



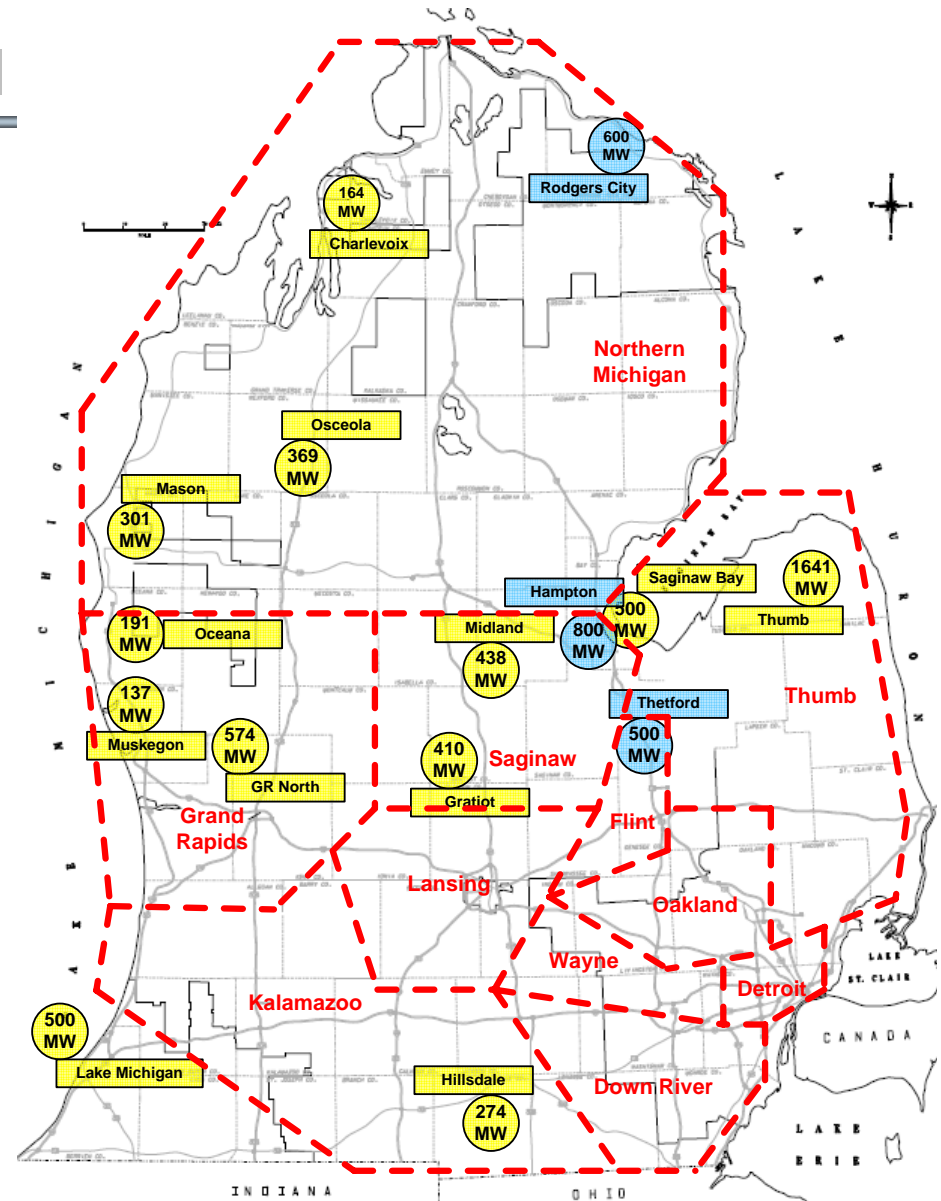
Michigan Wind Studies Update

MI – Wind Energy Transmission Study Phase I

- 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 – Wind Energy Transmission Study Phase I

- Significant transmission upgrades required to support large amounts of wind in the Thumb area
- 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 (both TO's and TDU's)



Michigan (and other) Wind Studies

- **MI Wind Energy Transmission Study Phase 1**
- **MI Wind Energy Transmission Study Phase 2**
- **MISO Generation Interconnection Studies**
 - Definitive Planning Phase (DPP) Study
 - System Planning & Analysis Phase (SPA) Study
- **DTE Interconnection Studies**
- **MI Planning Consortium**
- **MI Wind Energy Resource Zones Board**
- **Midwest ISO RGOS II**
- **JCSP**
- **MI Off-Shore ... Great Lakes Wind Council**



Coordination

■ What can be done to coordinate the various study efforts?

■ Short Term

- MI Wind Energy Transmission Study Phase 2
- MI Wind Energy Resource Zones Board
- MI Planning Consortium Work
- Midwest ISO Generation Interconnection Studies
- DTE Interconnection Studies

■ Long Term

- RGOS II
- JCSP
- Great Lakes Wind Council

■ Possible coordination through...

- Utilizing the Wind Energy Transmission Study (with input from Planning Consortium Group and the Midwest ISO and DTE interconnection queues) to scope a study that will anticipate the Wind Energy Zones Board transmission study needs and include the interconnection points requested through Midwest ISO and DTE interconnection processes
- Utilize short term results for long term inputs

Goals of Coordinated Study

- **Develop transmission system in Michigan to support:**
 - Current Midwest ISO generation interconnection queue
 - Current DTE generation interconnection queue
 - Ultimate expected reasonable wind export from the Thumb region
- **Produce report that will suffice:**
 - Michigan Wind Renewable Energy Wind Zones Board requirements
 - The second phase of the Michigan Wind Energy Transmission Study
 - Michigan Planning Consortium Report
- **Coordinate with Midwest ISO and DTE interconnection studies**
 - Required to move forward via existing processes

Study Assumptions

- Study Timeline
- Study Timeframe
- System Load
- Existing Generation Dispatch
- ITC/IESO Interface Flows
- Future Wind Locations
- Sink Points for Future Wind



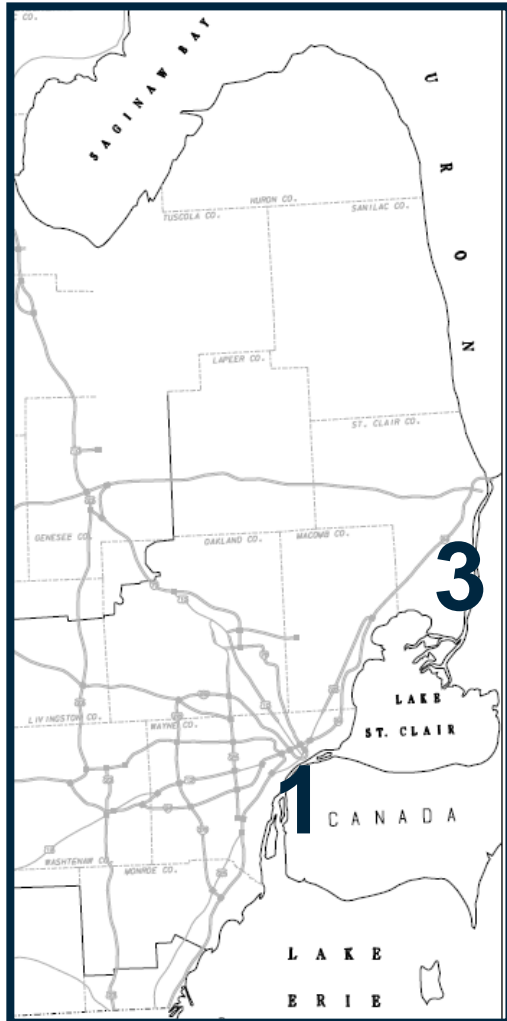
Study Assumptions - Timeline

Study	Q1 2009	Q2 2009	Q3 2009	Q4 2009
Coordinated Study				
Develop Input Assumptions				
Develop Models				
Perform Analysis				
Present Results				
Develop Report				
MISO DPP				
MISO SPA				
DTE Studies				
RGOS II				
Great Lakes Council				

Study Assumptions – Timeframe, Load & Gen

- **2009 System “As Is” Used as Starting Point**
 - Addition of the following projects:
 - B3N Phase Shifting Transformers
 - Upgrades required for G503 (Bad Axe to Wyatt #2)
- **Total Combined ITCT and METC peak load (plus losses) of approximately 21,805 MW (METC ~10,280 & ITCT ~ 11,525)**
 - Peak vs. off peak system loading?
- **Generation is typically dispatched in merit order (based on dated economic order lists)**
 - Generation on ITCT system feeding load on ITCT system
 - Generation on METC system feeding load on METC system

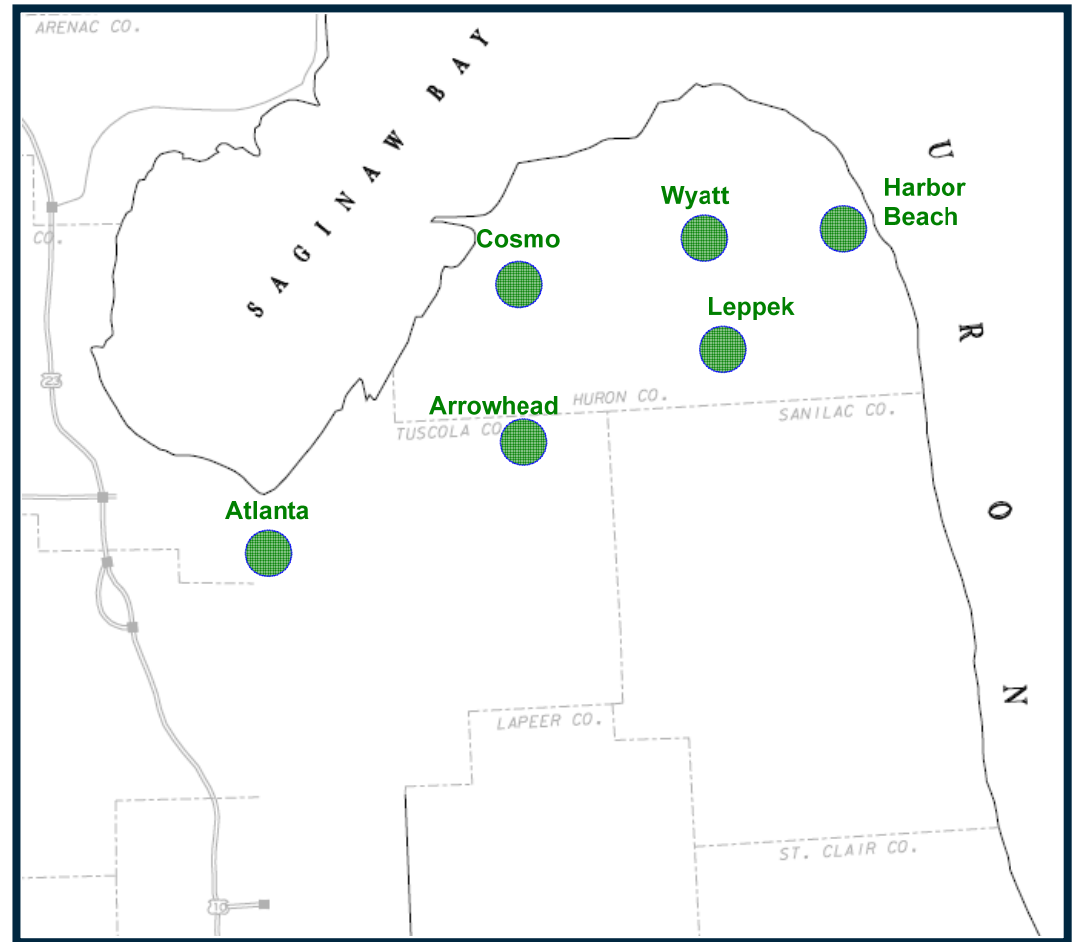
Study Assumptions – Michigan to Canada



- Assuming the “primary” wind zone will be located in the Thumb region of the Lower Peninsula, ITC/ESO interface flows will have a definite impact on the results
 - All phase shifters free flowing
 - All phase shifters controlling to 0 MW interface flow
 - All phase shifters controlling to ~ 1100 MW flowing from or through Michigan into or through Canada (flow controlled 1/6, 1/3, 1/3 and 1/6 across the B3N, L51D, L4D and J5D respectively)
 - Bracket flow with 1500 MW flow into Canada and 2500 MW flow into Michigan Other???

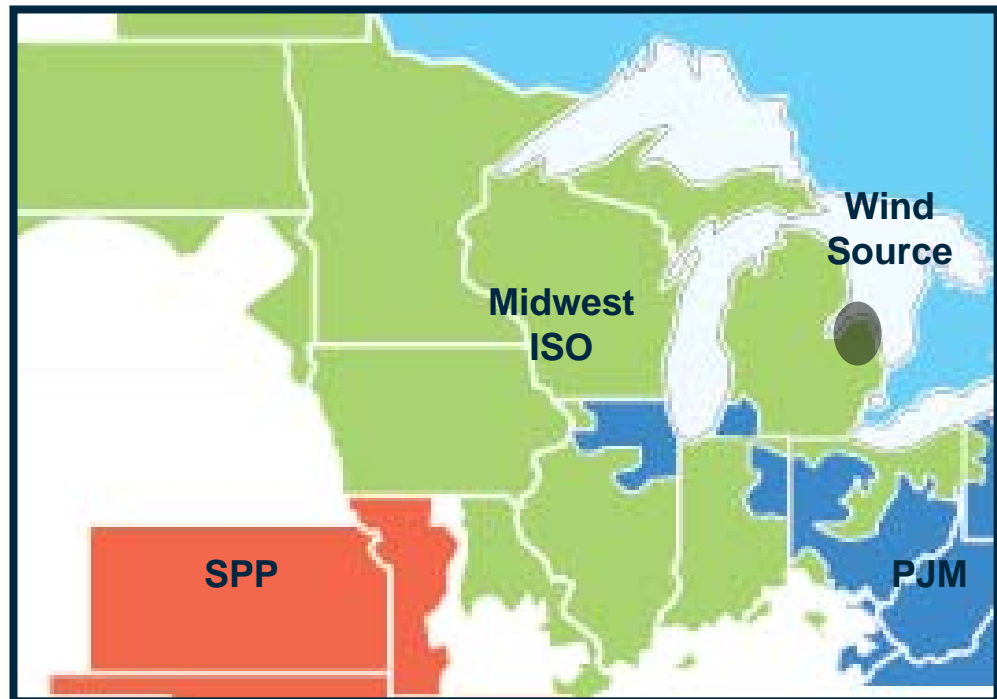
Study Assumptions – Wind Locations

- Future wind locations
- Include existing interconnection requests?
 - MISO
 - DTE
- Model only “hubs”, not “lower voltage” collector system



Study Assumptions – Sink Points

- Assume delivery of 100% of nameplate...
 - This will allow determination of total MW's exportable from the “zone”
 - Ultimate build out may want to consider some % of total nameplate
- Local vs. regional sink
- Ludington...?



Questions/Discussion

