



Great Lakes Wind Turbine Transport Terrestrial & Offshore Development



Great Lakes Wind Collaborative
2nd Annual Conference
Milwaukee, WI

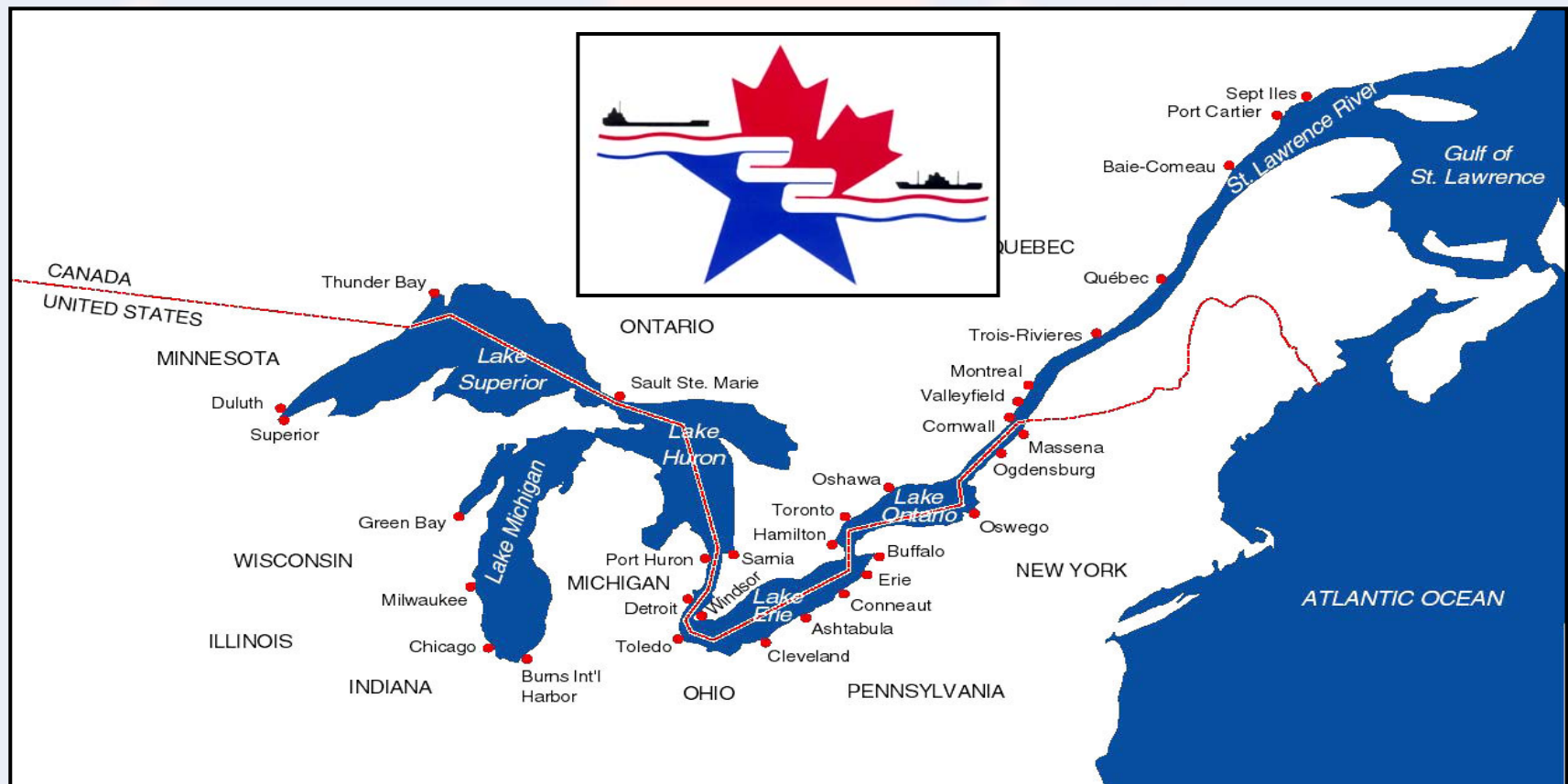
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The Great Lakes St. Lawrence Seaway System

- Great Lakes Seaway System – Highway H₂O
- Eight U.S. states, two Canadian provinces
- Traditional bulk cargo channel
- Project cargo growing, container feeder port?





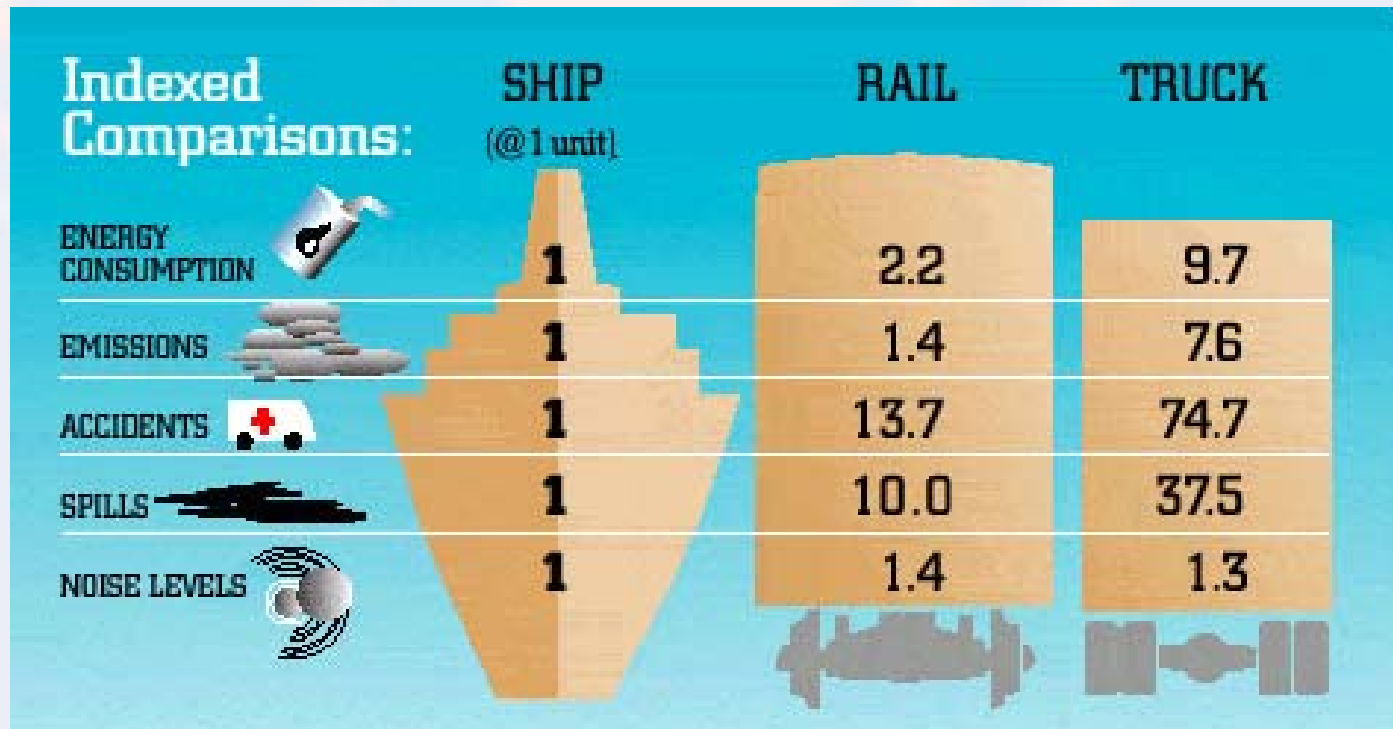
North American Inland Waterway Systems

- Abundant Capacity
- Efficient, Safe, Reliable
- Uniform Maritime Regulations
- Environmentally Friendly

Inland Rivers - Navigable Waterways



Waterborne Transportation is Environmentally Friendly





Great Lakes Wind Components Trade

- Two out of three Great Lakes ports are currently handling imports of wind energy components
- Since 2005 a tenfold increase in wind energy components.

Destination	Total 2005 - 2008
Duluth	91,461
Menominee	56,196
Ogdensburg	29,023
Milwaukee	25,259
Oswego	23,308
Hamilton	16,583
Windsor	16,490
Toronto	15,169
Thunder Bay	3,262
Owen Sound	2,668
Buffalo	2,102
Toledo	1,388
Burns Harbour	1,150
Chicago	217
Sault Ste. Marie	182

Great Lakes Wind Energy Growth

- A key player in the world's fastest growing wind energy market
 - Wind power projects in the Great Lakes currently produce 3,838 mw of wind power
 - In the U.S. Great Lakes Region projects totaling 1,611 mw are under construction
 - Hydro Quebec \$5.5 billion announcement in May 2008 largest to date





Marine Transportation Logistics Chain

- Wolfe Island Wind Farm, Ontario
 - 2nd largest wind farm in Canada: 86 turbines, 2.3 mw ea.
 - Siemens Windpower towers and turbines, shipped from Esbjerg, Denmark to Ogdensburg, NY on *MV Beluga Fighter*, 2 x 150 t cranes
 - Port of Ogdensburg unload, marshalling
 - Canadian barge operator designed and modified barge to shuttle passengers & equipment port to Wolfe Island
 - Designed/modified spud barge to 6-leg hydraulic jack-up barge used as temporary wharf in Kingston, ON
 - 2 tug and barge units operating full-time, two trips daily

Typical Barge Load

- One wind turbine =
9 components
 - 3 blades @ 43 mt ea
 - 1 base section @ 59 mt
 - 1 mid section @ 59 mt
 - 1 top section @ 48 mt
 - 1 cone
 - 1 generator @ 108 mt
 - 1 container-misc. parts





Jones Act and Offshore Wind Farms

- U.S. built, owned, crewed, and registered vessels in domestic waterborne commerce
- Waivers only based on “interest of national defense”
- Applies to offshore wind towers less than three mile territorial limit. Therefore, workboats to be Jones Act vessels.
- Final legal arbiter is DHS Customs Carrier Branch.

U.S.-Flag Wind Farm Opportunities



U.S.-Flag Offshore Service Vessel
IRON HORSE



U.S.-Flag Vessel
OCEAN TITAN

- Federal stimulus programs breathe new life into the U.S. Merchant Marine as reliable U.S.-flag vessels will be required for:
 - Importation of tower equipment and wind blades
 - Wind tower installation and service



Infrastructure Challenges to Offshore Development

- Seaway locks:
 - 740' x 78' x 26'6"
 - Air draft 116'6"
- Mississippi - Illinois River
 - Lamont Rail Bridge 19' air draft
 - Other low bridges



Seaway Sized Jack-up Barges

- Most jack-up barges exceed lock specifications
 - Modification of current inventory and/or new build opportunity for Great Lakes shipyards
 - Manitowoc
 - Cleveland
 - Toledo
 - Erie
 - Tender rigs



Following the European Offshore Lead

- EWEA Strategic Research Agenda: 2030
 - Two R&D areas
 - Sub-structures
 - Assembly, installation and decommissioning
- Monopile, fixed structures & floating designs
- Assembly
 - Transfer equipment from suppliers to sites
- Installation
 - Hostile environment
 - Reduce work performed offshore
 - Multiple vessels needed
- Decommissioning
 - Determine upfront total costs



Special Vessels Streamline Operations

- Great Lakes vessels likely to be smaller, more modest than European cousins
- Danish company A2SEA
 - *Sea Worker*
 - *Sea Power*
 - *Mayflower Resolution*
- Jack-up barges provide more economic solution for short/medium term
- Liftboats 'hot European market': self-elevating, self-propelled w/crane, open deck
- GL Shipyard infrastructure renewal essential for state-of-the-art vessels



Resolution on the Thames



Floating Wind Turbines: Deep Water = \$\$\$/MW

- Dutch Blue-H Technology in Italy, France
- Norwegian Hywind in Stavanger



Challenges

- Major long-term resource investment
- Rebuilding national grid
- Crucial role of shipyards
- Jones Act Vessels
- Educating Labor Force



Opportunities

Great Lakes Seaway System Opportunities

- Wind Rich Area
- Seamless Binational Waterway
- Port Efficiency
- Labor Stability
- Significant growth capacity
- Uniform Maritime Regulations
- Cost Competitive
- Port Expansion and Modernization
- Efficient Channel for less non-time sensitive cargos





Questions

Thank you for your attention. If you'd like a .pdf copy of the presentation, please contact me at:

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