



# Great Lakes Maritime Research Institute

*A University of Wisconsin - Superior and  
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## LNG AS MARITIME FUEL ON THE GREAT LAKES: REGULATORY ISSUES September 27, 2012

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## Research Overview/Purpose

- Project Tasking
- Research Process/Field Work
- Current U.S. Regulatory Framework
- Roadblocks to Success
- Recommendations



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## Project Tasking

Analyze U.S. Regulations regarding LNG propulsion on commercial vessels

- Identify federal, state and local regulatory gaps
- Review *SS Michigan* Car Ferry Badger Operations and make recommendations
- Roadblocks to Moving Ahead
- Recommendations for Successful Implementation



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## Research Process/Field Work

Conducted literature review

Field Work

- Rode SS *Michigan* Car Ferry Badger
- Interviewed Federal, State and Local Officials in Michigan, Wisconsin and Washington D.C.
- Phone interviews of other Federal, State and Local Officials
- Attended LNG Supply Chain Conference – Superior WI
- Norway trip: met with Rolls-Royce, Norwegian Maritime Authority and Det Norske Veritas



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## Current U.S. Regulatory Framework

Federal, State and Local regulations

- Vessel
- Facility

Fixed (building)

Portable (tank truck)



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## Federal, State and Local Facility Requirements

Agency/Organization	NFPA	Regulations	Policy	IMO
USCG	YES	NO	YES	NO
FERC	NO	NO	NO	NO
EPA	NO	NO	NO	NO
State of Michigan	YES	NO	NO	NO
State of Wisconsin	YES	YES	NO	NO
ACOE	NO	YES	NO	NO
FMCSA	NO	NO	NO	NO
City of Ludington	YES	YES	NO	NO
City of Manitowac	YES	YES	NO	NO
PHMSA	NO	YES	NO	NO
FRA	NO	NO	NO	NO
DOE	NO	NO	NO	NO



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## Federal, State and Local Tank Truck Requirements

Agency/Organization	NFPA	Regulations	Policy	IMO
USCG	YES	NO	YES	NO
FERC	NO	NO	NO	NO
EPA	NO	NO	NO	NO
State of Michigan	NO	NO	NO	NO
State of Wisconsin	NO	NO	NO	NO
ACOE	NO	NO	NO	NO
FMCSA	NO	YES	NO	NO
City of Ludington	YES	NO	NO	NO
City of Manitowoc	YES	NO	NO	NO
PHMSA	NO	NO	NO	NO
FRA	NO	NO	NO	NO
DOE	NO	NO	NO	NO



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## Federal, State and Local Vessel Requirements

Agency/Organization	NFPA	Regulations	Policy	IMO
USCG	YES	NO	YES	YES
FERC	NO	NO	NO	NO
EPA	NO	YES	YES	NO
State of Michigan	NO	NO	NO	NO
State of Wisconsin	NO	NO	NO	NO
ACOE	NO	NO	NO	NO
FMCSA	NO	NO	NO	NO
City of Ludington	YES	NO	NO	NO
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## U.S. Coast Guard

- Vessels -Responsible for navigation safety, vessel engineering and safety standards
- Facilities -safety of facilities or equipment located in or adjacent to navigable waters up to the last valve immediately before the receiving tanks
- No Regulations for LNG Propulsion and LNG Facilities (small quantities)
- Case by Case Basis



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## U.S. Coast Guard- Current Regulations/Policy

- Navigation and Vessel Inspection Circular (NVIC ) 01-2011 (Guidance Related to Waterfront LNG Facilities)
- 33 CFR 127 (Waterfront Facilities Handling LNG)
- COMDTINST 16010.3 (Risk Based Decision-Making Guidelines)
- CG 521 Policy Letter (01-12) : Equivalency Determination – Design Criteria for Natural Gas Fuel Systems
- Maritime Transportation Security Act (33 CFR 104/105)



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## U.S. Coast Guard- Current Regulations/Policy

- Current guidance and regulations pertain to facilities that handle LNG (33 CFR 127) as cargo and not applicable to smaller quantities used for fuel
- Coast Guard developing guidance on ship/shore transfer and training requirements
- Merchant Marine Personnel Advisory Committee (MERPAC) formed working group to advise Coast Guard on STCW qualifications



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## Army Corps of Engineers

- Facilities (Fixed)

Permit under Section 10 of the Rivers and Harbors Act  
Section 404 of the Clean Water Act

- Facility (Tank Truck)

Not Regulated

- Vessel

Not Regulated



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## Environmental Protection Agency

- 40 CFR 1042
- Replace entire engine then required to meet the present emissions standards.
- Only modify fuel source then no EPA emission requirements



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## Other Federal Agencies

### **Federal Energy Regulatory Commission (FERC)**

- Establishes rates for LNG.
- National Environmental Policy Act
- Natural Gas Act – Siting of facilities for import/export of LNG
- Would not be involved with LNG used as fuel

### **Pipeline and Hazardous Materials Safety Administration (PHMSA)**

- The Federal hazardous materials transportation law (Federal hazmat law), 49 U.S.C. § 5101
- transportation of hazardous materials in interstate, intrastate and foreign commerce by aircraft, railcar, vessel, and motor vehicle.



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## Other Federal Agencies

### **Federal Railroad Administration**

- Passenger and Freight Rail Safety
- Hazardous Material Tank Car Safety

### **Federal Motor Carrier Safety Administration (FMCSA)**

- Carriers have to be registered;
- Companies need a US DOT number and a MC number

### **Department of Energy (DOE)**

- Natural gas imports and exports
- Section 3 of the Natural Gas Act of 1938



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## Michigan

- Facilities (Fixed)
  - Regulations for CNG but not LNG
  - Case by case basis
  - Submit Application for Installation of Natural Gas Facility
- Facility (Tank Truck)
  - Transfer Operation Not Regulated
- Vessel
  - Not Regulated



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## Wisconsin

- Facilities (Fixed)
  - Required State Approved Plans
  - State Review (2009 Commercial Building Code Section 307)
  - Building Permit
- Facility (Tank Truck)
  - Transfer Operation Not Regulated
- Vessel
  - Not Regulated



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## Ludington, MI

- Facilities (Fixed)

  - Need Building Permit and City Council Approval

  - Case by case basis; no city ordinance

  - Submit Transfer Procedures to Fire Chief

  - Comply with NFPA Standards

  - LNG fire fighting training

- Facility (Tank Truck)

  - Not Regulated: No Permit or City Council Approval

  - NFPA Standards/fire fighting training/transfer procedures

- Vessel

  - Not Regulated but fire fighting training for fire department



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## Manitowoc, WI

- Facilities (Fixed)

  - Need Zoning Permit & Planning Commission Approval (Code 15.350)

  - Conditional Use Building Permit (2009 Commercial Building Code)

  - Submit Transfer Procedures to Fire Chief

  - Comply with NFPA Standards

  - LNG fire fighting training

- Facility (Tank Truck)

  - Not Regulated: No Permit or City Council Approval

  - NFPA Standards/fire fighting training/transfer procedures

- Vessel

  - Not Regulated but fire fighting training for fire department



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## Supply Chain in Great Lakes

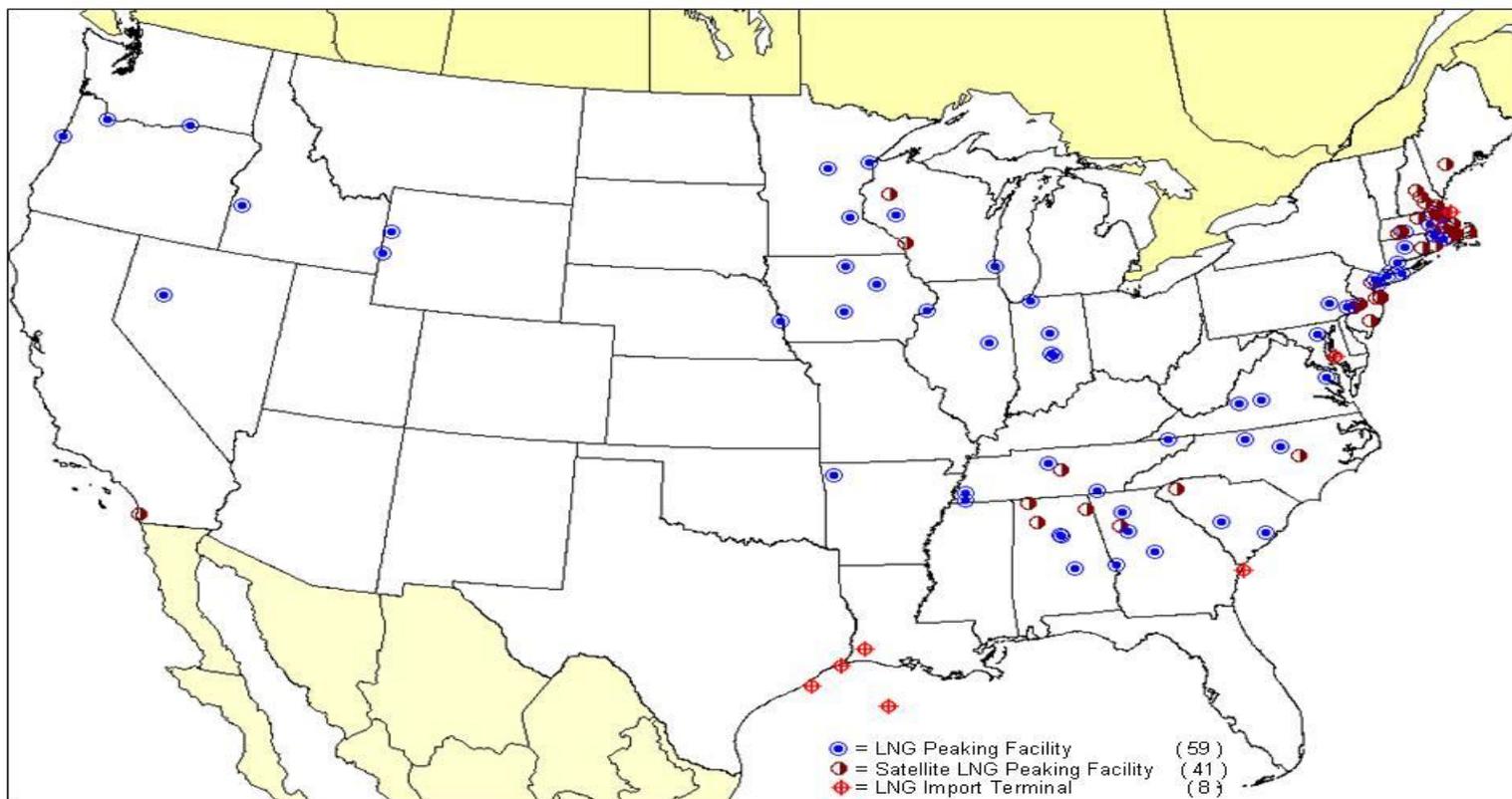
- Plentiful Natural Gas Supply
- Interest from companies to provide LNG
- LNG Peak Shaving facilities in the Great Lakes region
- Badger can be fueled by tank truck



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## U.S. LNG Peaking Shaving and Import Facilities, 2008



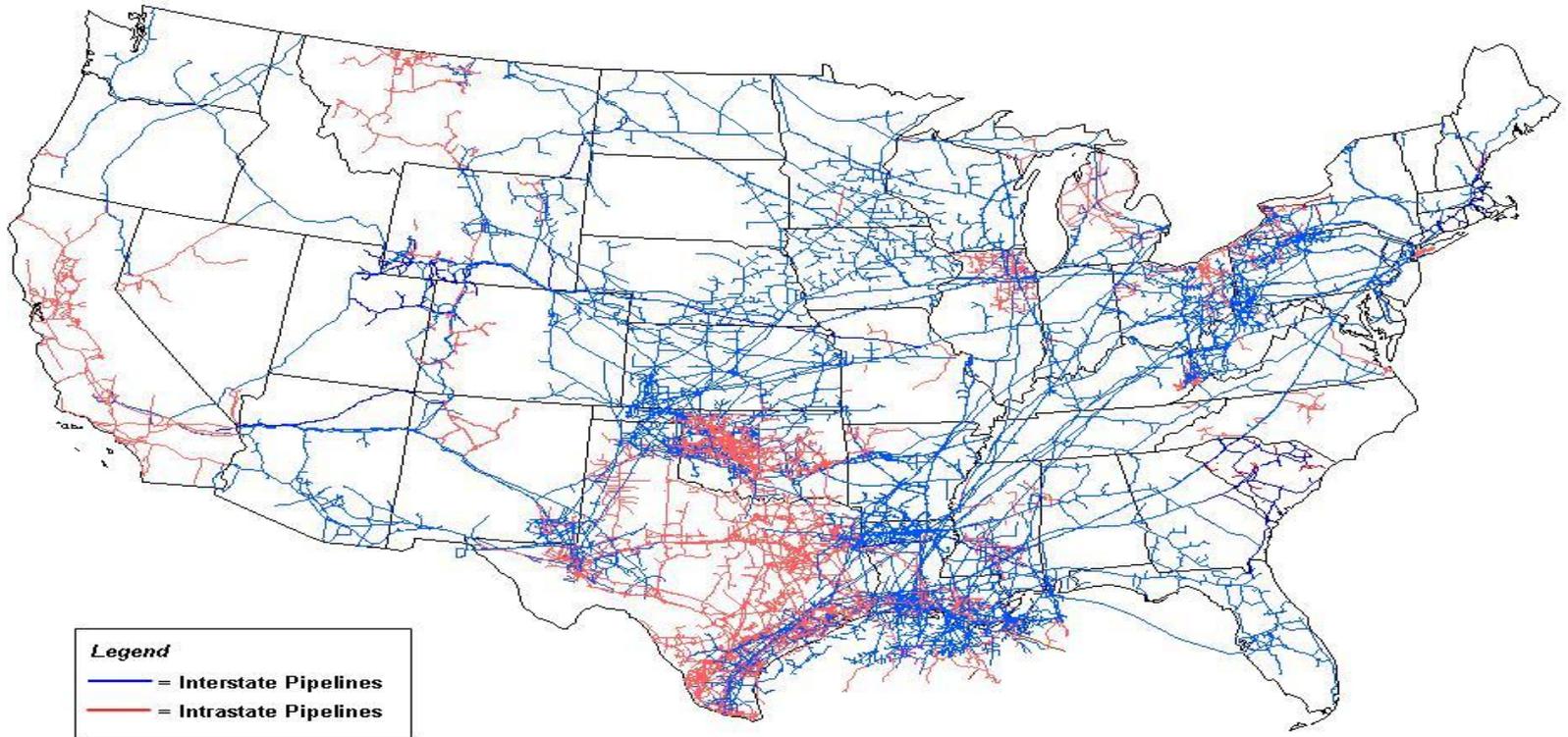
Note: Satellite LNG facilities have no liquefaction facilities. All supplies are transported to the site via tanker truck.  
Source: Energy Information Administration, Office of Oil & Gas, Natural Gas Division Gas, Gas Transportation Information System, December 2008.



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## U.S. Natural Gas Pipeline Network, 2009



Source: Energy Information Administration, Office of Oil & Gas, Natural Gas Division, Gas Transportation Information System



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## LNG Use In Norway

- Environmentally Driven
- Supply chain and availability of bunkering station in ports – a concern but increasing
- Significant Quantities of LNG
- 5 LNG production facilities in Norway
- Safe track record of LNG operations
- Norwegian government provides incentives for using LNG technology



## Norwegian LNG Regulations

- Det Norske Veritas (DNV) developed standards for LNG fueled vessels currently adopted by the Norwegian government and served as the basis for IMO Resolution MSC 285(86) (Interim Guidelines for Gas-Fuelled Engines on Ships)
- Non Classified Ships: DNV rules currently in force for gas-fueled engine installations
- LNG bunkering from shore to ship is regulated by the Directorate for Civil Protection and Emergency Planning (DSB).



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## NOx Fund

- Establishment of a private NOx fund
- Companies voluntarily contribute funds
- 85 percent of differential costs between the LNG and non-LNG engine plants can be recouped from the fund by companies who upgrade their technology with NOx reducing equipment.



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## NMA Recommendations

- Ensure good cooperation between government & industry
- Advertise as green solution
- Positive message to all stakeholders
- Incentive to industry and government



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## Roadblocks to Successful Implementation In the Great Lakes

- Stakeholder concern over LNG
- Cost to implement
- Delays in completing Federal, State and Local regulatory requirements
- Lack of LNG supply chain infrastructure
- Non support at Federal, State or Local level



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## Recommendations

### 1. Outreach

- Work closely with Federal, State and Local officials in planning and implementation (i.e., fueling procedures, fire fighting training, transfer requirements, licensing qualifications, etc)
- Develop an outreach plan to obtain buy-in and support from the local community
- Start the process sooner than later



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## Recommendations

### 2. LNG Facilities

- Continue to develop LNG supply chain in Ludington, Manitowoc and around the Great Lakes
- Create a phased-in approach: start out with LNG bunkering by tank truck and develop plans and obtain approvals/permits from applicable federal, state and local agencies for LNG storage tanks or liquefaction plants, if desired.

### 3. Vessels

- Work closely with the U.S. Coast Guard (Marine Safety Center and Sector Lake Michigan) to obtain plan approval for LNG conversion
- Implement Coast Guard mandates for transfer procedure requirement, training and licensing, when applicable.



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## **QUESTIONS?**