2021 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

Futures	1	2	3
Carbon Reduction Target (%)[1]	40	60	80
Carbon Reduction Acheived (%)[2]	63	64	81
Energy Supplied by Renewables (%)	26	32	50
20-Year Increase in Energy (%)[3]	10	24	40
20-Year Increase in Peak Demand (%)[3]	12	22	33

Current MISO Generating Capacity (GW)	184	184	184
Generation Retirements (GW)	-77	-80	-112
New Generation Added in MISO (GW)	130	169	343
Total Generation Net of Retirements (GW)	**237**	**273**	**415**
Generating Capacity in 20 Years Relative to Today[4]	1.3X	1.5X	2.3X

Notes to previous slide table

[1] Relative to 2005.

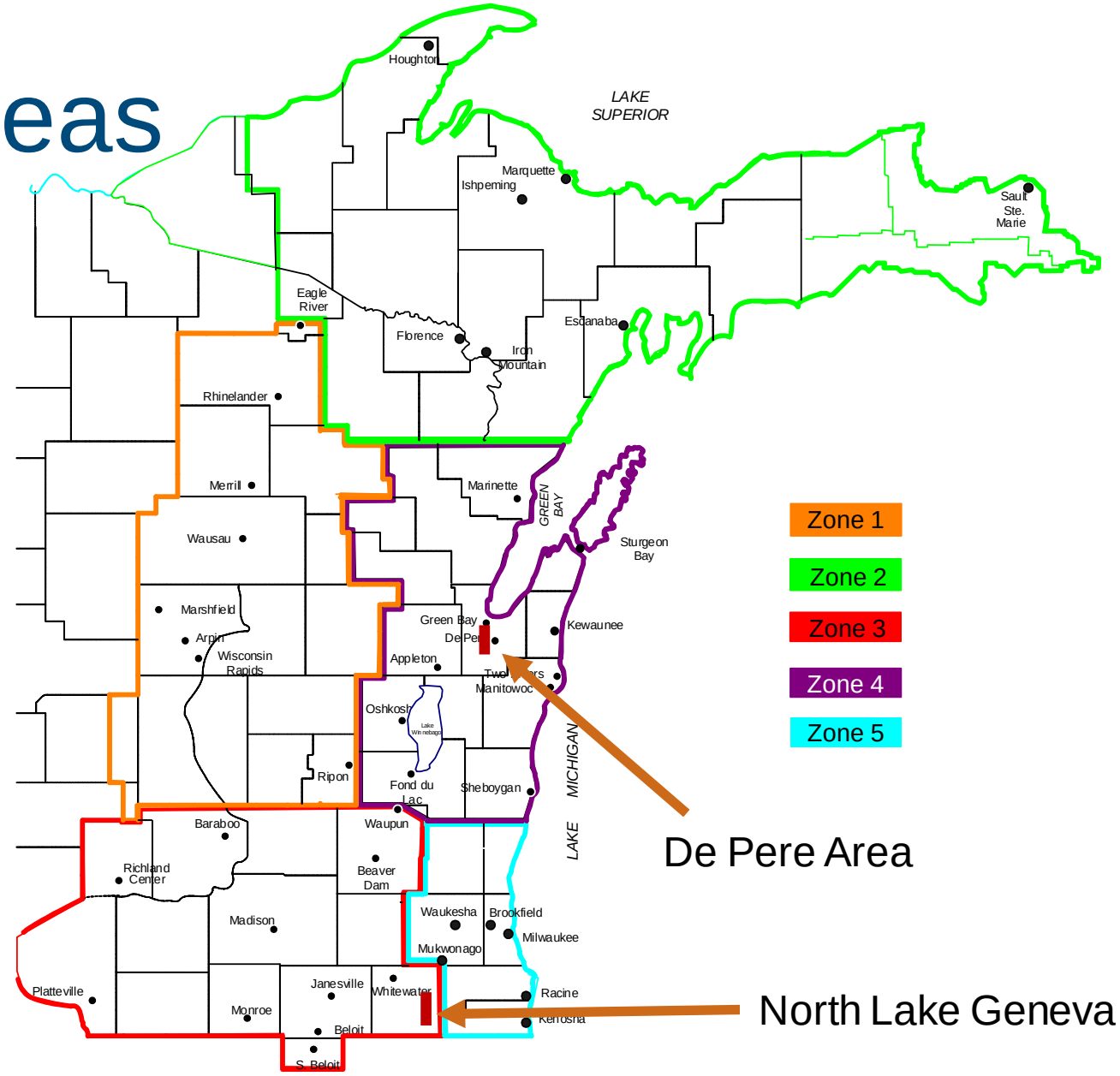
[2] Future 1 models 100% of the state-approved utility integrated resource plans (IRPs) and 85% of state and utility goals (e.g. carbon neutral by 2050) that are not legislated. This reduces carbon emissions more than setting a 40% carbon reduction target (in the EGEAS model). In other words, in Future 1, due to IRPs and state and utility goals, carbon declines by 63% rather

[3] **Annual net** energy and peak demand increases by 0.47, 1.08, 1.69% and 0.57, 0.98 and 1.43%, respectively, for each Future.

[4] Future 3 projects more than double (2.3X) today's amount of generating capacity in 20 years (415 versus 184 GW). Significant amounts of new transmission will be needed to deliver this variable largely renewable capacity to load. Fossil generators can have capacity factors as much as twice those of wind plants so to replace them you would need roughly twice as much wind capacity. Correspondingly, you would need roughly four times as much solar capacity. High performing wind and solar plants can have "capacity factors" in the range of 50% and 25%, repectively. A 50% capacity factors means that a 100 MW wind plant's average hourly output would be 50 MW. Hence the "Generation Increase Relative to the Current Amount" can be substantial. More renewable generation is also required because of its variable nature.

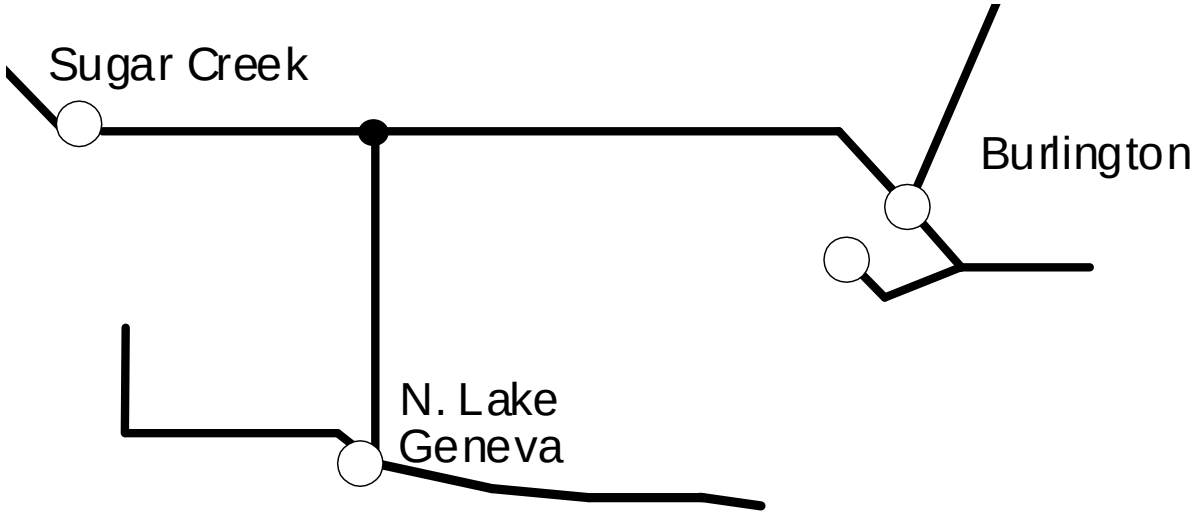
MTEP21 Study Areas

- North Lake Geneva Area
  - New generation changes may affect area
- De Pere Area



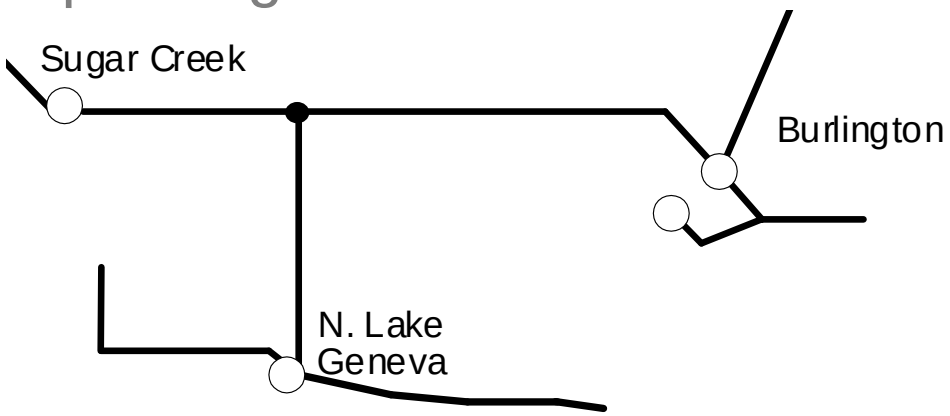
North Lake Geneva Alternatives

- **Energy Storage**: 10 MW, 40 MWH battery at North Lake Geneva
- **Uprate**: Burlington – North Lake Geneva Tap 138 kV
  - uprated to maximum normal and emergency temperature ratings



North Lake Geneva Alternatives

- **Reconductor**: reconductor to T2 Hawk conductor at maximum normal and emergency temperature ratings
  - Burlington – North Lake Geneva Tap 138 kV
  - North Lake Geneva Tap – Sugar Creek 138 kV
  - North Lake Geneva – North Lake Geneva Tap 138 kV
- **Series Reactor Alternatives**: 5 ohm series reactor added to line
  - Burlington Reactor Alt: Burlington – North Lake Geneva Tap 138 kV
  - Sugar Creek Reactor Alt: North Lake Geneva Tap – Sugar Creek 138 kV



North Lake Geneva Study Results

Alternatives	MISO F1 Planning Future Benefit
Energy Storage	$2,823,950
Uprate	($215,984)
Reconductor	$4,485,355
Burlington Reactor	$1,366,082
Sugar Creek Reactor	$2,026,199

Note: Numbers are 2021 present value gross 40-year benefit from the Customer Benefit metric.

North Lake Geneva Conclusions

- **Energy Storage**:
  - Eliminated due to insufficient benefit/cost ratio
  - Cost Estimate: $15M
- **Tap Uprate**:
  - Eliminated due to negative benefits in MISO Future 1
- **Tap Reconductoring**:
  - Eliminated due to insufficient benefit/cost ratio
  - Cost Estimate: $14M
- **Series Reactor Alternatives**:
  - Burlington Reactor Alt: Eliminated due to insufficient benefit/cost ratio
  - Sugar Creek Reactor Alt: Eliminated due to insufficient benefit/cost ratio
  - 5 ohm Series Reactor Cost Estimate: $2M

De Pere Alternatives

- **Energy Storage:** 25 MW and 25 MWH battery at Glory Road
- **Double Circuit:** Double circuit following lines
  - Lost Dauphin – Red Maple 138 kV
  - Red Maple – De Pere 138 kV
  - De Pere – Glory Road 138 kV
- **Series Reactor:** 5ohm series reactor on 138 kV De Pere – Glory Road
- **De Pere 69 kV:** Connect De Pere generation to 69 kV at Oak St.
  - Single 138/69 kV transformer and 0.2 mi of 69 kV line

De Pere Alternative Results

- Noticed inconsistencies in the modeling and missed area projects which lead to higher local congestion and inflated benefits
- We will provide an update on the results

Alternative	MISO F1 Planning Future Benefit
Energy Storage	
Double Circuit	
Series Reactor	
De Pere 69 kV	

Next Steps

- Continued work monitoring new generation impacts on congestion and their projects
- Report on the De Pere area results next meeting
- Timelines
  - March 2021 – Next Stakeholder Meeting

Questions

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