.97%
    - Electrification: 15.2% of growth
- Carbon Reduction: 60%
  - 65% realized in results
- Wind/ Solar Gen: 35%
- Gen Retirements: 80.4 GW
  - Mid-range life-spans used
- Gen Additions: 179.4 GW

Data is from the Updated December 2021 MISO Futures Report at: https://cdn.misoenergy.org/MISO%20Futures%20Report538224.pdf

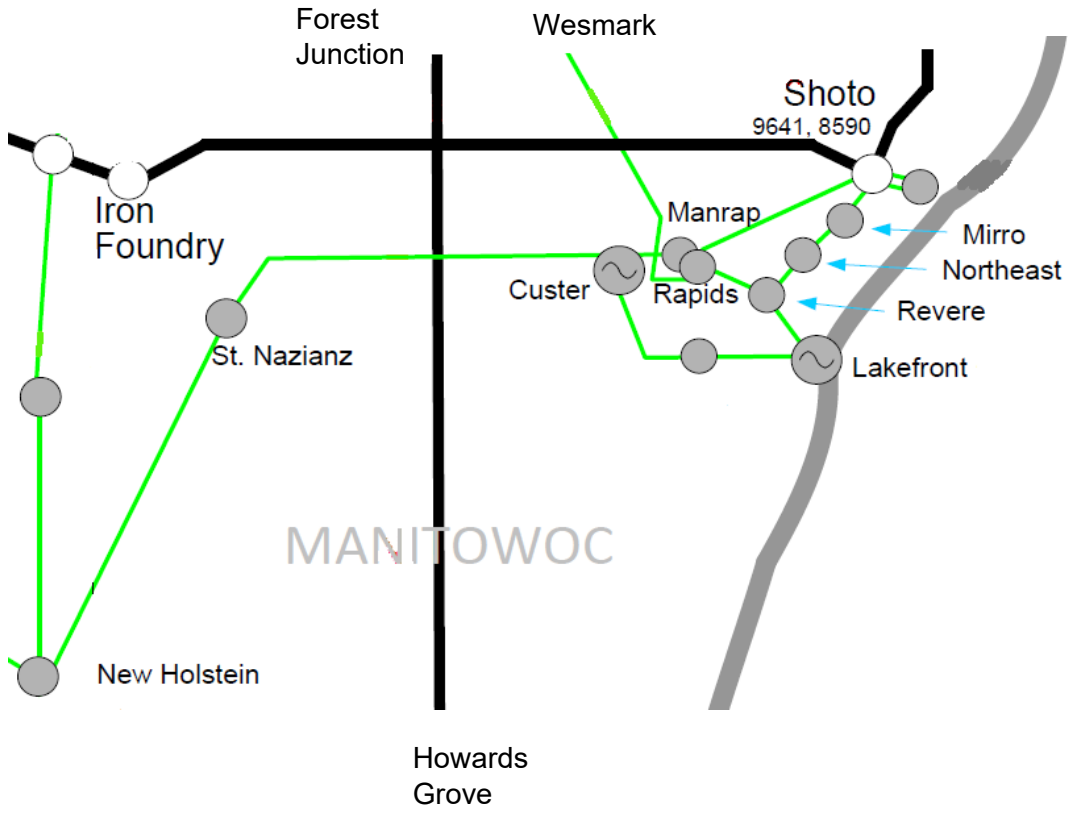
2022 Study Areas

- Manitowoc Area
- East Campus (Madison) Area



Manitowoc Area Alternatives

- **Rebuild**
  - Rebuild to T2 Linnet conductor at maximum normal and emergency temperature ratings
    - Shoto – Northeast – Revere Drive 69kV
- **Battery Storage**
  - 10 MW, 40 MWh battery
    - Manrap
    - Lakefront
- **New Substation**
  - Rapids – Wesmark 69kV crosses Iron Foundry – Shoto 138kV
  - Custer – New Holstein 69kV crosses Forest Junction – Howards Grove 138kV



Manitowoc Area Study Results

Alternatives	MISO MTEP21 Planning Futures		Cost Estimate
	F1	F2	
Shoto-Northeast-Revere Drive 69kV	$8.2 M	$28.6 M	$12.0 M
Manrap 69kV Battery	$3.9 M	$10.4 M	$25.0 M
Lakefront 69kV Battery	$4.5 M	$8.6 M	$25.0 M
New Sub: Rapids-Wesmark 69kV x Iron Foundry-Shoto 138kV	$9.2 M	$31.5 M	$17.5 M
New Sub: Custer-New Holstein 69kV x Forest Junction-Howards Grove 138kV	$11.4 M	$44.8 M	$17.5 M

Note: Savings are 2022$ present value gross 40-year benefit savings from the Customer Benefit Metric. Costs are 2022$ estimates.

Manitowoc Area Conclusions

- **Rebuild**
  - Further analysis recommended
- **Battery**
  - Eliminated due to insufficient benefit/cost ratio
- **New Substation**
  - Further analysis recommended

- As the recent Lakefront 9 Attachment Y retirement studies could lead to required projects, the economic planning team will continue coordination efforts to identify the most reliable and cost-effective solutions for the Manitowoc area.
  - MISO's Lakefront 9 Attachment Y Study Report can be found at: http://www.oasis.oati.com/woa/docs/MISO/MISOdocs/Attachment_Y_Information.html

East Campus (Madison) Area Alternatives

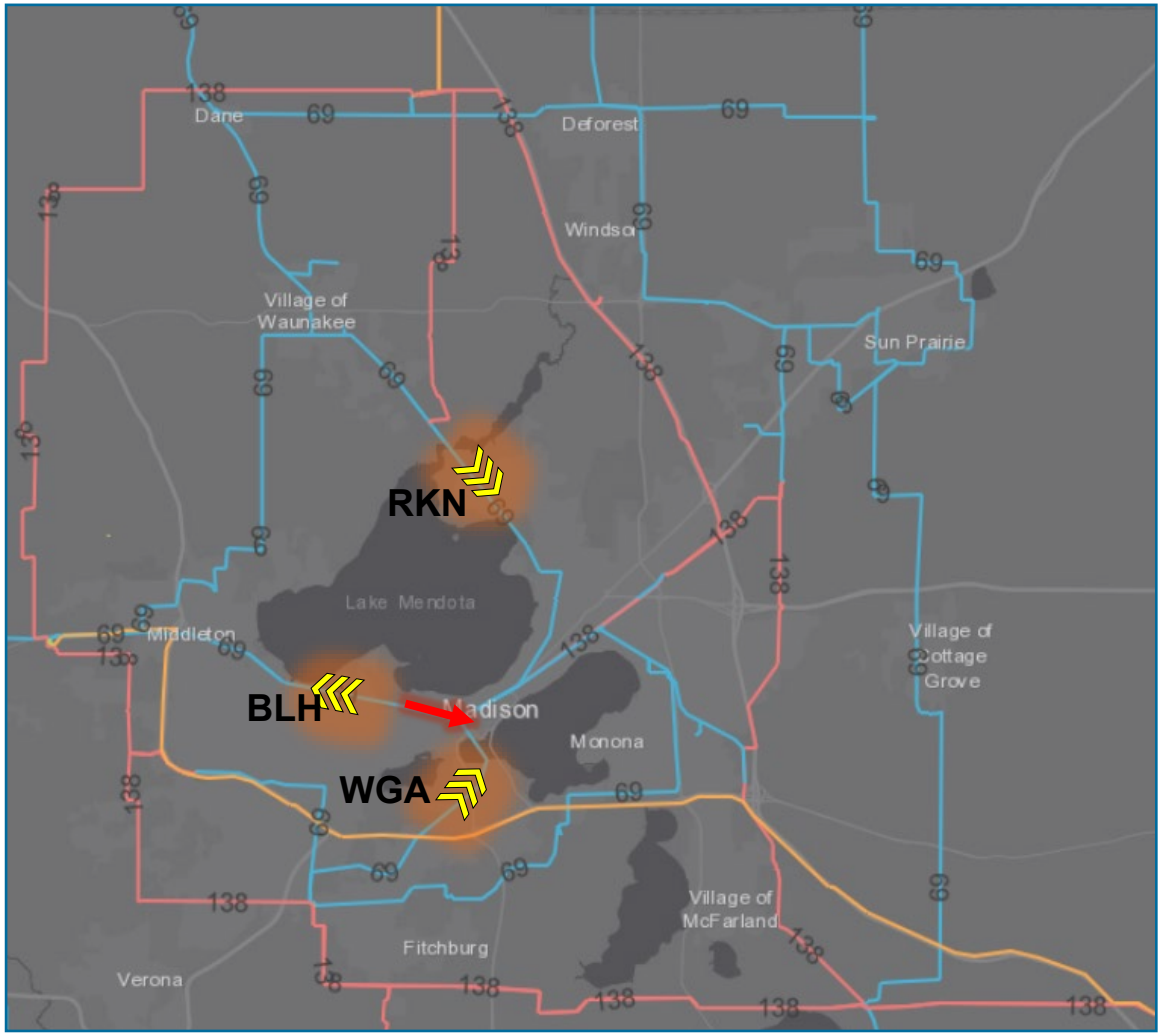
- **1) Increase rating on East Campus – Walnut 69kV underground cable**
- **2) Series Reactor on East Campus – Walnut 69kV**
- **3) Energy Storage**
  - 30 MW, 120 MWh battery at Blount
- **4) New Blount – Walnut 69kV underground cable**
- **5), 6), & 7) Flow Regulation**

East Campus (Madison) Area Alternatives

- **5) Blackhawk 69kV regulation**
- **6) Ruskin 69kV regulation**
- **7) Wingra 69kV regulation**

- 69kV flow regulation options:
  - Phase shifter/ angle regulator
  - SmartWires (or similar)

- Operator angle adjustment for specific situations may provide further value



Available ESRI 2022 map layer : US Electric Power Transm. Lines

East Campus (Madison) Area Study Results

Alternatives	MISO MTEP21 Planning Futures		Cost Estimate
	F1	F2	
Increase rating on East Campus – Walnut 69kV underground cable	$4.1 M	$6.0 M	$5.0 M
Series Reactor on East Campus – Walnut 69kV	$5.8 M	$5.0 M	$3.0 M
Energy Storage	$0.7 M	$4.4 M	$72.0 M
New Walnut-Blount 69kV underground cable	$6.5 M	$4.3 M	$24.0 M
Blackhawk 69kV regulation	$5.1 M	$10.6 M	$6.0 M
Ruskin 69kV regulation	$7.8 M	$9.1 M	$6.0 M
Wingra 69kV regulation	$6.1 M	$7.0 M	$6.0 M

Note: Savings are 2022$ present value gross 40-year benefit savings from the Customer Benefit Metric. Costs are 2022$ estimates.

East Campus (Madison) Area Conclusions

1) **Increase East Campus – Walnut 69kV underground cable rating**
   - Pending further analysis
2) **Series Reactor on East Campus – Walnut 69kV**
   - Physical space limited, further investigation needed
3) **Energy Storage**:
   - Eliminated due to insufficient benefit/cost ratio
4) **New Walnut-Blount 69kV underground cable**
   - May have additional reliability drivers, pending further analysis
5) **Blackhawk 69kV regulation**
   - "Tighter" control over East Campus – Walnut 69kV flows
6) **Ruskin 69kV regulation**
   - Slightly preferred over Blackhawk
7) **Wingra 69kV regulation**
   - Did not perform as well as Blackhawk or Ruskin regulation

Next Steps

- Continue Madison and Manitowoc Area studies

- Timelines
  - March 2022 – Next Stakeholder Meeting

Questions

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