ATC Stakeholder Update
2019 PROMOD Study Assumptions

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ATC Economic Planning
7-10-09

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Agenda / Introduction

- MISO RGOS Model Description
- MISO RGOS Model History and Background
- MISO RGOS Model Update
- New Generation Assumptions
- Transmission Assumptions
- Modeling Demand Response
- Schedule and Next Steps

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MISO RGOS Model Description

- Per RGOS scope, Reference and Gas only Futures to be studied
- PROMOD model is an MTEP 09 vintage
- The PowerBase database (containing the generation, load, fuel, etc information) is the same as used in JCSP study
- 2019 PROMOD case uses the MTEP09 2019 power flow model

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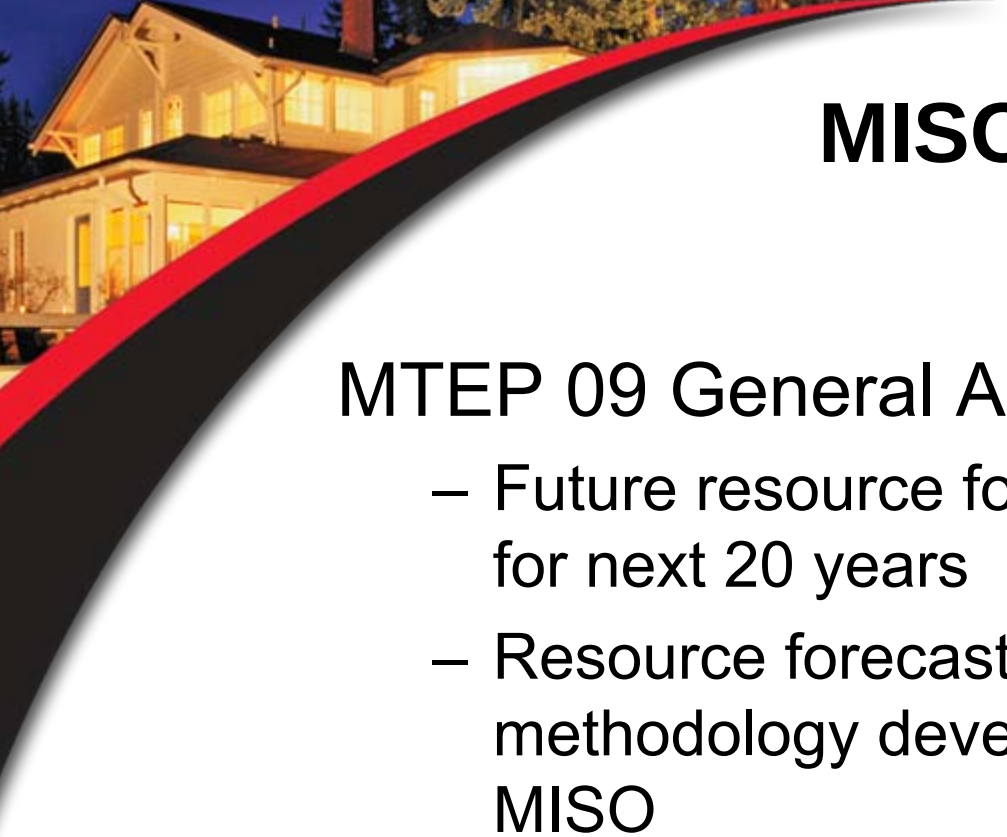

MISO RGOS Model History and Background

MTEP 09 General Assumptions

- Future resource forecasting based on EGEAS for next 20 years
- Resource forecast sited based on methodology developed by stakeholders and MISO
- Transmission topology from latest power flow models
- Model includes entire eastern interconnection, except Florida, NEISO and Hydro Quebec
- Event File based on NERC and MISO Book of Flowgates

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MISO RGOS Model History and Background

MTEP 09 Wind Generation Assumptions

- Reference and Gas Futures include RPS wind requirements
- Hourly wind profiles from National Renewable Energy Lab (NREL)
  - Wind profiles were created for 2004, 2005, and 2006
  - MISO & ATC 2019 analysis will use the 2005 profiles
  - Significant increase in granularity as compared to previous models
  - Simulated hourly wind output videos can be seen at: www.jcspstudy.org

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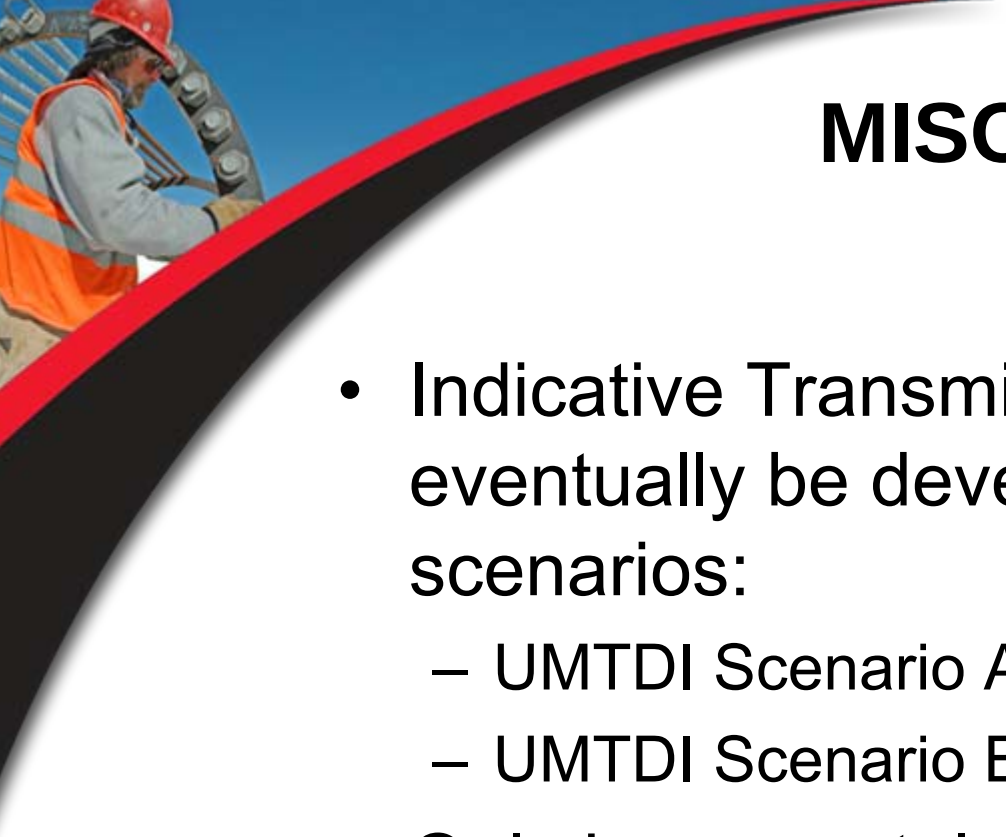

MISO RGOS Model History and Background

- Indicative Transmission Overlays will eventually be developed for two scenarios:
  - UMTDI Scenario A
  - UMTDI Scenario B
- Only incremental differences between A & B
- MISO is analyzing Scenario B first (ATC starting point)

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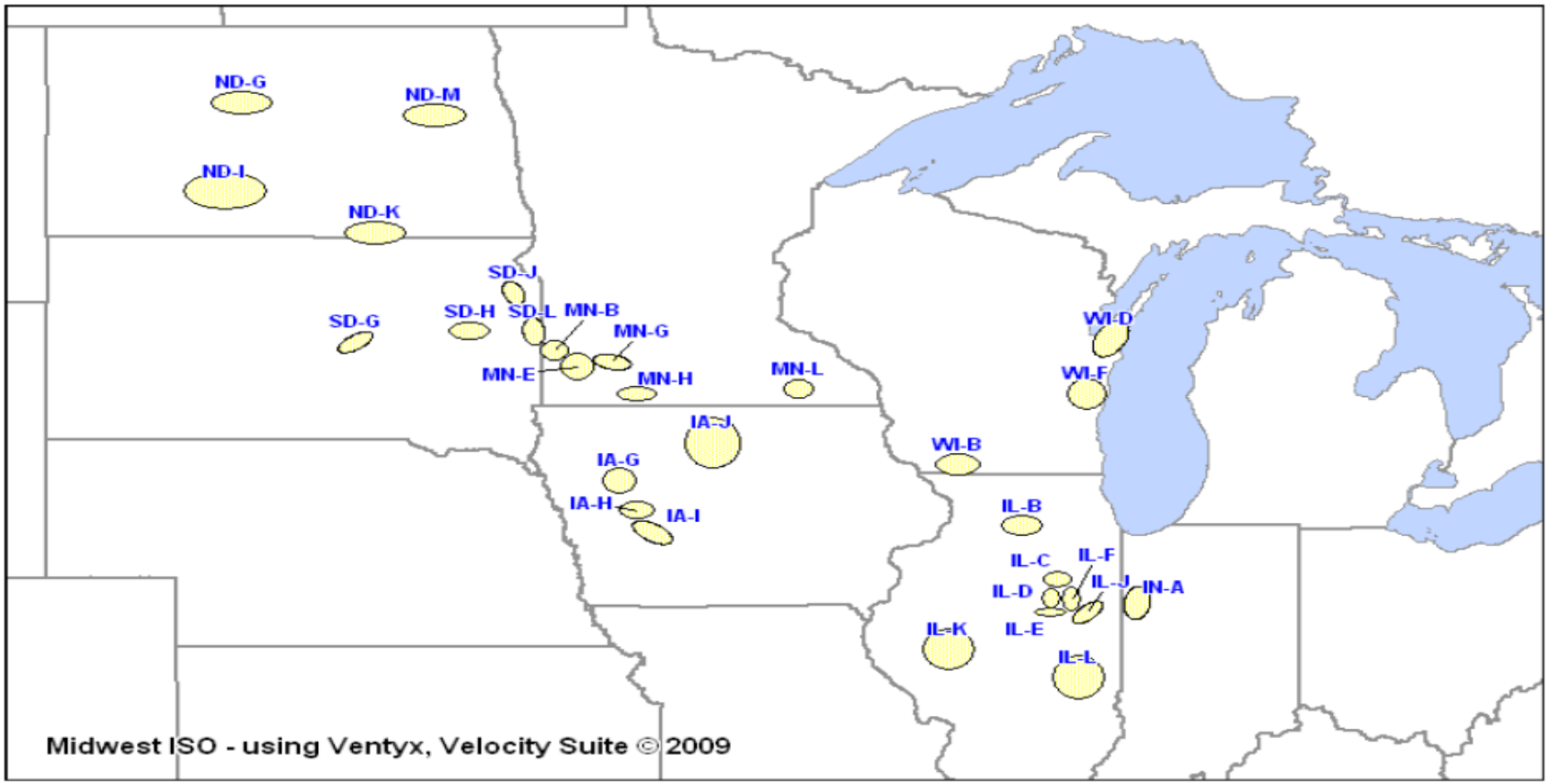
MISO RGOS Model History and Background

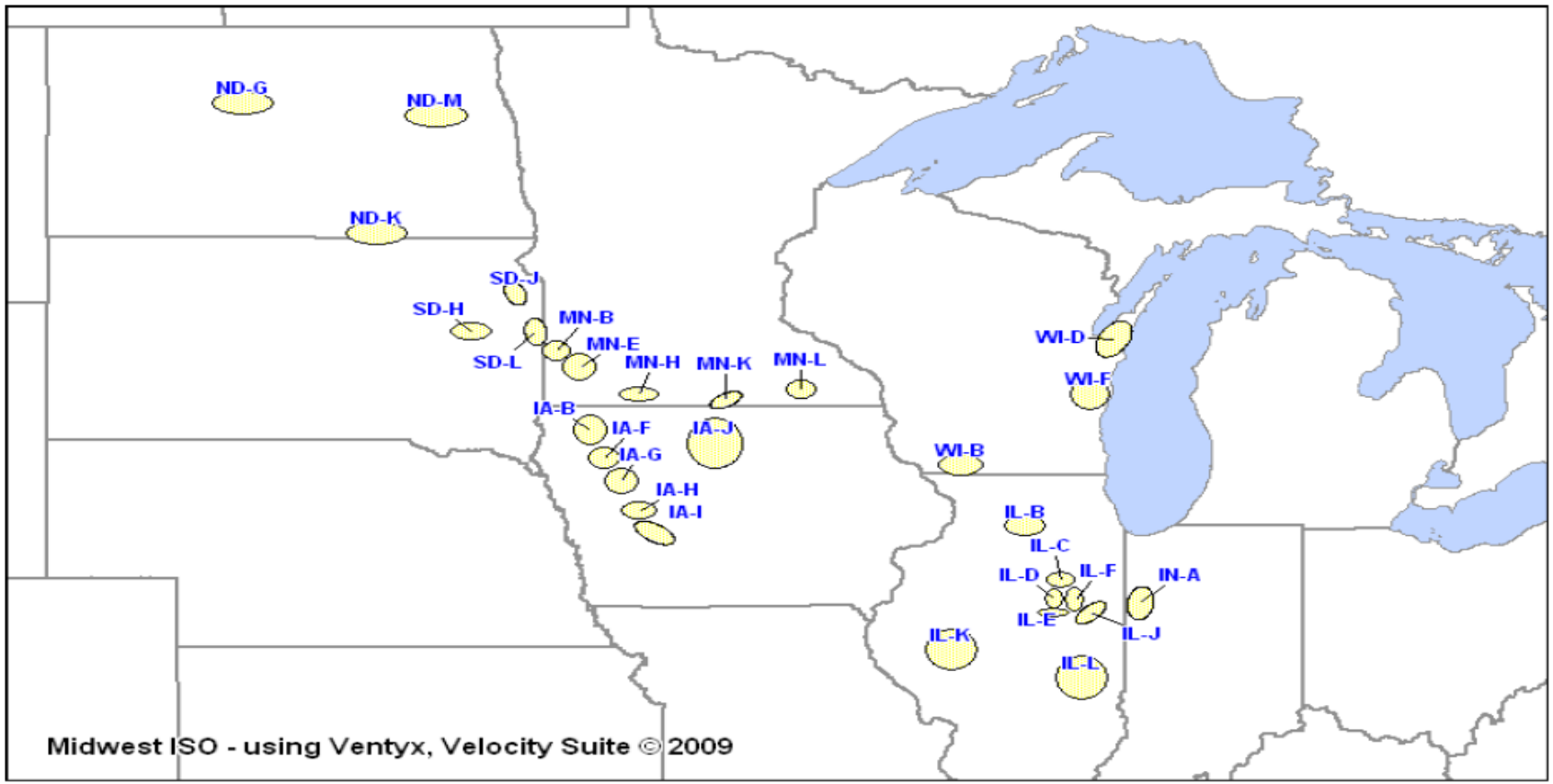
Scenario A



The nine Illinois zones will be used for the 15GW portion of the study. For the 25 GW study, only four zones will be used; the four zones being IL-B, IL-C, IL-D and IL-K. The zones IL-K, IL-L and IN-A are in the Midwest ISO footprint while the other Illinois zones are in the Commonwealth Edison (PJM) footprint.

MISO RGOS Model History and Background

Scenario B



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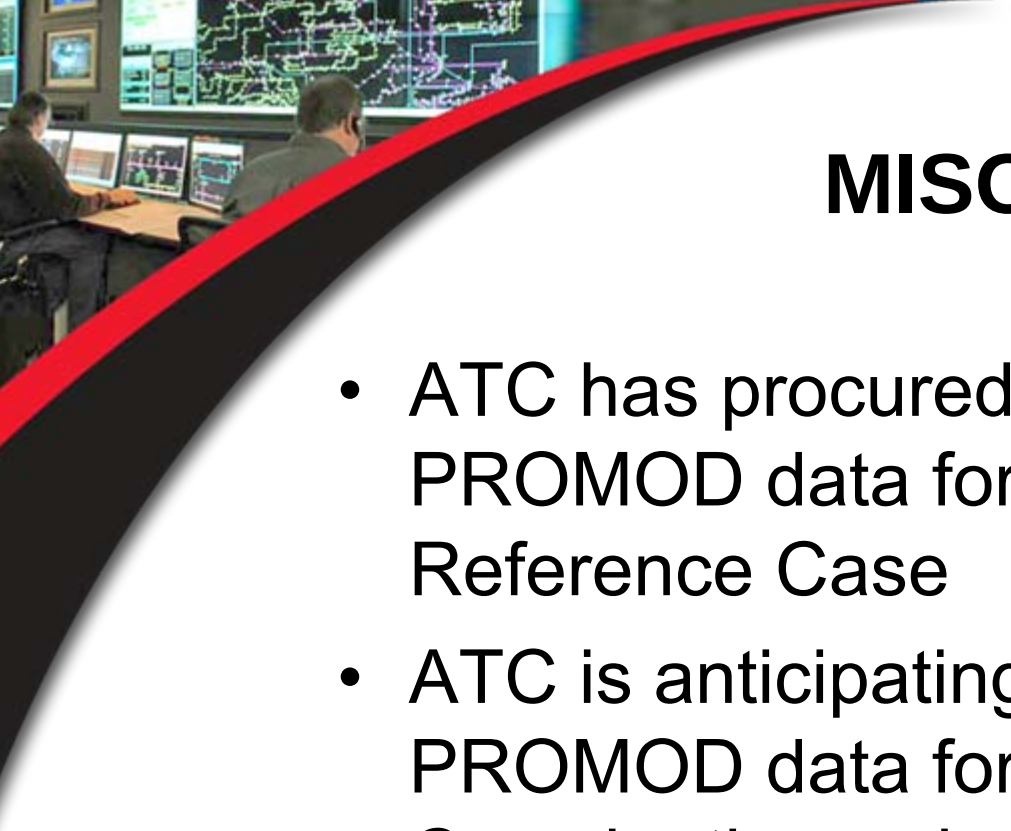
MISO RGOS Model History and Background

MISO 15 GW Reference Case – Generation Capacity vs. Load %

Area	2019 Max Capacity vs Load* (%)	2019Total Max Capacity* (GW)	2019 Non-Coincident Peak Demand (GW)
MISO - All	20.6%	160.5	133.1
MISO - Central	25.0%	56.8	45.5
MISO - East	20.2%	53.4	44.4
MISO - West	16.4%	50.4	43.3
MRO - Non-MISO	20.9%	18.2	15.1
ComEd	-1.1%	29.0	29.3
ATC	22.9%	20.4	16.6

*Wind Capacity is calculated at 15% for Gen vs. Load %



MISO RGOS Model Update

- ATC has procured the finalized MISO PROMOD data for the 2019 15 GW Reference Case
- ATC is anticipating receipt of the MISO PROMOD data for the 25 GW Reference Case by the end of July
- The timeline and development of the 45 GW Case is currently uncertain
- ATC has begun work on 2019 PROMOD model development

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New Generation Assumptions

15 GW Reference Case:

2019 total wind capacity and average capacity factors by state

Area / State	Total Capacity (MW)	Straight Average Annual Capacity Factor (%)
North Dakota / South Dakota	4,581	39.7%
Minnesota	5,585	38.8%
Iowa	5,847	37.8%
Illinos	6,358	33.8%
Wisconsin	3,238	32.4%
Michigan	168	31.6%

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New Generation Assumptions

15 GW Reference Case:

2019 total wind capacity and average capacity factors by region

Area / State	Total Capacity (MW)	Straight Average Annual Capacity Factor (%)
MISO Wide (includes ATC)	15,257	36.7%
MISO - Central	3,015	33.2%
MISO - East	398	32.3%
MISO - West (includes ATC)	11,845	37.5%
ATC Only	3,228	32.5%
MRO - Non-MISO	7,499	37.9%
ComEd	3,350	34.6%
PJM (includes ComEd)	5,126	30.8%

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New Generation Assumptions

- Interruptible and Direct Load Control pricing
  - ATC 2008 Value: $783.83 ($2019)
  - MISO 2009 Value: $783.83 ($2019)
  - Proposed ATC 2009 Value: $648.62 ($2019)*
- *What is reasonable?*

*Lower 2009 projection is based on lower projected natural gas costs

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Transmission Assumptions

MISO indicative plans (scenario B)

- 345 kV overlay, 15 GW wind future
  - Slow Growth future
- 345 kV overlay, 25 GW wind future
  - High Retirements future
  - High Environmental future*
  - Fuel & Investment Limitations future
- 765 kV overlay, 15 GW wind future
  - Not used
- 765 kV overlay, 25 GW wind future
  - Robust Economy future
  - DOE 20% Wind future*

* These futures contain 45 GW additional wind and may require additional transmission overlay

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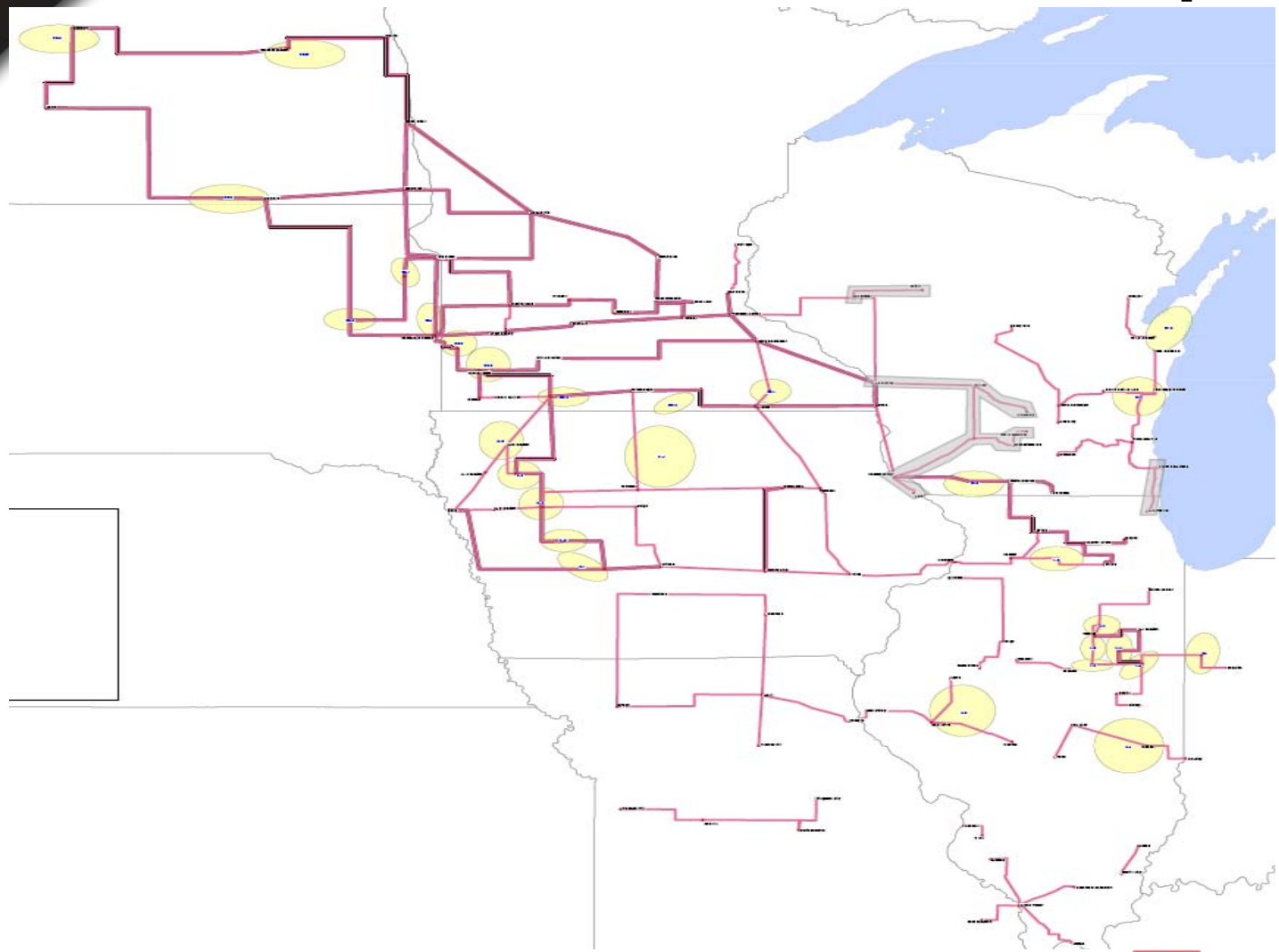
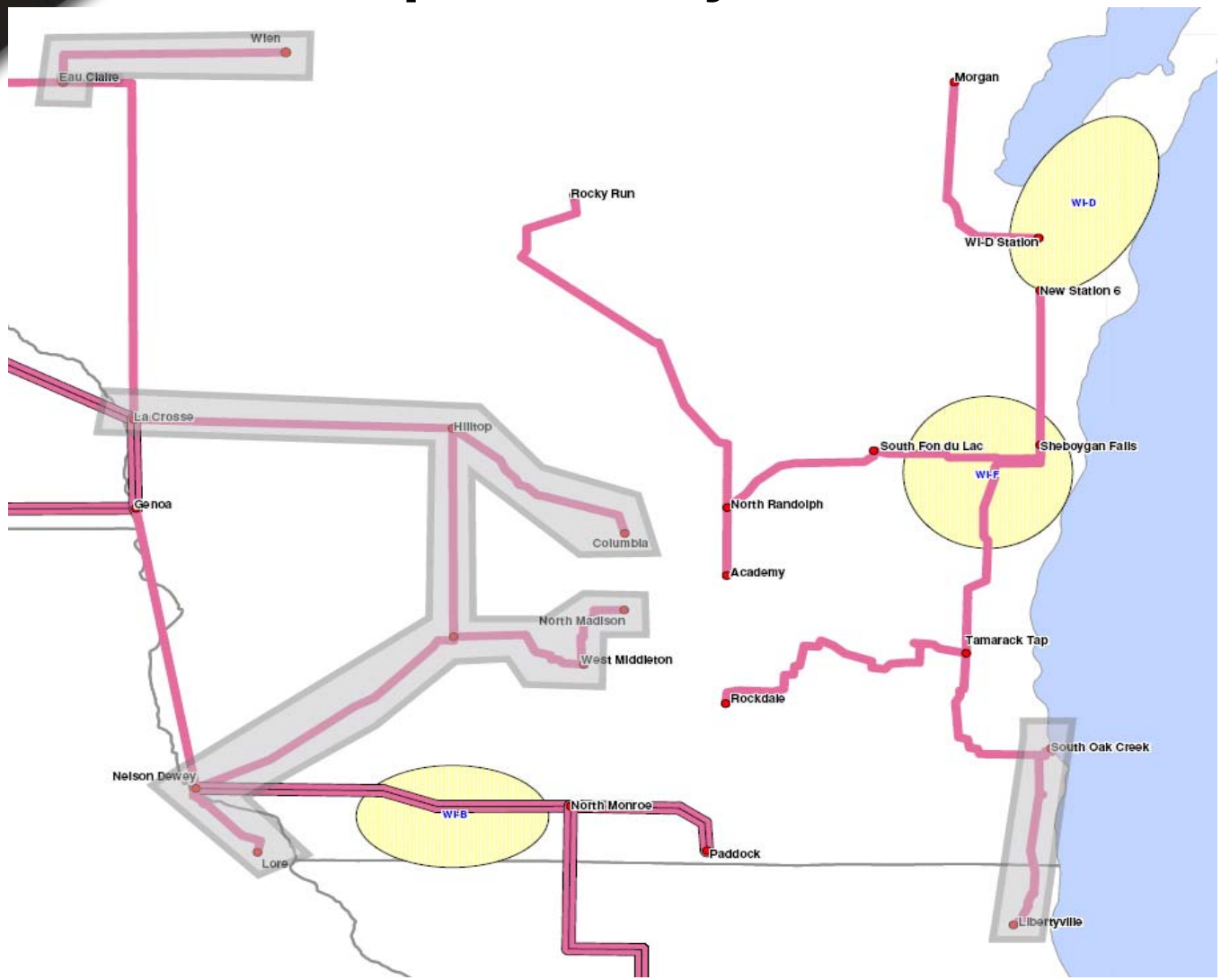
Transmission Assumptions



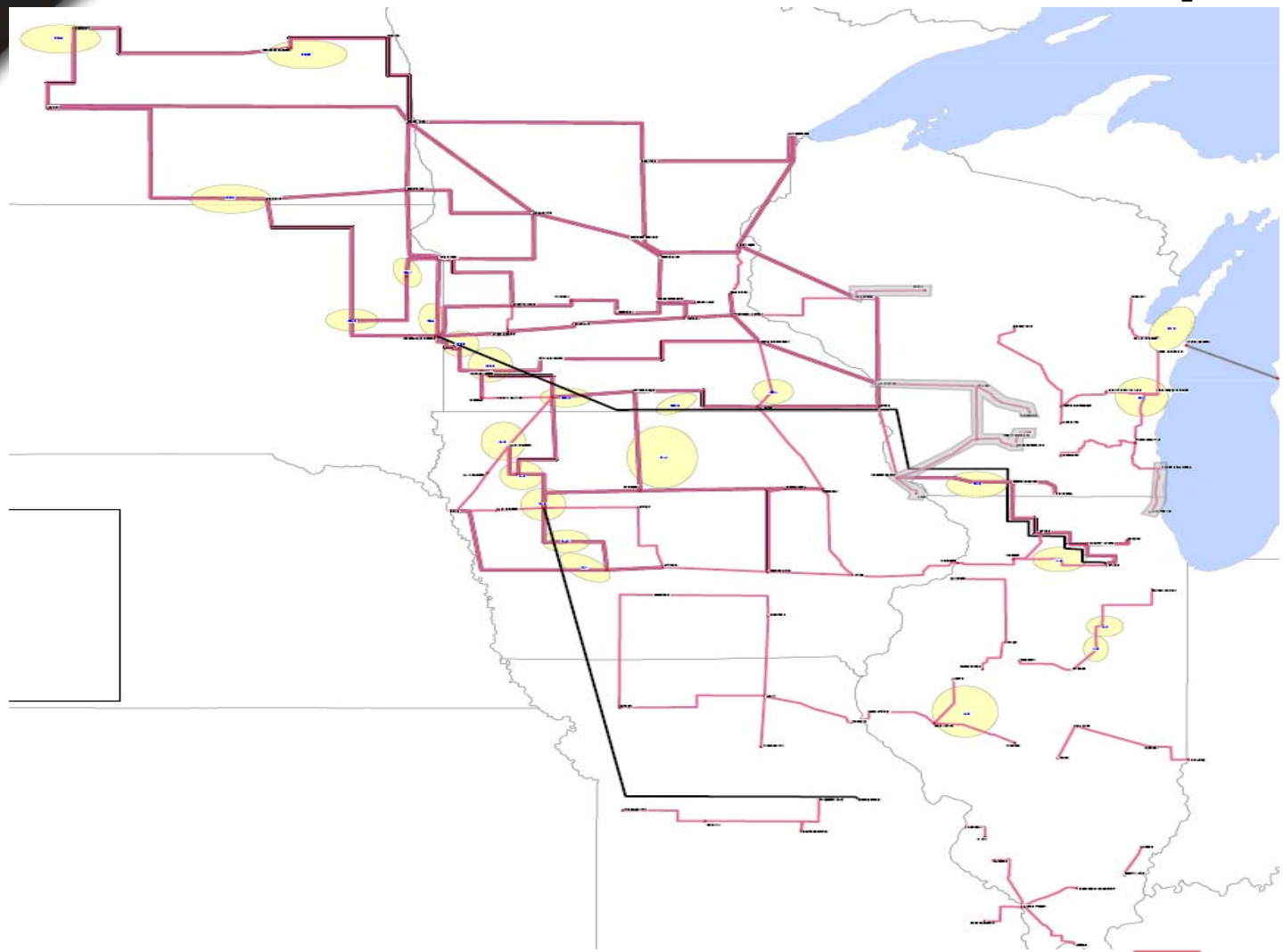
RGOS (B) – 345 kV – 15 GW

Proposed Adjustments to Overlay



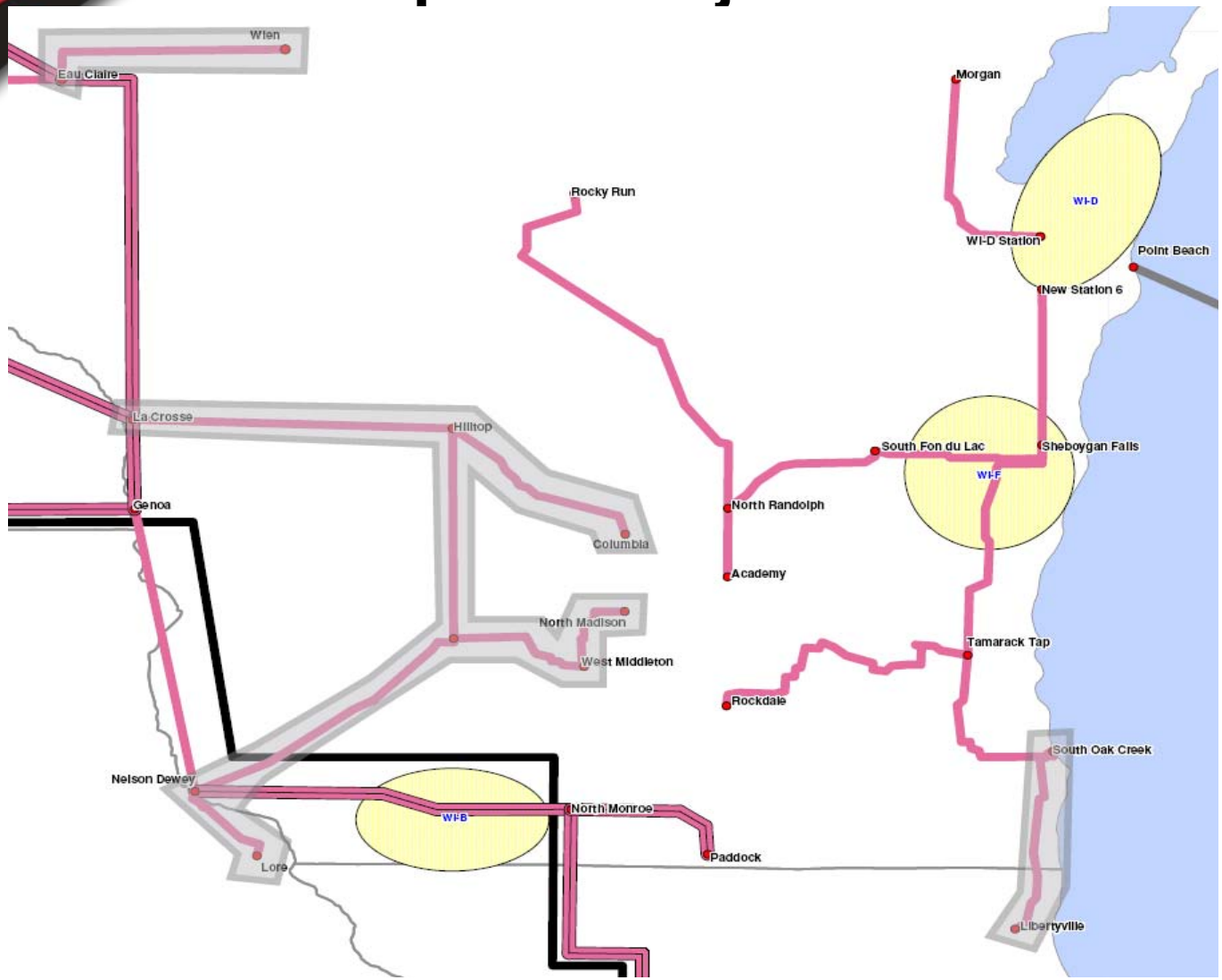
Lines to remove from 345 kV (15 GW) Overlay

Transmission Assumptions



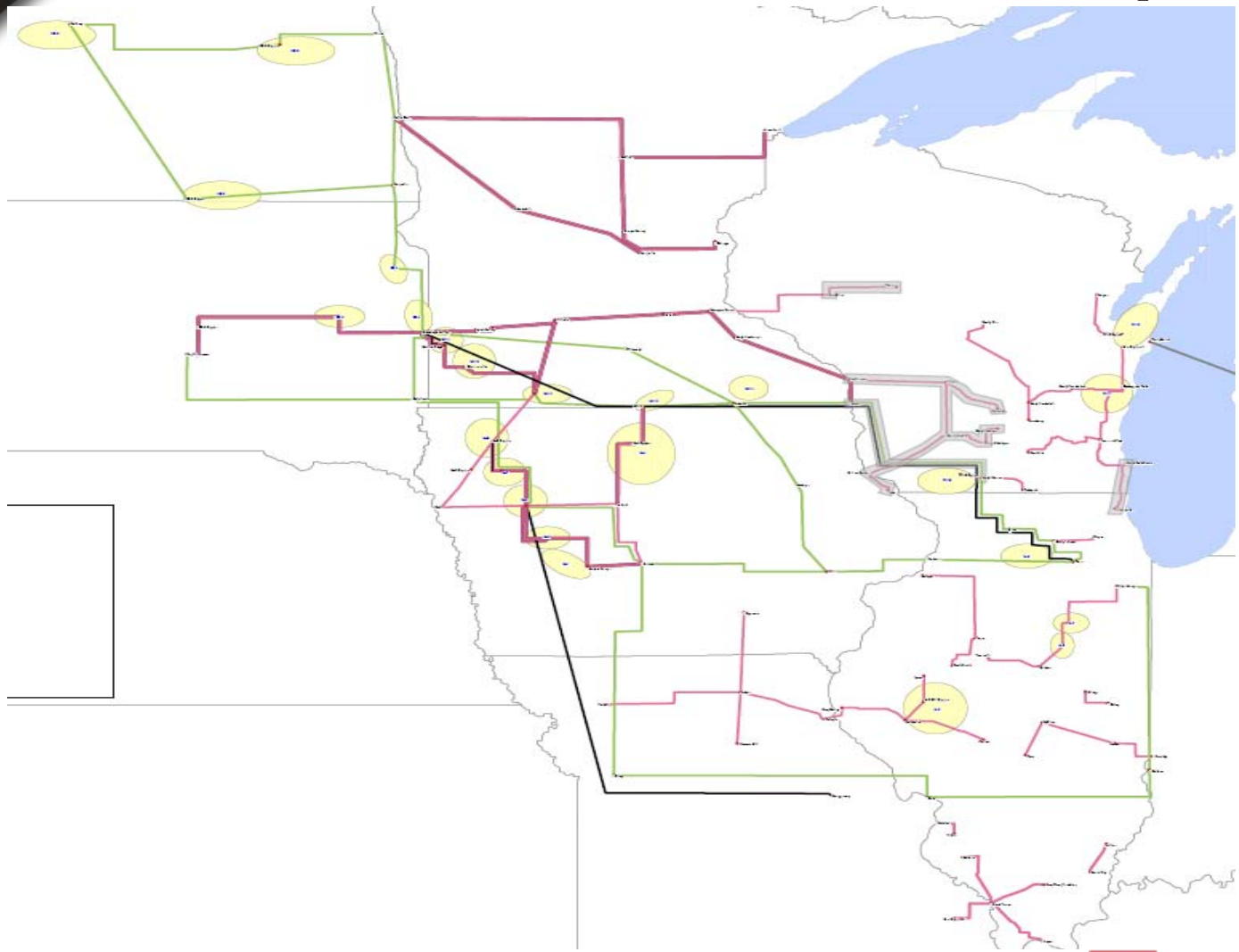
RGOS (B) – 345 kV – 25 GW

Proposed Adjustments to Overlay



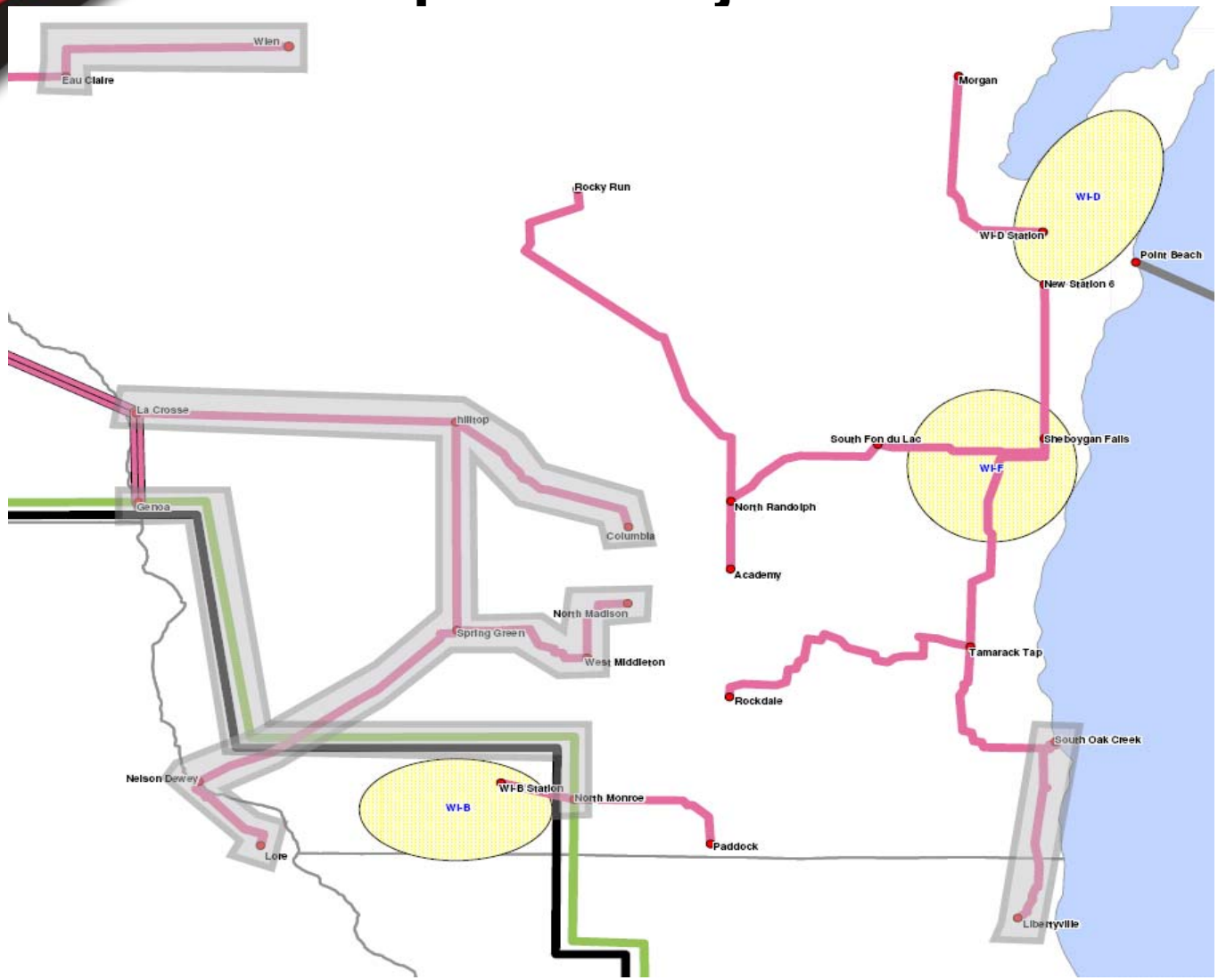
Lines to remove from 345 kV (25 GW) Overlay

Transmission Assumptions



RGOS (B) – 765 kV – 25 GW

Proposed Adjustments to Overlay



Lines to remove from 765 kV (25 GW) Overlay

Transmission Assumptions

ATC TYA modifications

- Powerflow model for ATC internal footprint will be updated
- All planned and proposed transmission projects through 2019 will be included

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Transmission Assumptions

Event file updates (constraints)

- Verify ratings of ATC elements
- Increase ratings on 1st tier constraints by up to 50%
  - Assumption is that these issues will be fixed by owner of equipment
  - Do not modify if expected to be heavily impacted by projects under analysis for this study
- Remove constraints 2+ tiers away from ATC footprint
- Use the PROMOD Analysis Tool to identify new events within ATC and 1st tier to be added to event file
- Add generator contingencies for selected units

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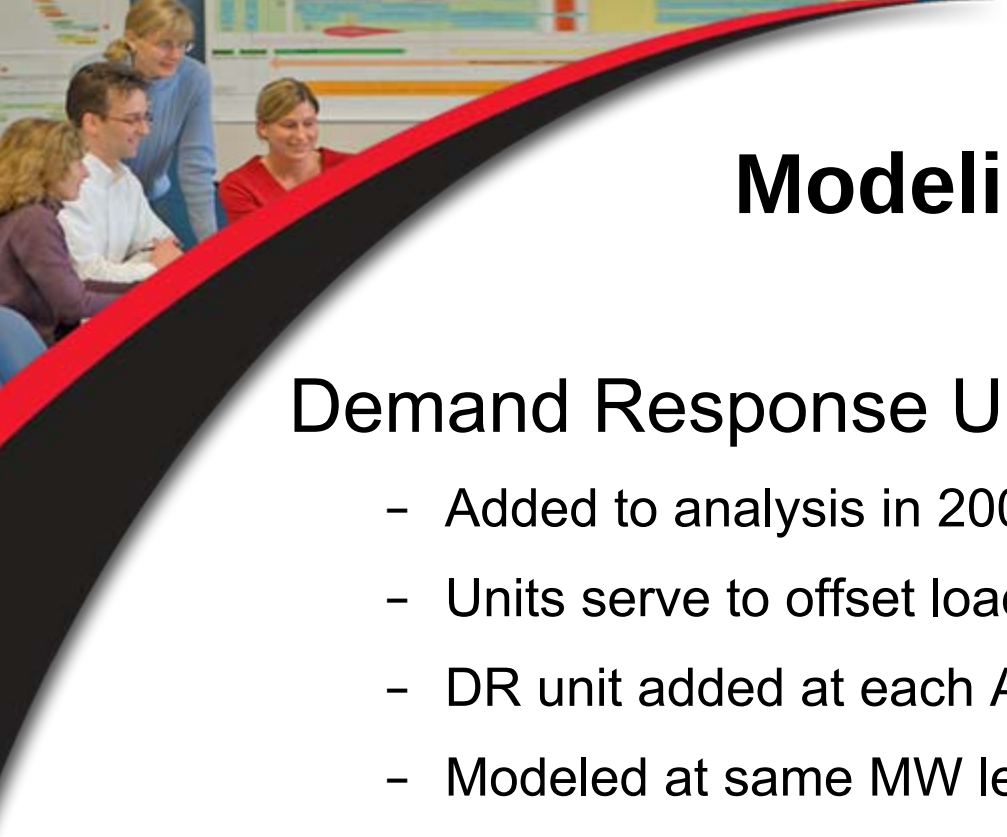

Modeling Demand Response

Demand Response Units

- Added to analysis in 2008
- Units serve to offset loads and model DR action
- DR unit added at each ATC footprint load of 5 MW or more
- Modeled at same MW level as load
- High dispatch cost of $1000/MWH in 2008
- Succeeding in eliminating “buying through” of constraints

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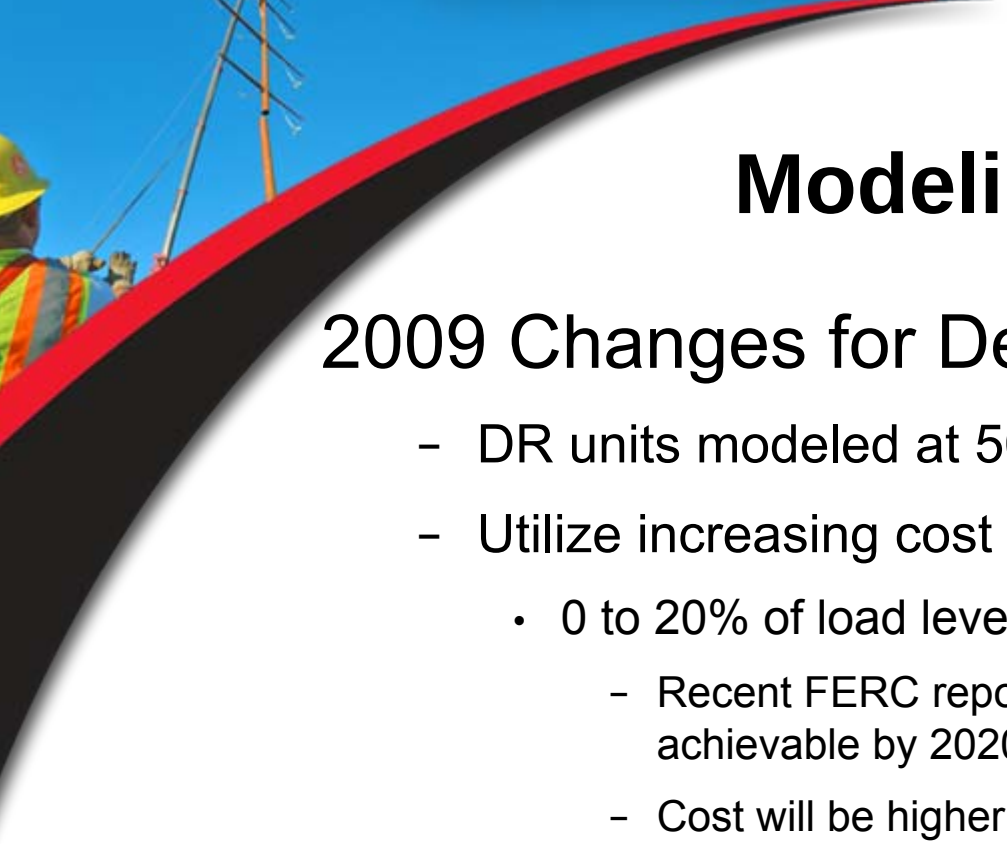

Modeling Demand Response

2009 Changes for Demand Response Units

- DR units modeled at 50% of MW load level
- Utilize increasing cost curves to simulate resistance to DR
  - 0 to 20% of load level
    - Recent FERC report claims 20% reduction in peak load is achievable by 2020 through Demand Response programs
    - Cost will be higher than typical baseload plant costs but lower than typical peaker plant costs in order to reduce peak load
  - 20 to 40% of load level
    - Cost will be higher than typical peaker plant costs
    - Simulates increased customer reluctance to reduce load
  - 40 to 50% of load level
    - Cost will be very high (~ $1000/MWH)

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ATC Schedule and Next Steps

Next steps…

- Compile stakeholder feedback
- Finalize assumptions
- Complete model development
- Perform analysis
- Communicate results

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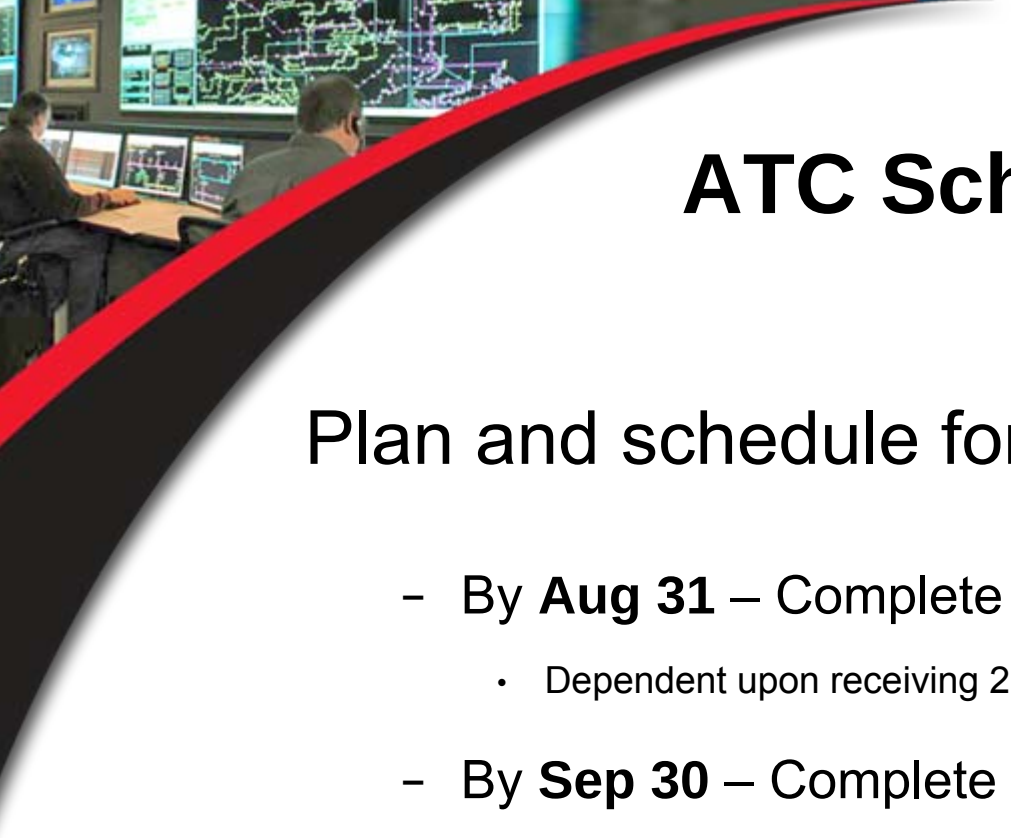

ATC Schedule and Next Steps

Plan and schedule for 2009

- By **Aug 31** – Complete PROMOD model development
  - Dependent upon receiving 25 GW case from MISO
- By **Sep 30** – Complete PROMOD study runs
- By **Oct 31** – Complete post-processing and analysis
- By **Nov 15** – ATC posts final results
  - Update on progress will be posted if final results not available

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Questions?

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