

Michigan Wind Energy  
Transmission Study (MI-WETS)  
and  
Michigan Planning Consortium  
Generation Integration Workgroup



Michigan Wind Energy Resource Zone Board Meeting  
12/12/2008

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# Outline of presentation...

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- Calendar of Related Studies...
- Potential Role of Michigan Planning Consortium & MI-WETS in Support of Michigan Wind Board
- MI WETS Overview
  - MI WETS for Lower Peninsula Update
  - MI WETS for Upper Peninsula Update

## Related Projects:

This work is never “done”...

MI-WETS	Wind & Michigan Only; High-Level Analysis	2/09
MI Planning Consortium	All Generation Types; process oriented	07/09
MI RPS Plans	Applications from providers	2-3/09
MI-WETS Update(?)	Based on input from Wind Board; MTEP 08	05/09?
JCSP/MTEP 09	Joint Coordinated System Plan – transmission plan for eastern interconnect to accommodate wind	7/09
EWITS	Wind study for whole eastern interconnect – focus on operational impacts to grid	7/09

# MI-WETS Overview

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- ❑ A preliminary, high-level scoping study, for information only
- ❑ NOT generation interconnection studies; NOT transmission system plans
- ❑ Separate studies performed for UP and LP
- ❑ Overall Goal: Model different possible scenarios for wind energy production in Michigan, to develop an overview and basic understanding of high level transmission system needs
- ❑ Objective: Provide basic information policy makers can use to begin to understand the likely ramifications of future wind energy development

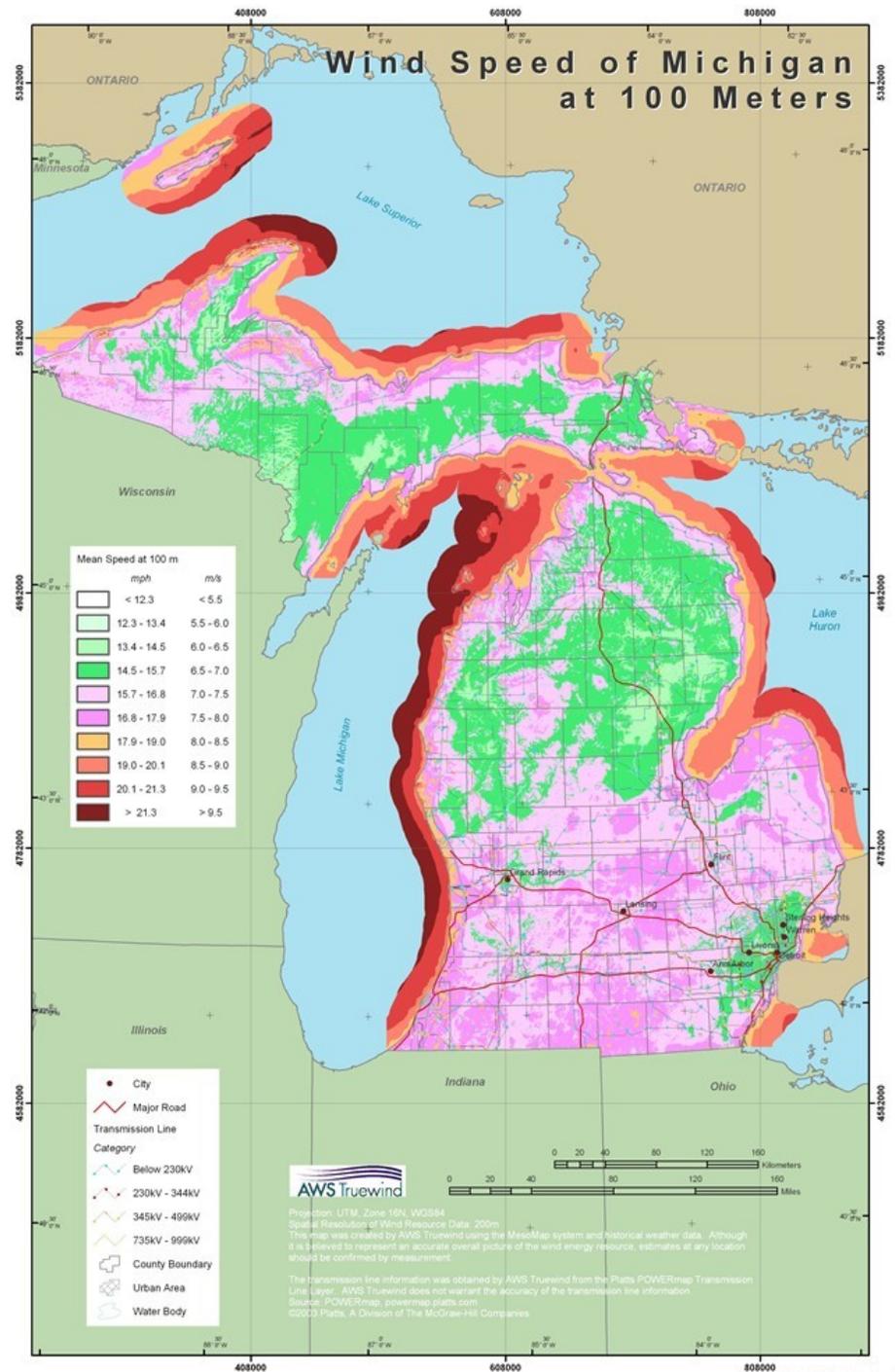
# MI-WETS for Lower Peninsula

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- Several specific wind scenarios analyzed:
  - low, medium, and high on-shore wind production (1500 MW, 3000 MW, 4500 MW)
  - one off-shore scenario (adding two 500 MW off-shore farms to 4,500 MW scenario)
  - with and w/o three possible future fossil units
- This study does not include community wind or small wind systems, that will interconnect at distribution system voltages.
- Scenarios developed with input from MI-WETS Working Group

# Michigan Wind Mapping Progress

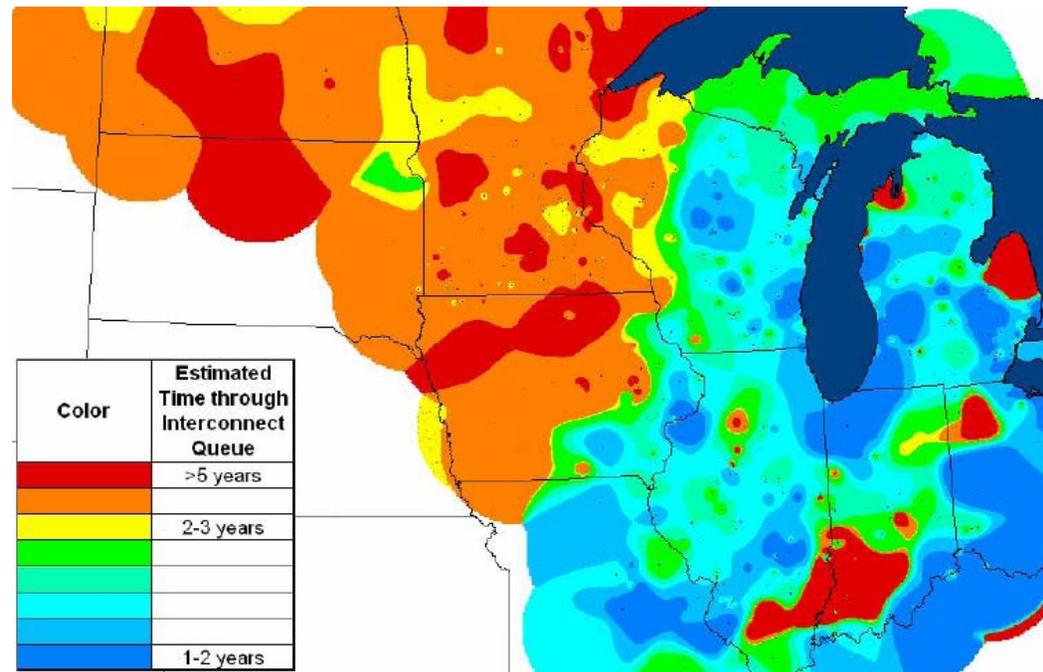
- DOE Tall-Towers Project
  - new tall tower near Benton Harbor
- New 100m map for eastern interconnect coming soon (3 km cells)
- 100m towers installed @ Stoney Corners; new 120m towers proposed for 2009 MI installation
- MSU LPI continuing GIS wind resource mapping





# Roadblocks in MISO Interconnection Queue Process

- ❑ This map is meant to give a high level estimate of the approximate time it may take to move through the MISO Generation Interconnection process based on the projected amount of first contingency incremental injection capability considering existing and proposed generation in a geographic area.
- ❑ This map considers only study timeline, not permitting or construction timelines.
- ❑ This map should not be treated as a substitute for studies.

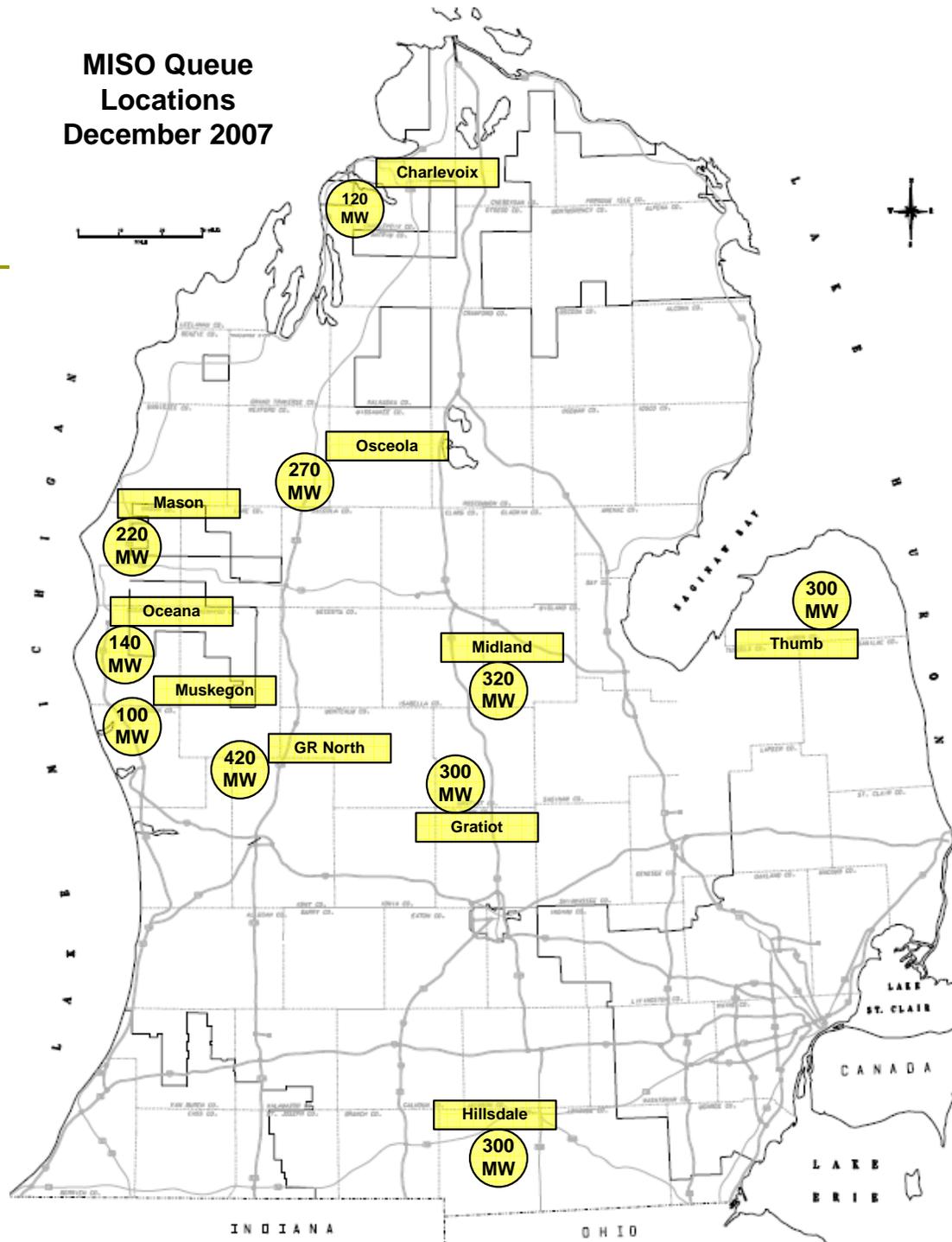


# MISO Queue Summary Dec 2008

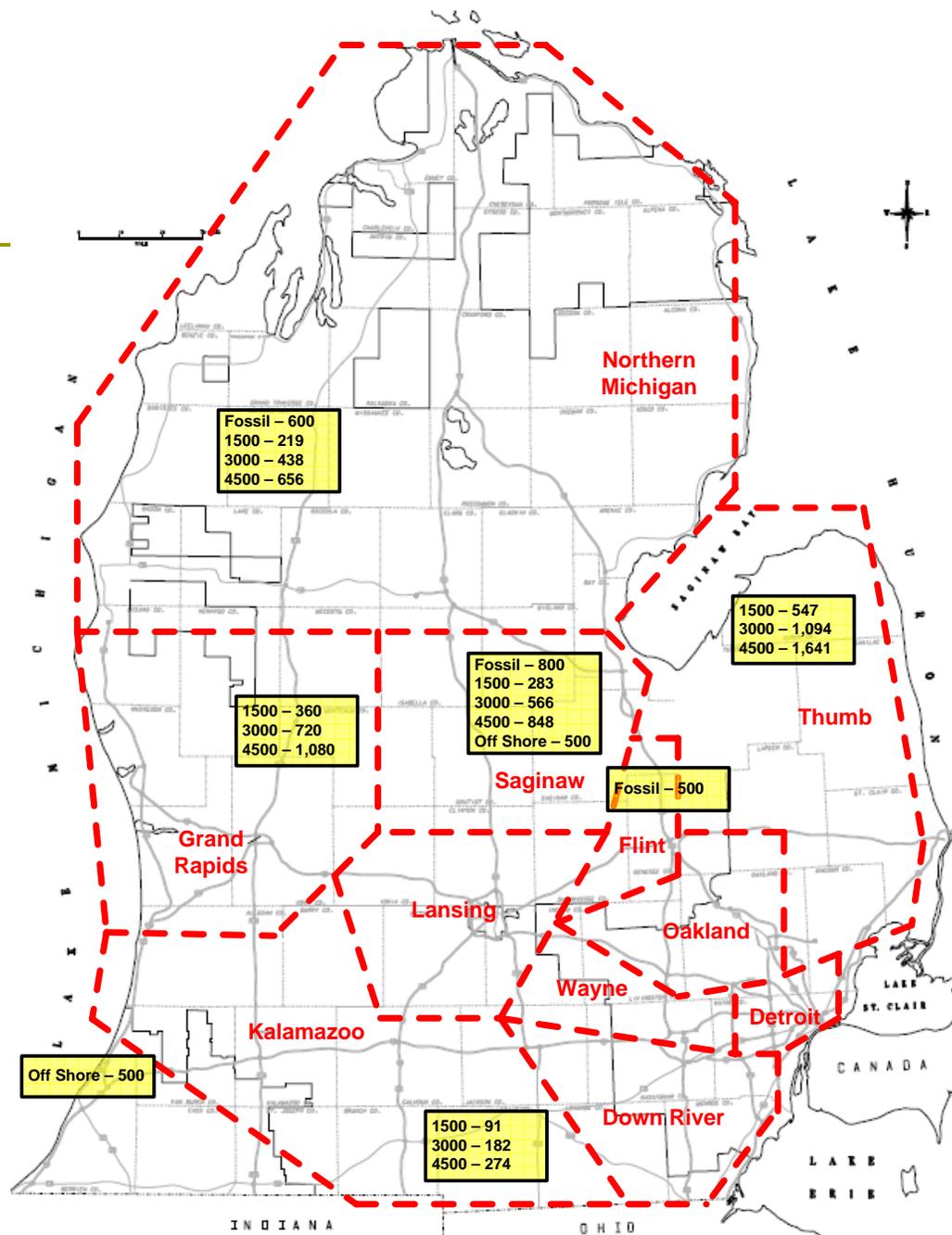
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- Michigan 23 wind projects; 15 counties; 2988 MW
  - Allegan, Charlevoix, Delta, Gratiot, Hillsdale, Huron, Kent, Marquette, Mason, Missaukee, Oceana, Osceola, Ottawa, Saginaw, Tuscola
- Total Michigan Queue: projects, 7,029 MW<sub>summer</sub>
  - Adds coal (3), gas cogen, biomass (2), nuclear
  - Adds Bay, Kalkaska, Midland, Monroe, Presque Isle
- Midwest States A wind projects; B MW.
- Other?

MISO  
Queue:  
Michigan  
LP Wind  
Generation  
Locations



Possible  
Michigan  
Future  
Generation  
Locations  
by Area:  
ITC Planning  
Polygons



# Other Key Assumptions

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- Total Combined ITCT and METC peak load (plus losses) of approximately 24,400 MW
  - METC ~11,950
  - ITCT ~ 12,450
- Approximately 2018 timeframe
  - Based on forecasts available at the start of this study
  - Corresponds with 2010-2011 from 21<sup>st</sup> Century Plan base forecast for combined ITCT and METC load)

# Preliminary Results

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- ❑ Significant transmission upgrades required to support large amounts of wind in the Thumb area
  - Amount of future wind in the Thumb will dictate voltage level required for upgrades (i.e. 120 kV vs. 230 kV vs. 345 kV)
- ❑ In order to export large amounts of power from Michigan, stronger interconnections to the south would be required
- ❑ Large amounts of generation in Northern Michigan may require stronger (or controllable) interconnections with ATC to the north
- ❑ Coordination would be required with neighboring utilities

## Next Steps for Lower Peninsula Study

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- ❑ Finalize study results and develop rough estimates of MECS Transmission expansion costs for 5500 MW wind scenario
- ❑ Finish and deliver ITC report to MI-WETS
- ❑ Incorporate into MPSC Staff MREP report in early 2009
- ❑ Reconvene MI-WETS working group to determine good wind zones to be studied in more detail in 2009

# Preliminary Ideas for MI-WETS 09

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- ❑ Model some specific zone or zones in more detail to better understand costs
- ❑ Analyze DOE 20% Vision concept for 2030 for Michigan (link to Midwestern Governors Association 25% by 2025)
- ❑ Other (as assigned by Wind Board)...  
Please review MI-WETS 08 Preliminary Information on MPC GI Workgroup Page:

# MI-WETS for the Upper Peninsula

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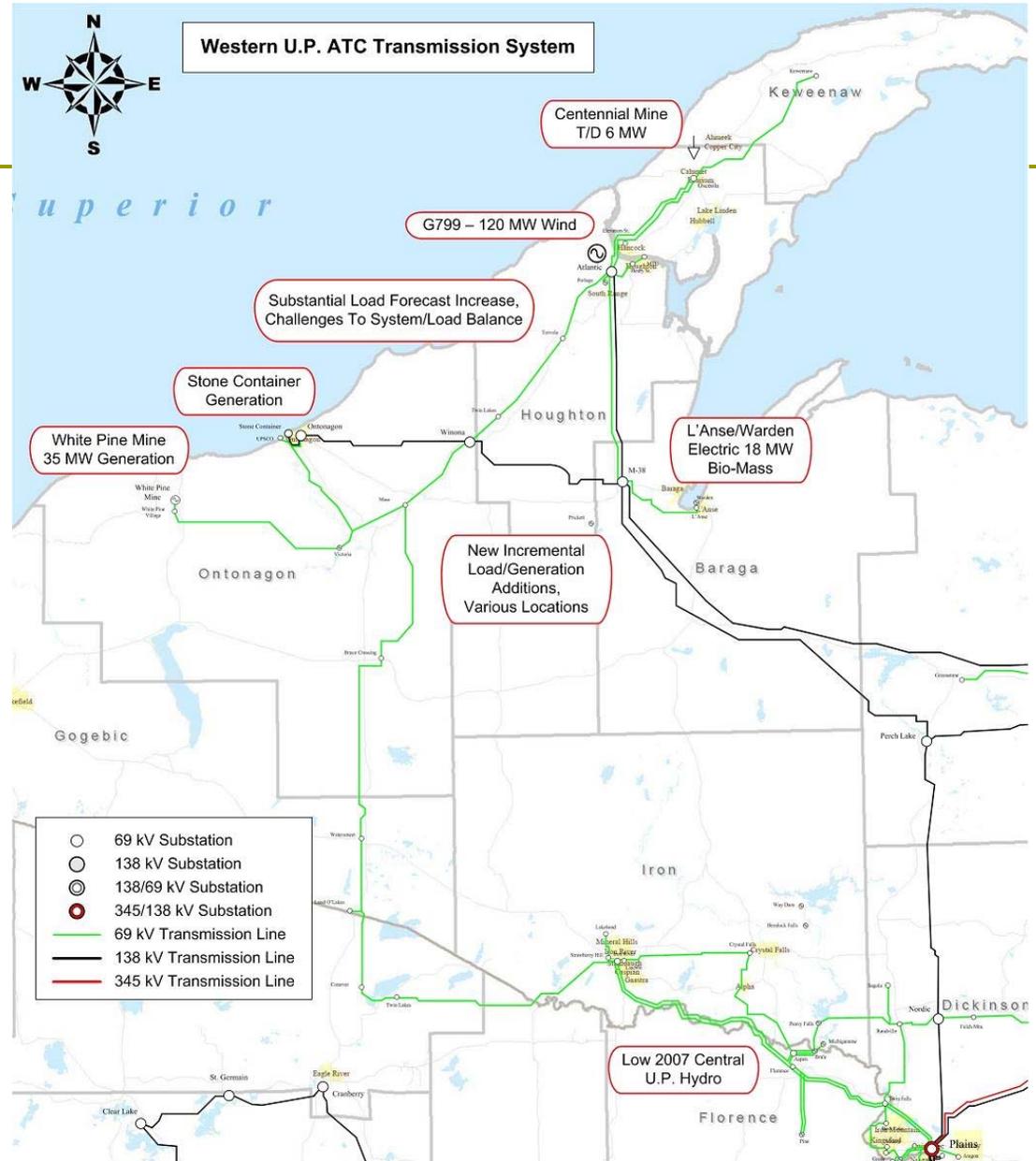
- Approach is to examine existing generation interconnection studies
  - Look for general issues in the studies
  - Can generation interconnection projects also solve other UP needs?
- 6 interconnection queue studies for five locations in the UP have been published
  - 3 are for wind generation in the 100 to 200 MW range
  - 3 are for non-wind, but provide useful information overview of system issues

# Overview of UP Transmission Sub-Regions

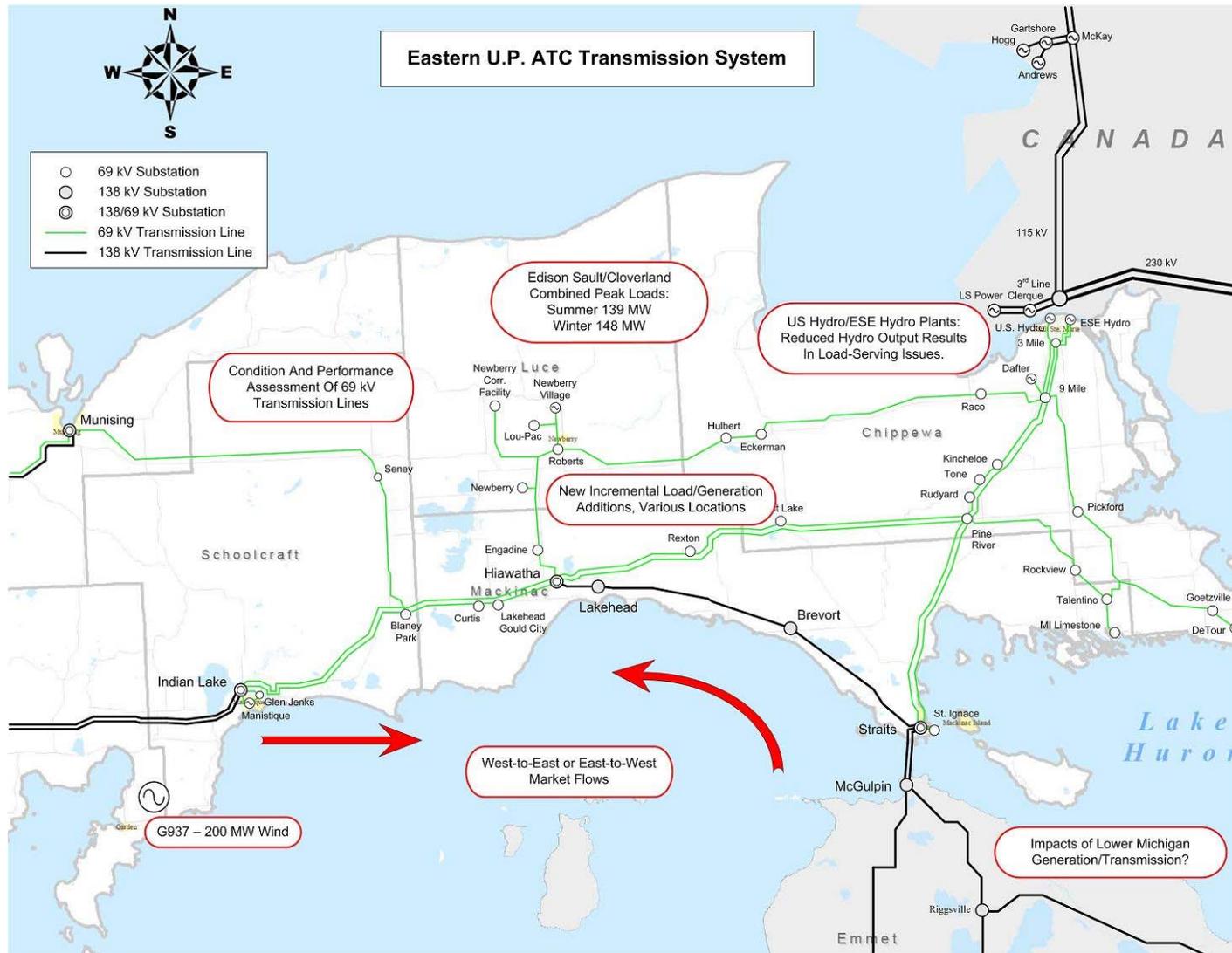
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- In ATC's current work on the UP, West, Central and East study areas are identified
- East and West areas are somewhat similar
  - Rely heavily on traditional 69kV networks
  - Existing generation hosted in these areas is smaller than 100MW per site
- Public information about interconnection studies resides on the MISO website at <http://www.midwestiso.org/page/Generator+Interconnection>. There, see *Generator Interconnection Queue Projects* and search the *GI Interactive Queue* (database)

# Western UP Overview



# Eastern UP Overview



# Studies in the East and West

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## □ West

- G583 Gas/Biomass; FIS complete; Withdrawn 6/08
  - 16MW Ontonagon County
  - White Pine Substation
- G799 Wind; FES Study complete; Dropped out of queue 6/08
  - 120.45MW Houghton County
  - Atlantic Substation

## □ East

- G799 is at the border of the East area
  - Electrically part of the Central Area

## Study Findings – East and West Areas

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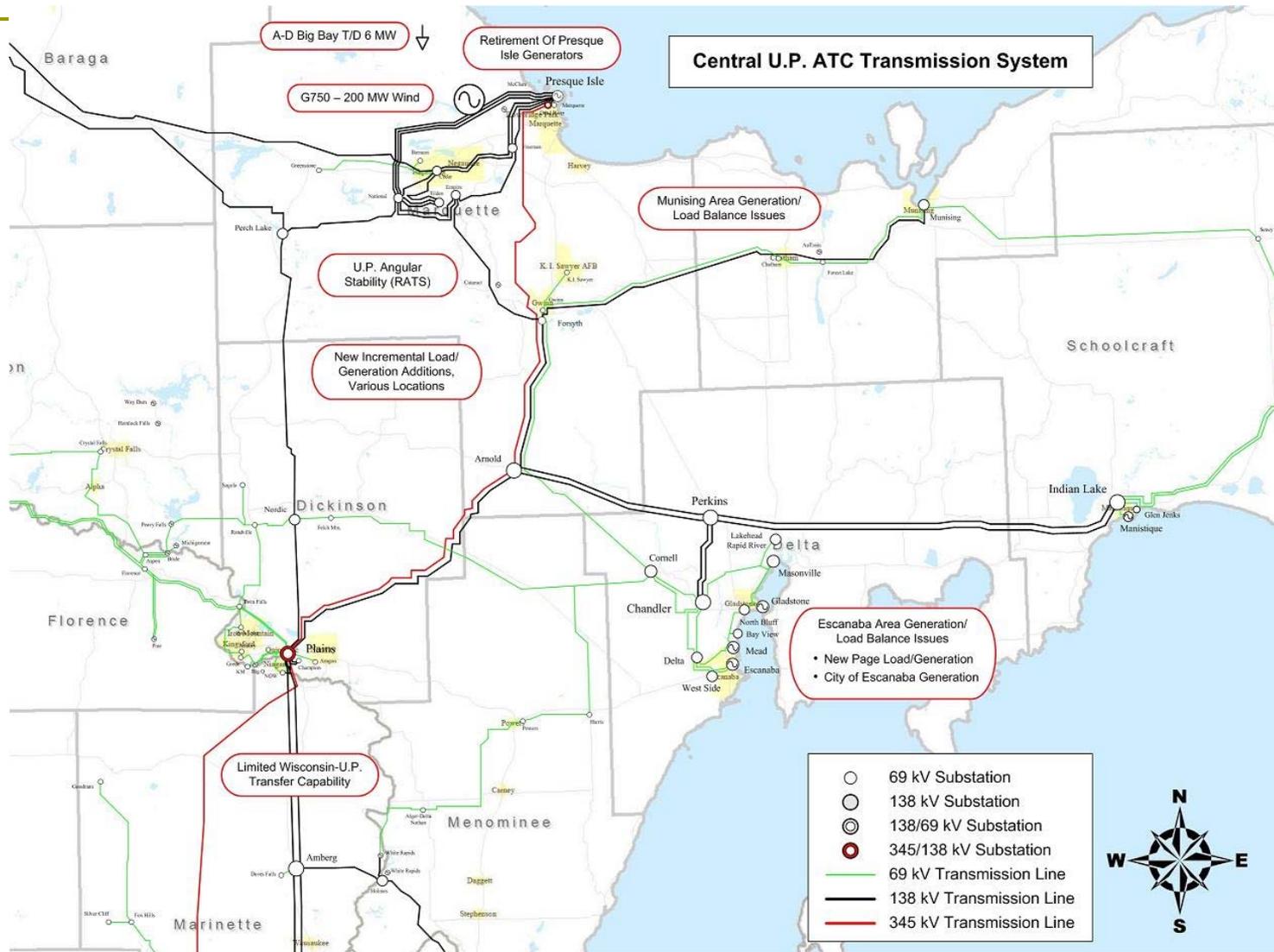
- ❑ Commercial scale wind projects are much larger than current generation resources in the East and West UP
- ❑ Large scale generation projects cause the transmission system to exceed multiple limitations
  - Even the 16MW project required several system upgrades
- ❑ The UP system could host wind generation with the appropriate upgrades

# Overview of the Central UP Transmission Sub-Region

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- The Central UP hosts much larger loads and generators than the East and West
- Large loads (mines, paper and forest products mills, or municipal utilities) have historically provided their own generation at the load site.
- Transmission consists of a single 345kV line, with a network of 138kV lines underlying it.
  - The system is currently at its limit for importing and exporting power

# Central UP Overview



# Studies in the Central area

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## □ Central

- G567 and G568 Coal; SIS complete; Withdrawn from queue
  - 165 MW and 135 MW (300 MW Total)
  - Delta County
  - Escanaba Substation
- G750 Wind; FES & SIS studies complete; Must meet MISO milestones.
  - 201MW, Marquette County
  - Lines 446 and 447
- G937 Wind; FES study complete; SIS study underway
  - 200MW, Delta County
  - Indian Lake – Perkins 138kV Lines

# Study Findings – Central Area

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- ❑ Each of the Central area studies showed the need for significant transmission upgrades to host the proposed generators.
- ❑ New generation proposals compete with the existing generation and loads for scarce import and export capacity
- ❑ The Central UP system could also host wind generation with the appropriate upgrades

# UP Wind Projects

## Overall Observations

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- ❑ The traditional reliability of the UP transmission system relies on a balance of load, generation and transmission
- ❑ Commercial scale wind projects are much larger than current generation resources in the East and West UP
- ❑ The Central UP transmission system lacks the additional margin to host new large scale generation without significant system upgrades

# MI-WETS UP Next Steps

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- ATC is currently working on its ATC Energy Collaborative – Michigan
  - a study of the overall UP needs for 2013, 2018, and 2024
- Wind is one several drivers for planning the transmission system
- ATC is looking for transmission projects which will best fulfill multiple needs
  - Generation Interconnection
  - Load serving
  - Market Access

# MI Planning Consortium

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- ❑ In July 2008, MPSC Order in Case No. U-15590 established the Michigan Planning Consortium (MPC) to improve the planning process for electricity infrastructure projects and identify possible ways to reduce ratepayer costs.
- ❑ Initial MPC goals include:
  - Ensure adequate information sharing in the planning process, on a local and detailed level.
  - Evaluate energy infrastructure alternatives, including proposed transmission projects.
  - Examine cost effects of alternatives on Michigan customers.
  - Recommend most effective ways for Michigan stakeholders to participate in regional planning processes, and related state and Federal Energy Regulatory Commission (FERC) proceedings, including MPSC Act 30 certification proceedings (for a transmission line Certificate of Public Convenience and Necessity; CPCN).

## MI Planning Consortium (2)

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- “Generation Integration” group is focused on transmission planning for Michigan wind resource development and other generation integration, to identify ways to best coordinate and hopefully optimize transmission expansion in Michigan.
- MI Planning Consortium is presently one of 7 active MPSC Electricity Workgroups. Link to “workgroups” webpage by visiting <http://www.michigan.gov/mpsc>, then click on “**Electricity**” then “**Workgroups**”.
- MI-WETS report will be subsumed into MPC, but MPC goals are broader than MI-WETS.

# MREP Calendar of Events...

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- ❑ Fri Jan 23; MPC GI Meeting; 9:30 a.m. here at MPSC Offices
- ❑ Next Wind Working Group meeting Jan 26, 9 to noon @ MPSC Offices
- ❑ Michigan Wind Conference @ Cobo Hall March 3-4
- ❑ Michigan Agri-Energy Conference @ Kalamazoo March 30-31
- ❑ Michigan Energy Fair, Onkama @ Manistee County Fairgrounds, June 26-28