Transmission Planning Challenges – Congestion Identification and Mitigation

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Spring 2009 Technical Workshop in Support of DOE 2009 Congestion Study
March 26, 2009

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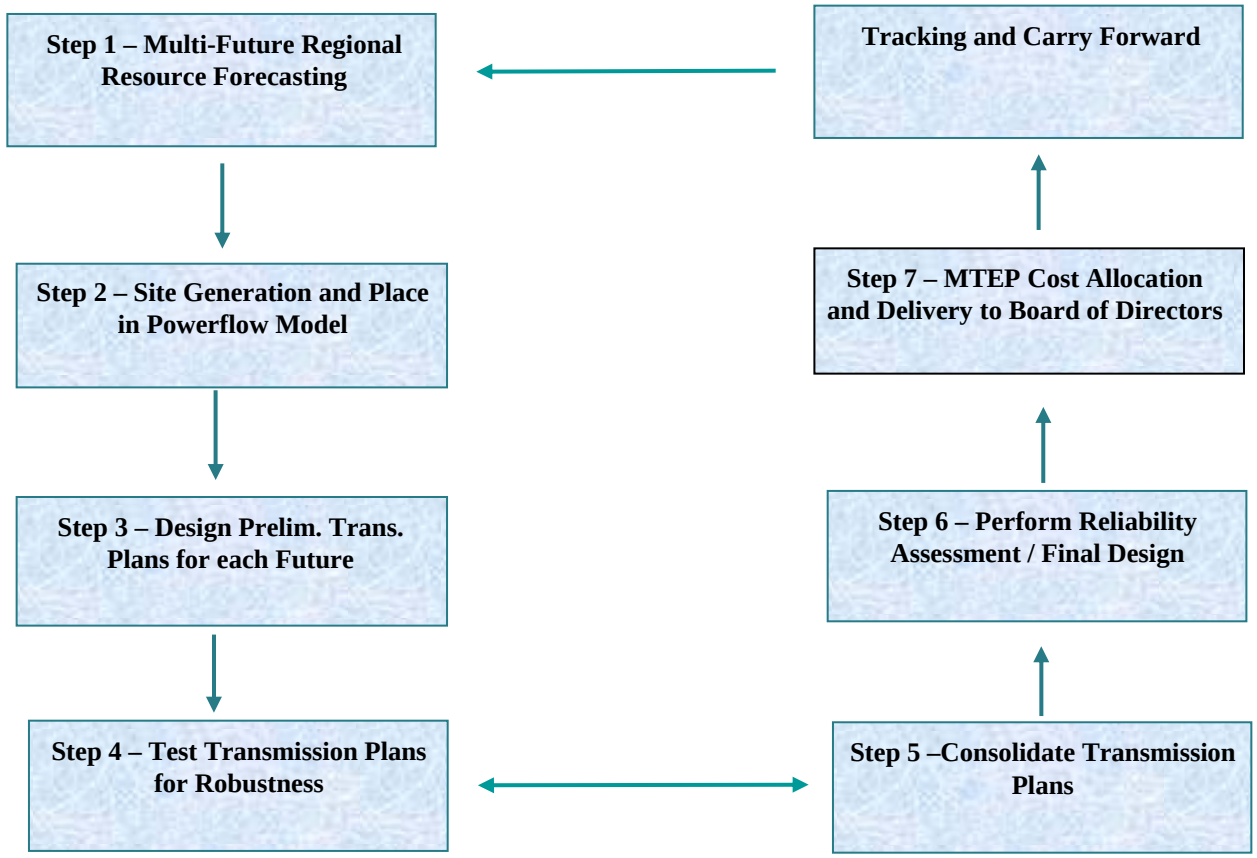
Midwest ISO Value Based Planning

A 7 Step Process has been undertaken by the Midwest ISO to develop top-down, value-based transmission plans under a wide range of potential energy policy outcomes – or Future scenarios*



* - Future scenarios included in MTEP08 analysis are Reference, Renewable, Environmental, and Fuel

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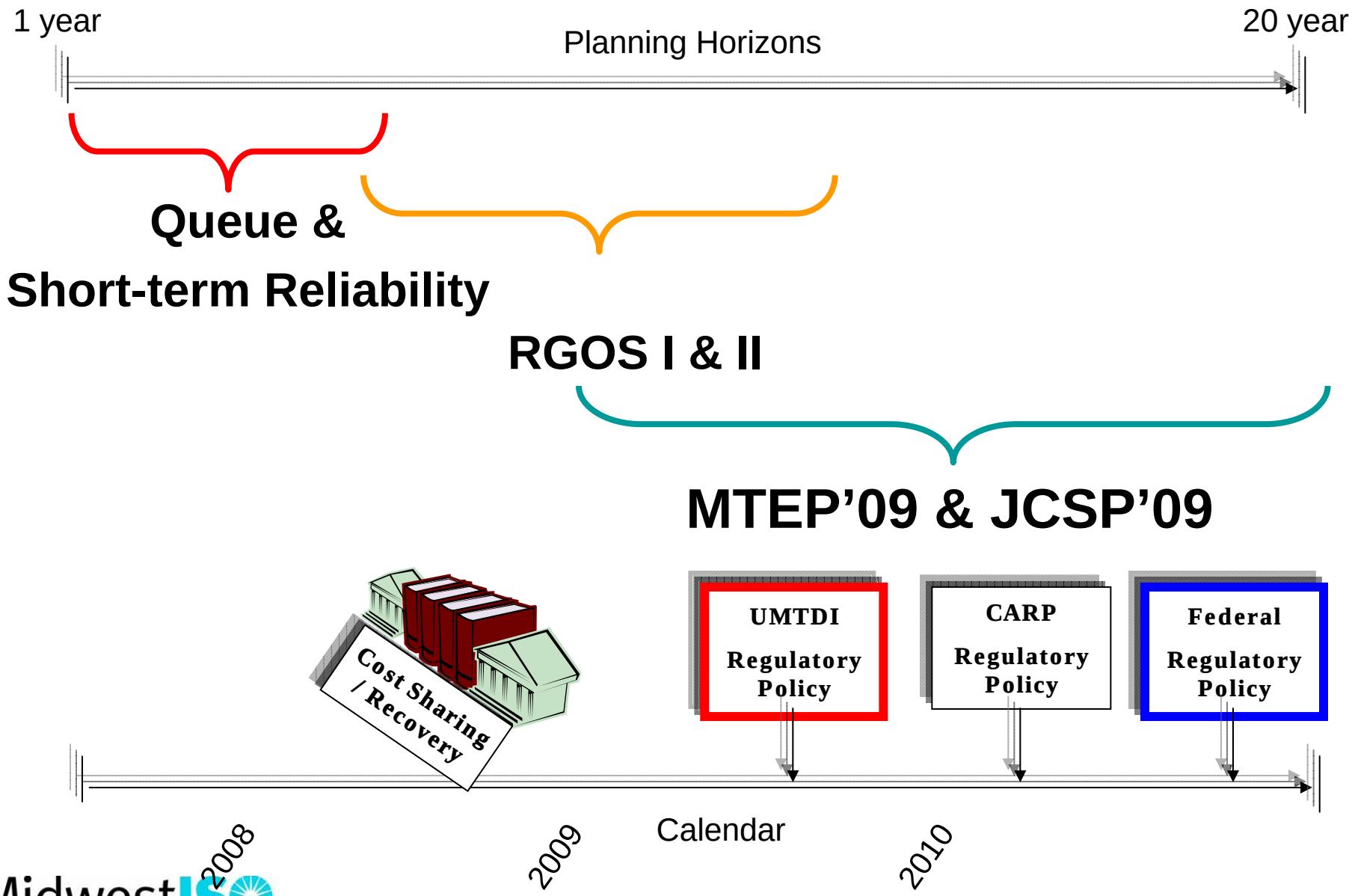
Timelines for Planning Processes / Policy



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External and Internal Planning Activity at Midwest ISO

- Internal
  - Queue
  - Targeted Studies (such as the Regional Generation Outlet Study)
  - MTEP

- External
  - JCSP
  - MTEP

Let's look at external studies first because
these studies Define the Space for internal studies

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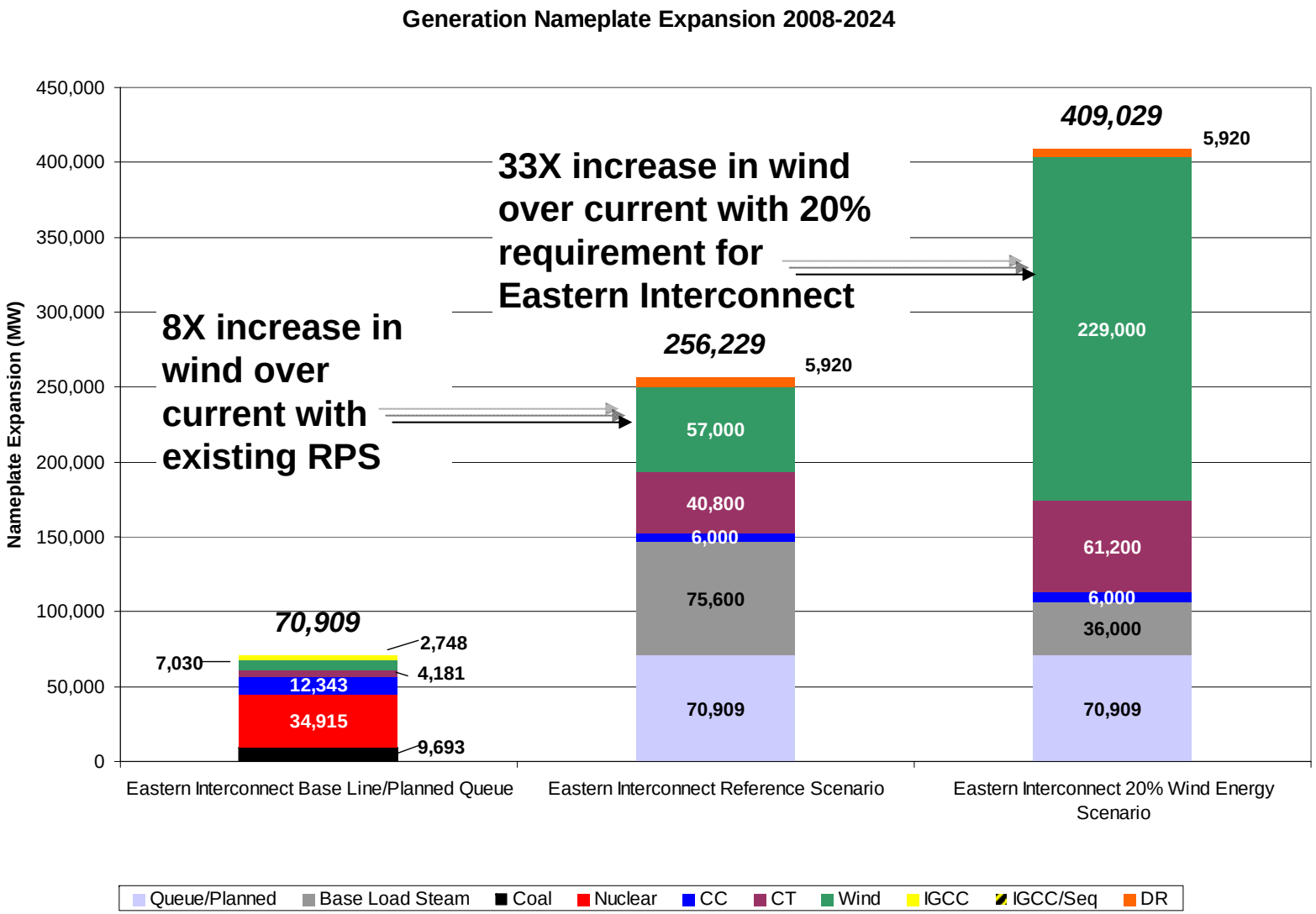
JCSP - Increasing levels of wind generation expected



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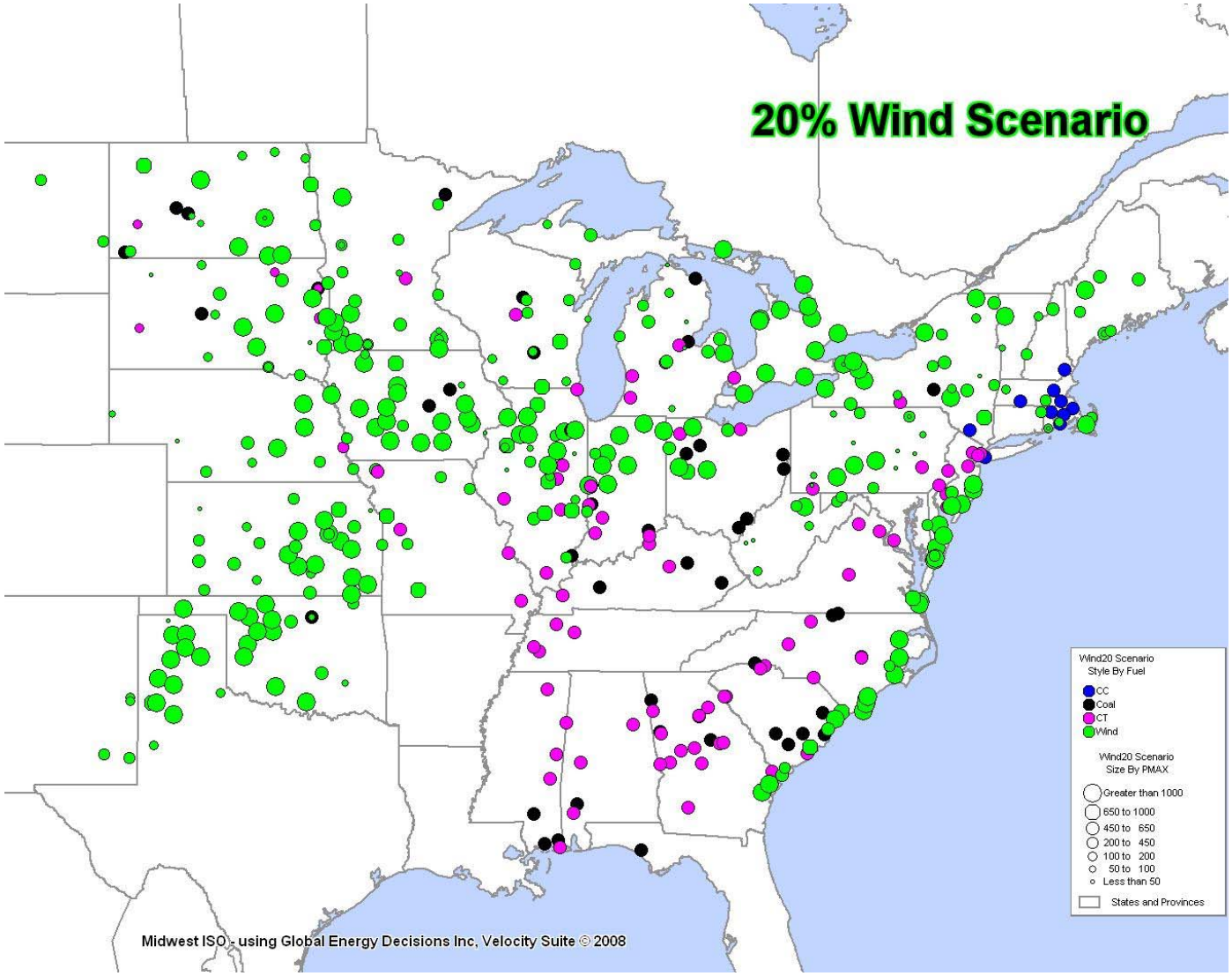
Source: JCSP 2008 Report

JCSP - 20% Wind Energy Scenario Siting



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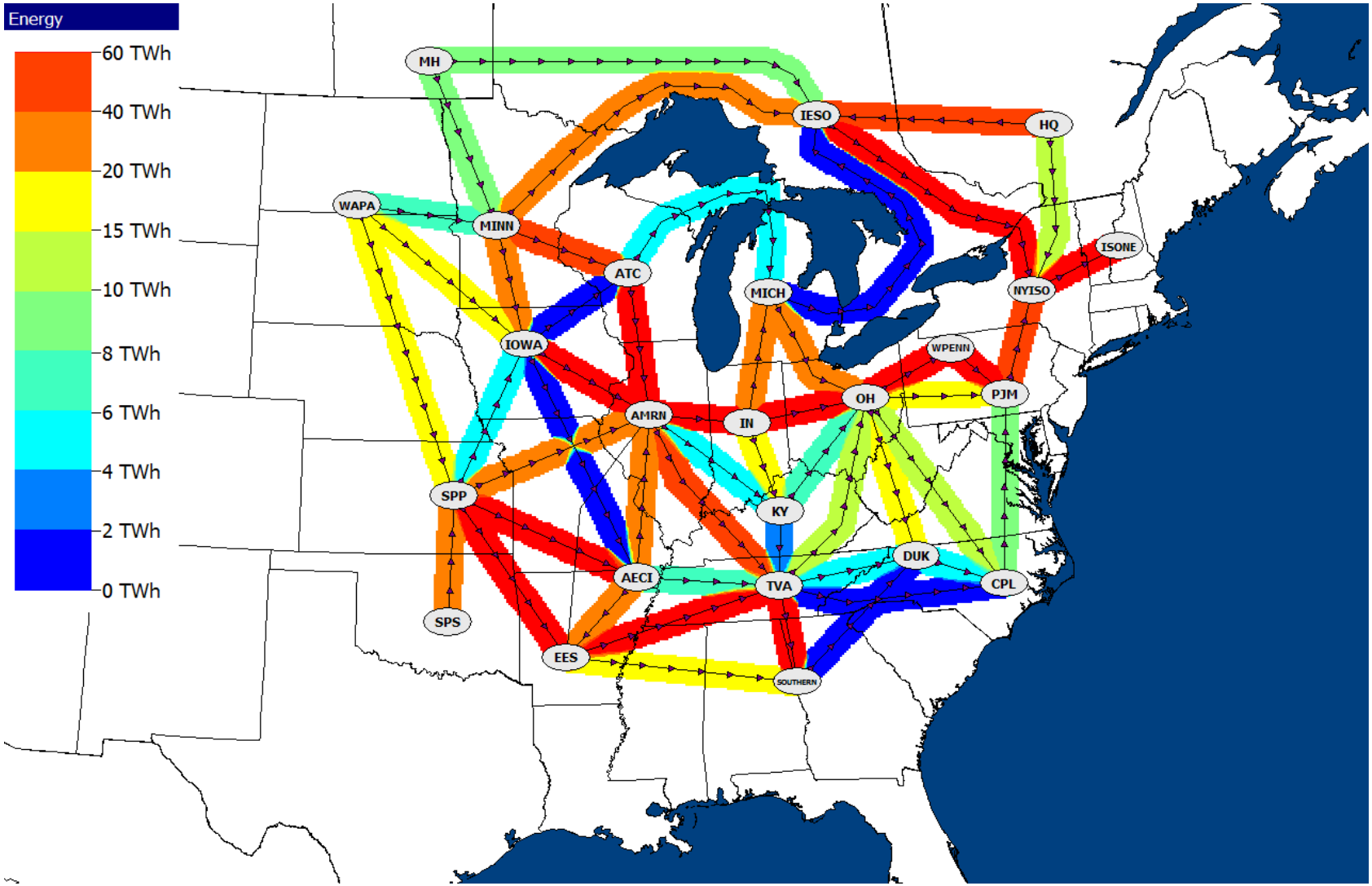
JCSP – 20% Wind Scenario Interface Contour: Annual Energy Difference
Copper Sheet to Constrained Case



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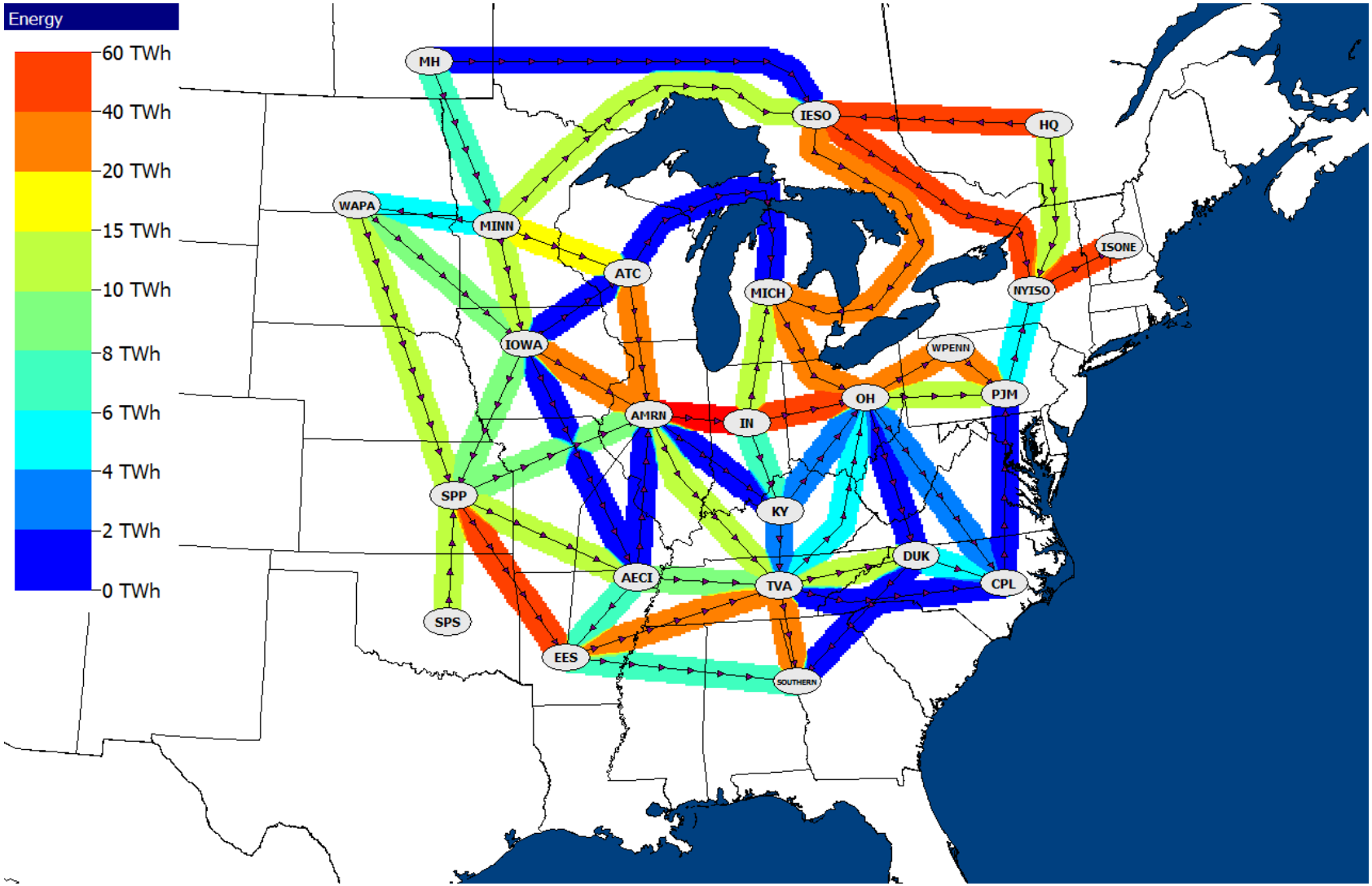
JCSP PROMOD outputs - July 22, 2008

JCSP - Wind Scenario Interface Contour: Annual Energy Difference
Copper Sheet to Overlay Case



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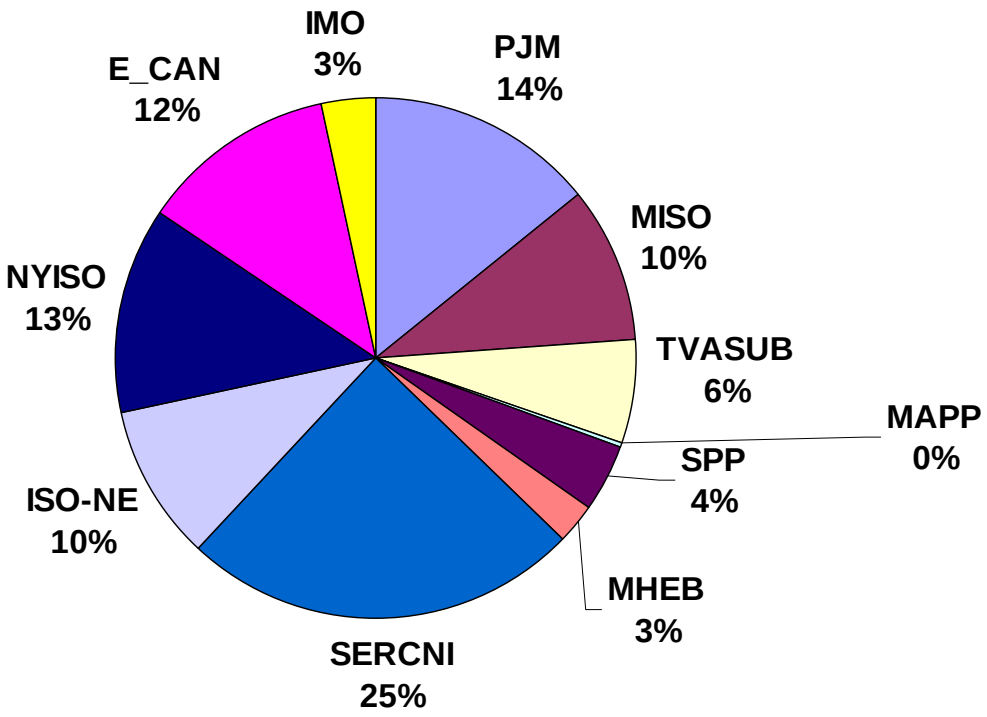
JCSP PROMOD outputs - July 22, 2008

Potential Benefits
Adjusted Production Costs
$35B/Yr



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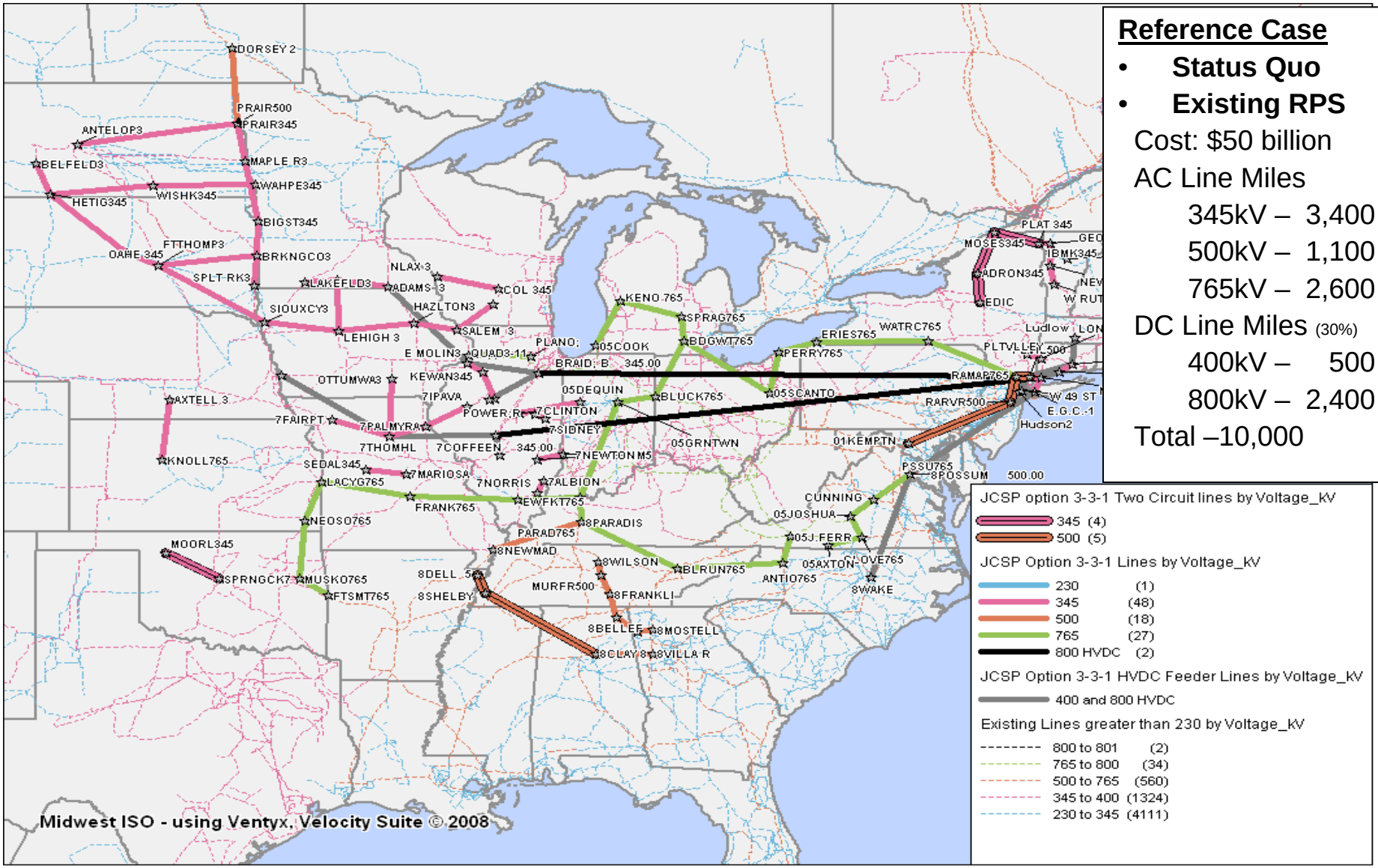
Reference Case – Representative Overlay Needs



Reference Case

- **Status Quo**
- **Existing RPS**

Cost: $50 billion

AC Line Miles

345kV – 3,400

500kV – 1,100

765kV – 2,600

DC Line Miles (30%)

400kV – 500

800kV – 2,400

Total –10,000

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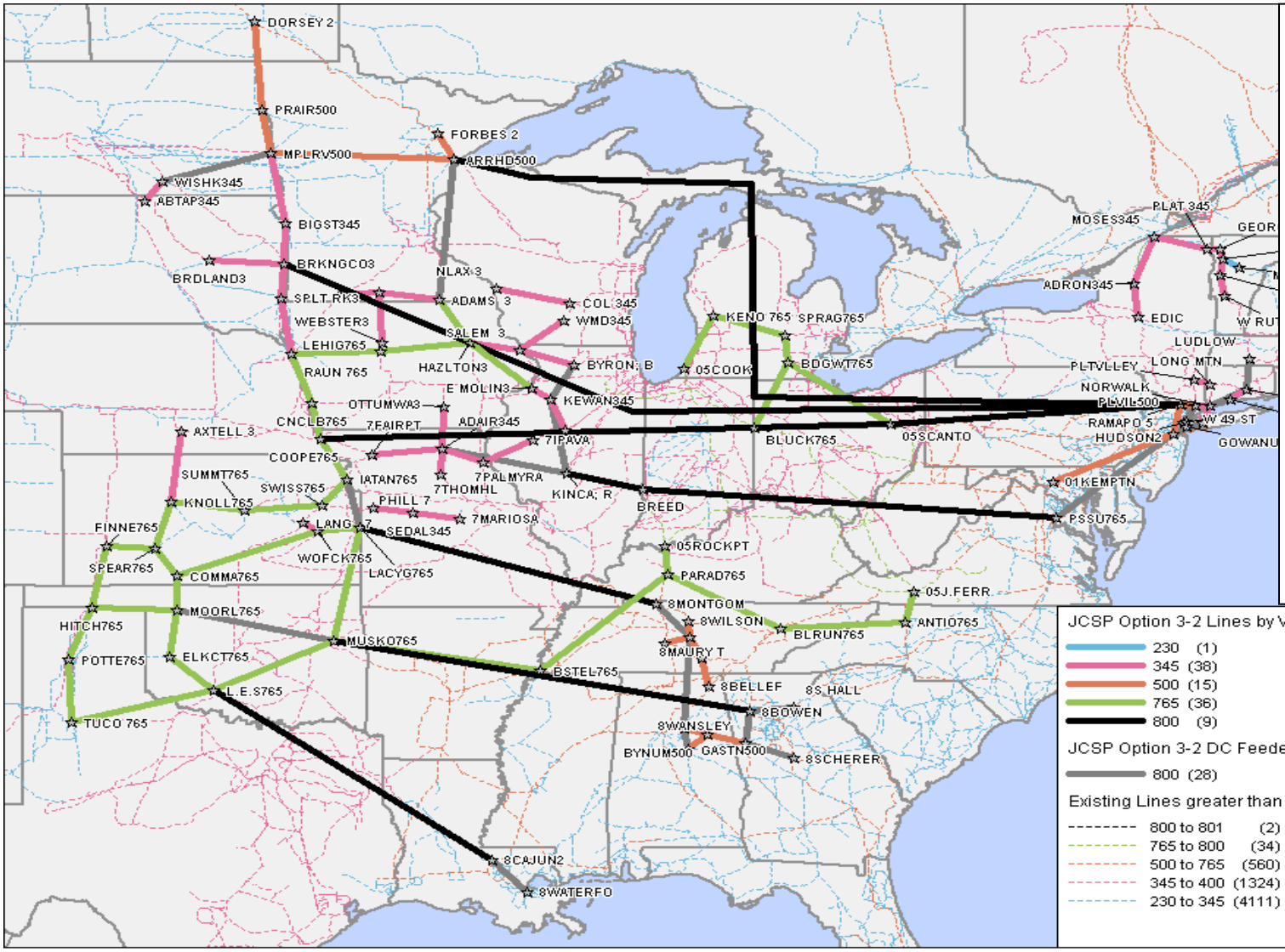
20% Wind Energy - Representative Overlay Needs



20 % Wind Case

- **20% RPS by 2024**

Cost: $80 billion

AC Line Miles

345 – 2,200

500 – 1,100

765 – 4,000

DC Line Miles

400kV – 0

800kV – 7,500

Total –15,000

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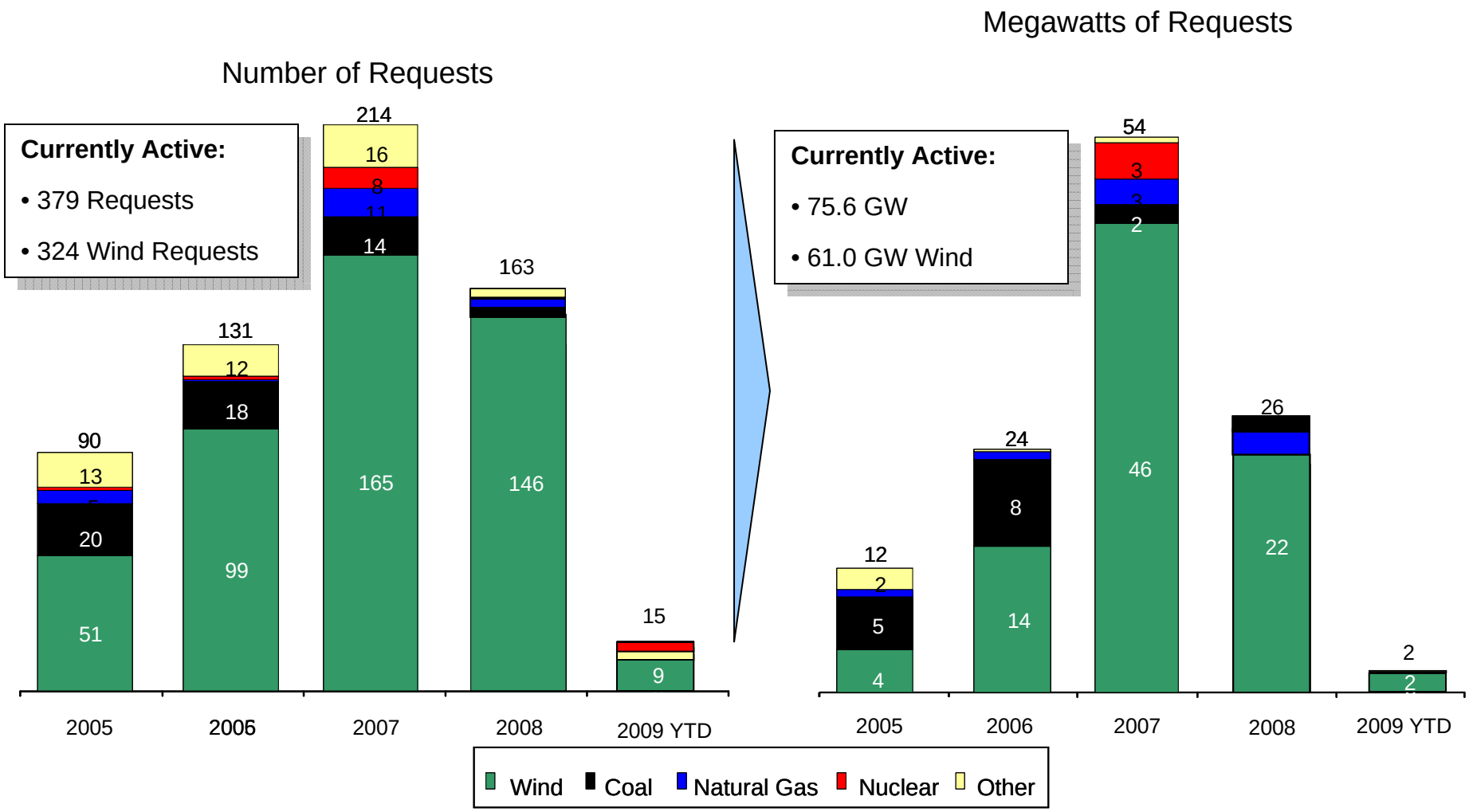
Let's look at the Queue ...



* All requests received as of February 26, 2009

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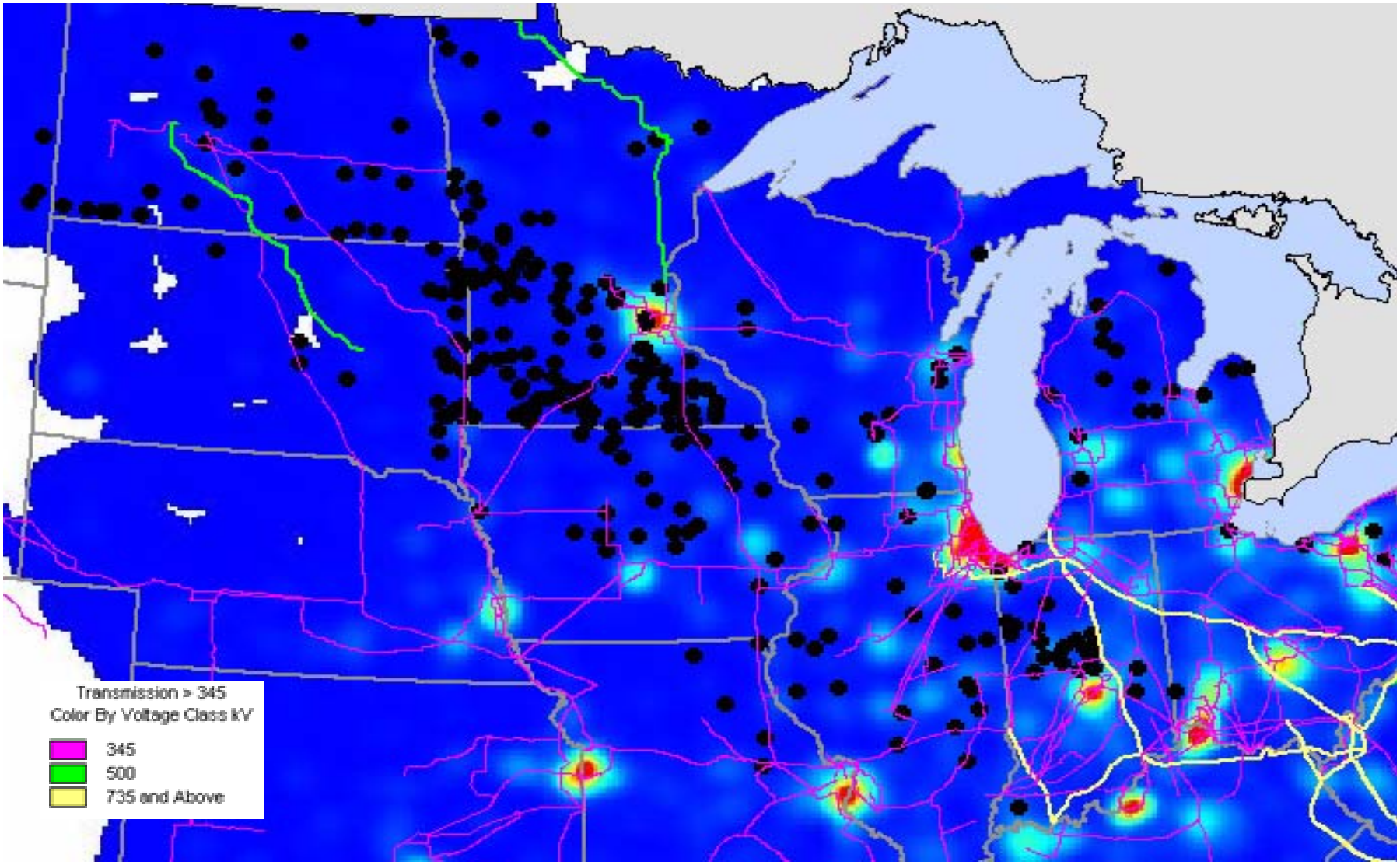
Limited Transmission Infrastructure in Location of Queue Requests

(Queue Locations Relative to Load Centers)



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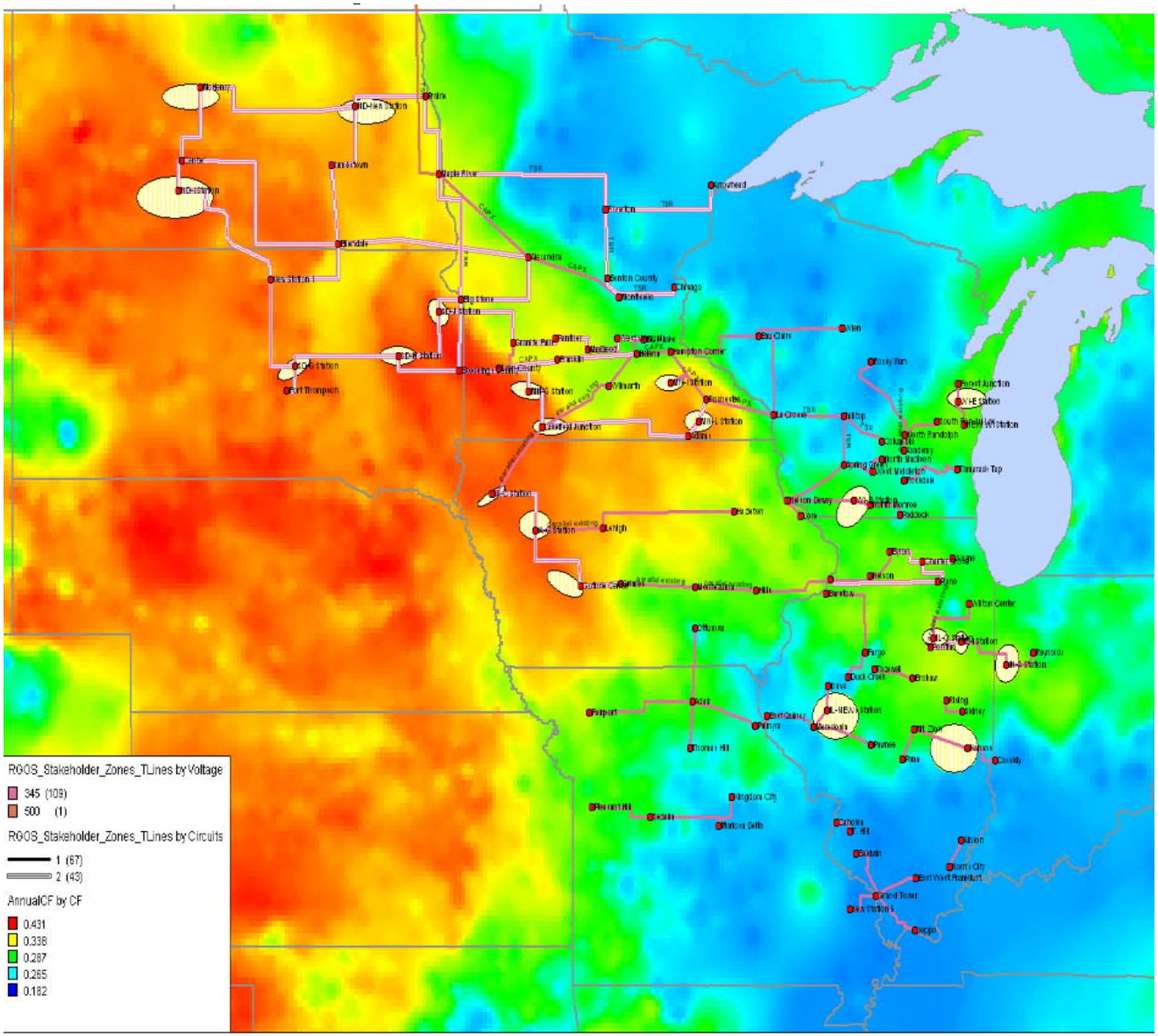
Regional Generation Outlet Study (RGOS)



- Bridge between longer term (JCSP) and short term (Queue) planning processes
- Develop Definitive Transmission Plans to meet Midwest ISO first set of RPS' in western Midwest ISO
  - Minnesota, Wisconsin, Illinois, Iowa, Missouri, Michigan
  - Approximately 22,000 MW
- Achieve Regulatory Consensus
- Commitments to Plans by year-end 2009
- Analysis of eastern portion of footprint starting soon

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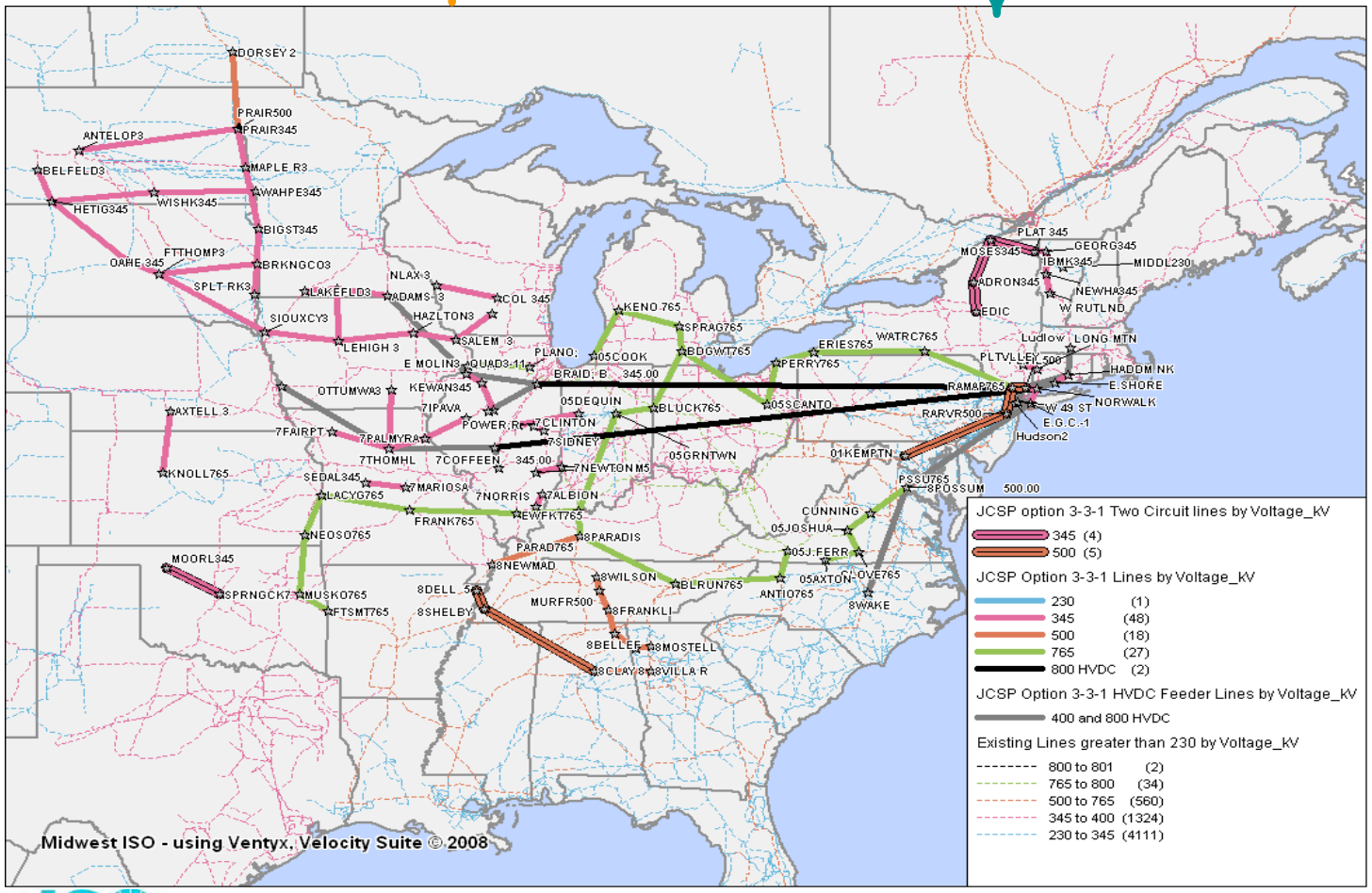
Conceptual Progression of Plans

1 year — Planning Horizons — 20 year

Queue | **RGOS** | **JCSP**



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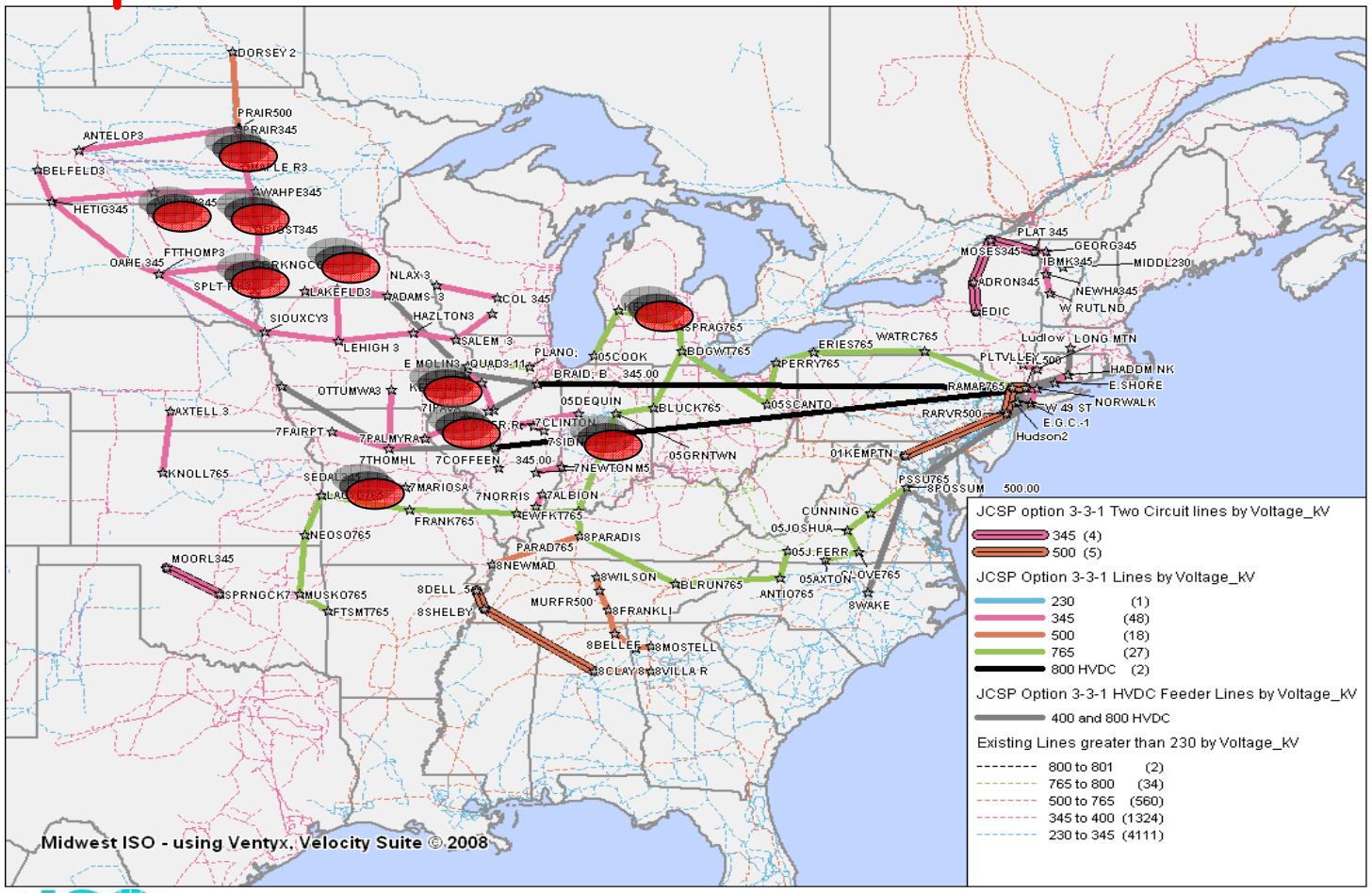
Queue Development Continues with smaller near term upgrades …

1 year — Planning Horizons — 20 year

Queue



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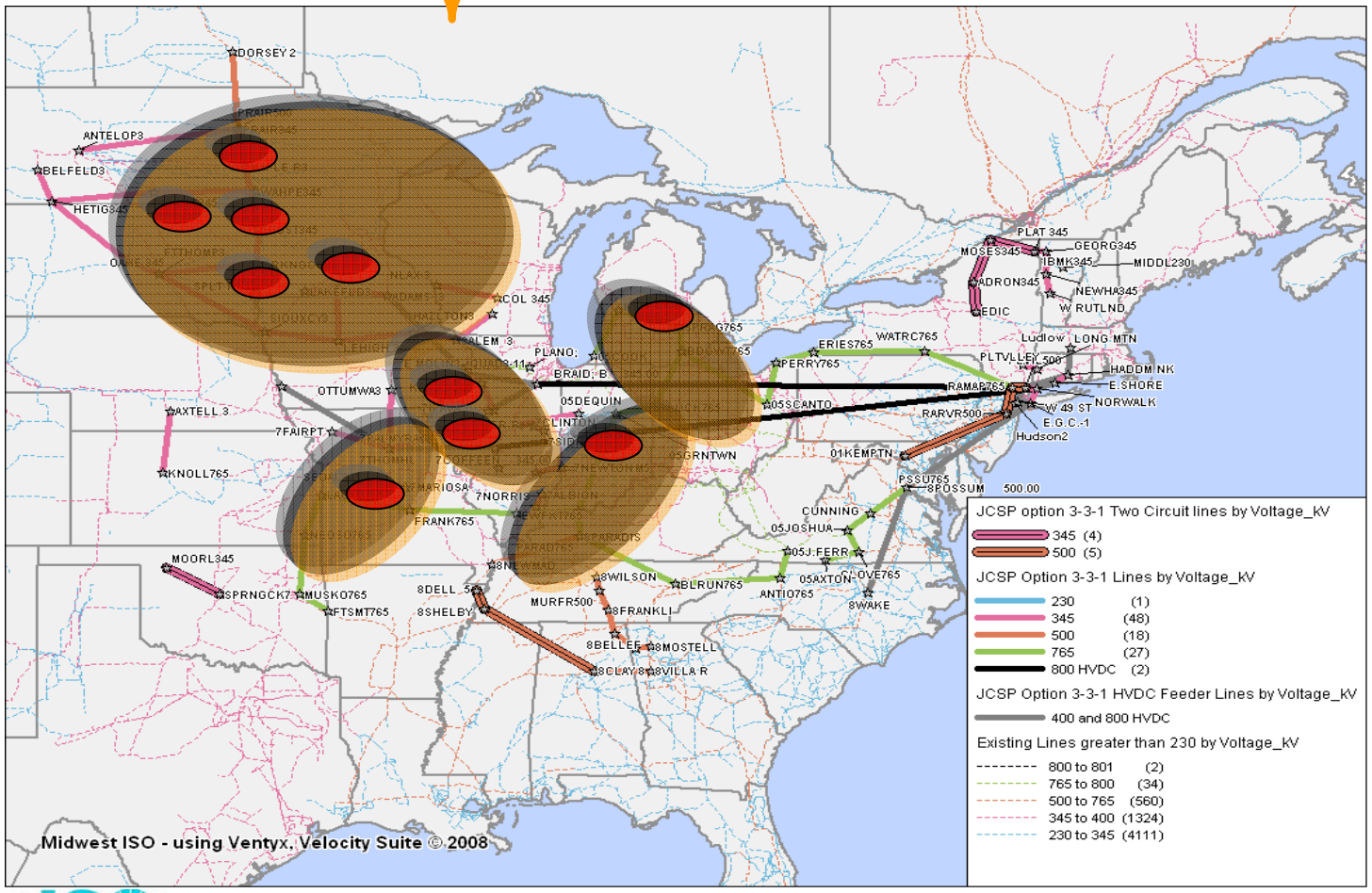
… Until RGOS Aggregate Plans better inform broader solutions…

1 year — Planning Horizons — 20 year

RGOS



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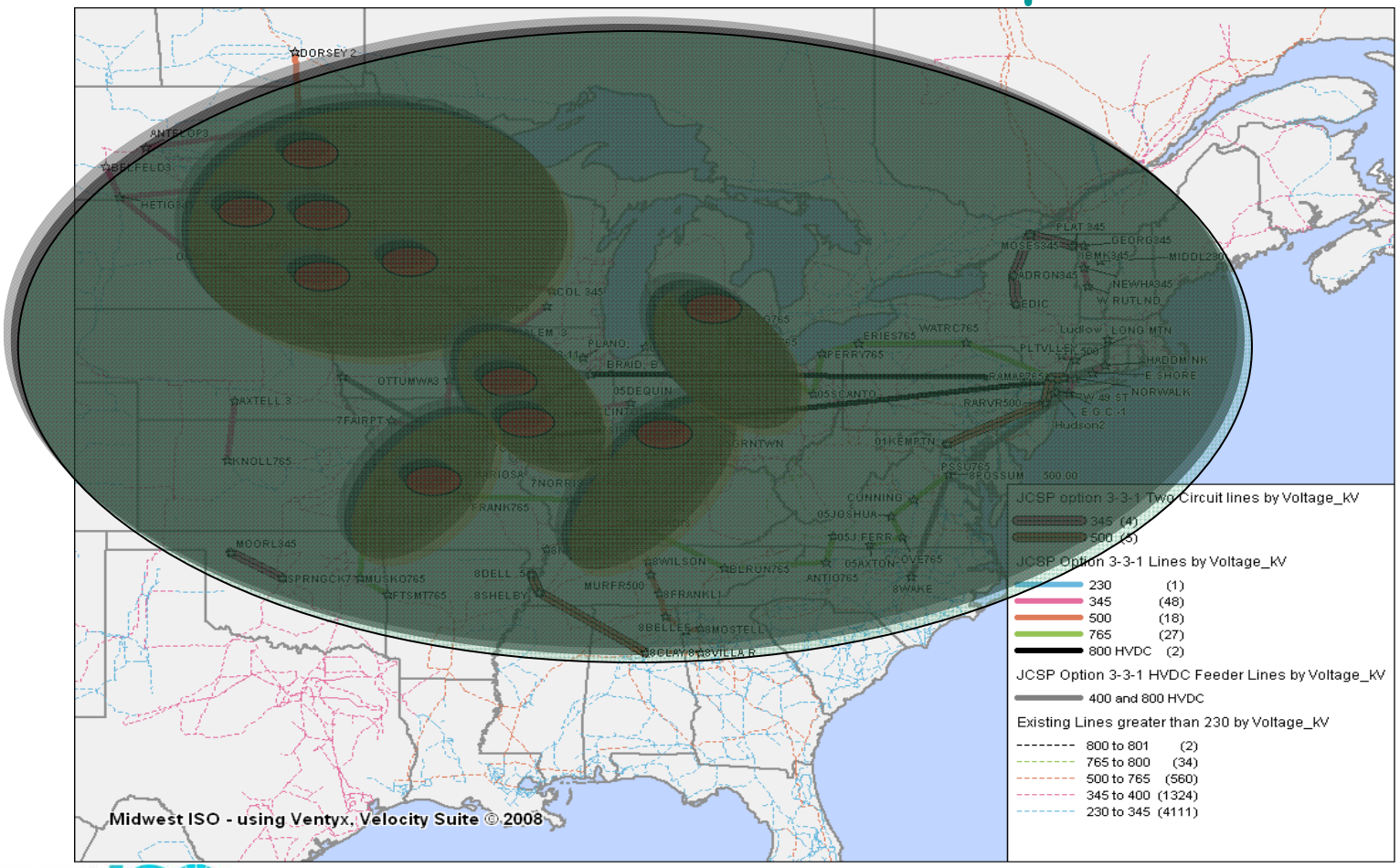
… Consistent with an inter-regional plan with a longer term view

1 year — Planning Horizons — 20 year

JCSP



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