Wind & Solar Energy

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Holland Board of Public Works

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MPSC Background

- Michigan Public Service Commission
  - Three Governor-appointed Commissioners
  - Regulates rates for 15 investor-owned and cooperative (member owned) electric utilities
  - Regulatory responsibilities for distribution-level electric utility interconnections and the new Renewable Energy Standard (RPS) & net metering program

Public Act 295 of 2008

- Wind Energy Resource Zones
- 10% renewable energy standard (RPS) by 2015, with interim steps for 2012-13-14.

CLEAN, RENEWABLE, AND EFFICIENT ENERGY ACT
Act 295 of 2008

AN ACT to require certain providers of electric service to establish renewable energy programs; to require certain providers of electric or natural gas service to establish energy optimization programs; to authorize the use of certain energy systems to meet the requirements of those programs; to provide for the approval of energy optimization service companies; to provide for certain charges on electric and natural gas bills; to promote energy conservation by state agencies and the public; to create a wind energy resource zone board and provide for its power and duties; to authorize the creation and implementation of wind energy resource zones; to provide for expedited transmission line siting certificates; to provide for a net metering program and the responsibilities of certain providers of electric service and customers with respect to net metering; to provide for fees; to prescribe the powers and duties of certain state agencies and officials; to require the promulgation of rules and the issuance of orders; and to provide for civil sanctions, remedies, and penalties.

History: 2008, Act 295, Imd. Eff. Oct. 6, 2008.

Compiler's note: Enacting section 1 of Act 295 of 2008 provides: "Enacting section 1. As provided in section 5 of 1846 RS 1, MCL 8.5, this act is severable."

The People of the State of Michigan enact:

PART 1.
GENERAL PROVISIONS

460.1001 Short title; purpose of act.

Sec. 1. (1) This act shall be known and may be cited as the "clean, renewable, and efficient energy act".

(2) The purpose of this act is to promote the development of clean energy, renewable energy, and energy optimization through the implementation of a clean, renewable, and energy efficient standard that will cost-effectively do all of the following:

(a) Diversify the resources used to reliably meet the energy needs of consumers in this state.

(b) Provide greater energy security through the use of indigenous energy resources available within the state.

(c) Encourage private investment in renewable energy and energy efficiency.

(d) Provide improved air quality and other benefits to energy consumers and citizens of this state.

History: 2008, Act 295, Imd. Eff. Oct. 6, 2008.

Compiler's note: Enacting section 1 of Act 295 of 2008 provides: "Enacting section 1. As provided in section 5 of 1846 RS 1, MCL 8.5, this act is severable."

460.1003 Definitions; A to C.

Sec. 3. As used in this act:

(a) "Advanced cleaner energy" means electricity generated using an advanced cleaner energy system.

(b) "Advanced cleaner energy credit" means a credit certified under section 43 that represents generated advanced cleaner energy.

(c) "Advanced cleaner energy system" means any of the following:

(*i*) A gasification facility.

(*ii*) An industrial cogeneration facility.

(*iii*) A coal-fired electric generating facility if 85% or more of the carbon dioxide emissions are captured and permanently geologically sequestered.

(*iv*) An electric generating facility or system that uses technologies not in commercial operation on the effective date of this act.

(d) "Affiliated transmission company" means that term as defined in the electric transmission line certification act, 1995 PA 30, MCL 460.562.

(e) "Applicable regional transmission organization" means a nonprofit, member-based organization governed by an independent board of directors that serves as the federal energy regulatory commission-approved regional transmission organization with oversight responsibility for the region that includes the provider's service territory.

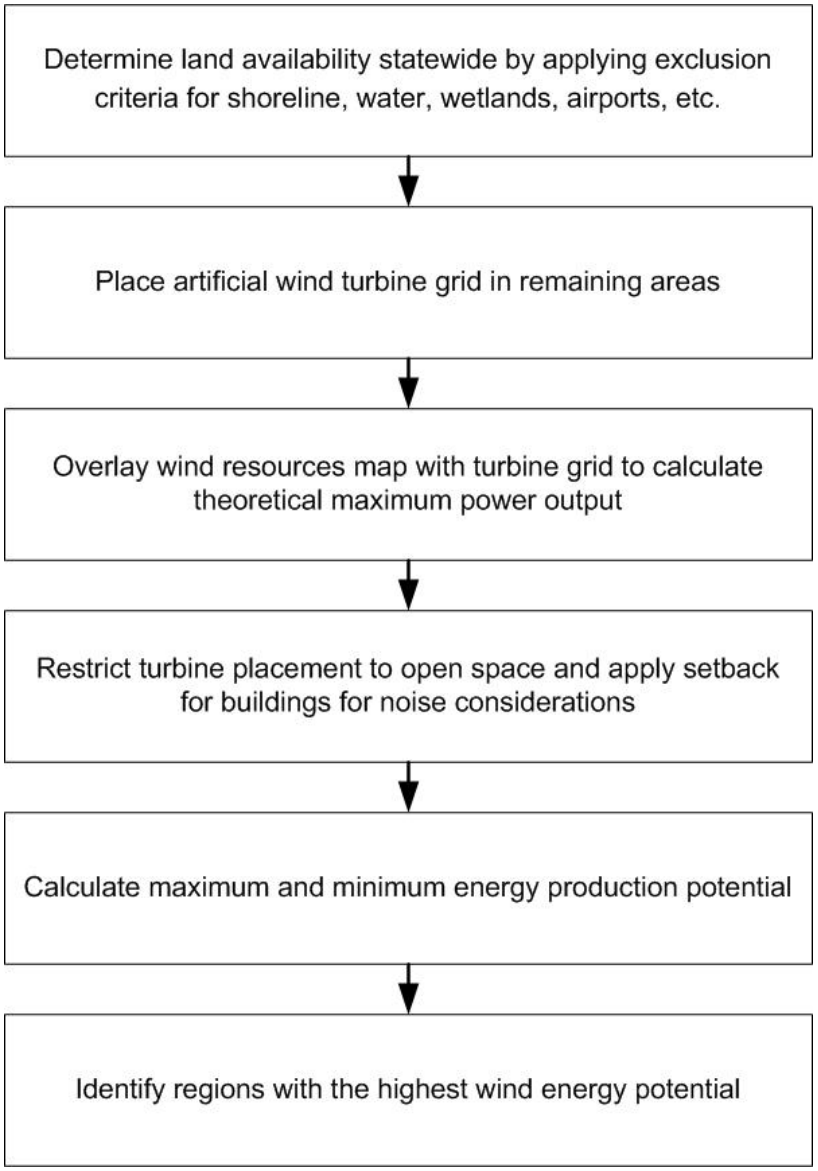
(f) "Biomass" means any organic matter that is not derived from fossil fuels, that can be converted to usable fuel for the production of energy, and that replenishes over a human, not a geological, time frame, including, but not limited to, all of the following:

(*i*) Agricultural crops and crop wastes.

Wind Energy Resource Zones

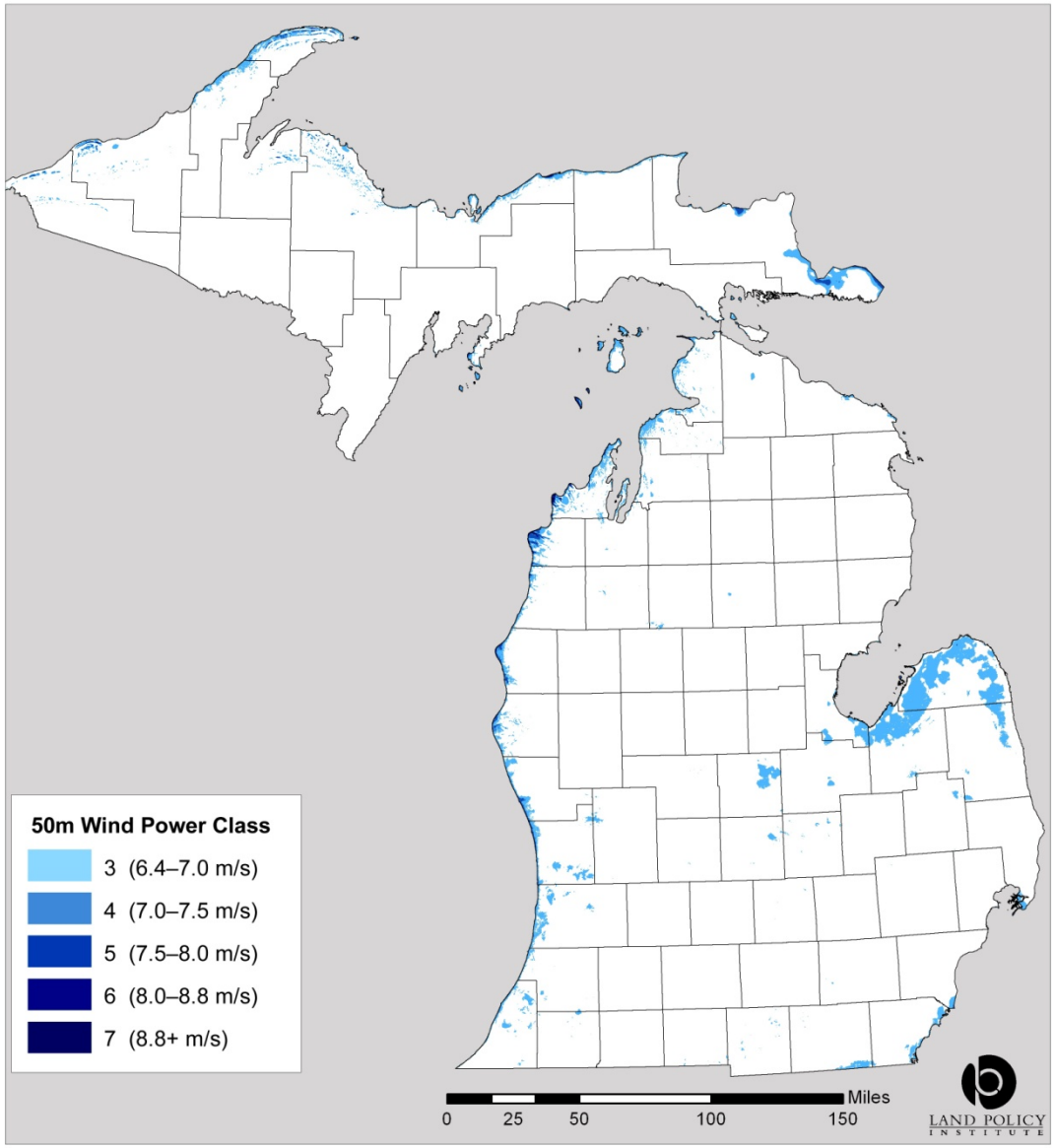
- The Commission established an 11-member Board
- Primary responsibility to identify the regions of the state with the highest wind energy potential
- Board performed a high level statewide wind potential study
- 2009 Final Report: www.michigan.gov/windboard

Methodology Overview



SOURCE: Public Sector Consultants Inc., 2009, using information from MSU Land Policy Institute, 2009, prepared for WERZ Board.

Class 3 or Higher Areas at 50 Meters



SOURCE: Map by MSU Land Policy Institute, 2009, prepared for WERZ Board, using data from AWS TrueWind and the U.S. DOE National Renewable Energy Laboratory (NREL).
NOTE: Legend uses wind power classification speeds specified by NREL.

Allegan County Wind Zone

County	Townships
Allegan	Casco (6), Clyde (5), Fillmore (2), Ganges (4), Laketown (1), Lee (7), and Manlius (3)

Michigan Wind Energy Resource Zones

Wind Regions Summary

		Minimum			Maximum		
Region	Counties	Number of turbines	Capacity (MW)	Annual energy potential (MWh)	Number of turbines	Capacity (MW)	Annual energy potential (MWh)
1	Allegan	166	249	747,938	296	445	1,338,415
2	Antrim Charlevoix	102	153	439,555	183	274	786,572
3	Benzie Leelanau Manistee	435	652	1,991,679	778	1,167	3,564,058
4	Huron Bay Saginaw Sanilac Tuscola	1,578	2,367	6,723,472	2,824	4,236	12,031,477
TOTAL		**2,281**	**3,421**	**9,902,644**	**4,081**	**6,122**	**17,720,522**

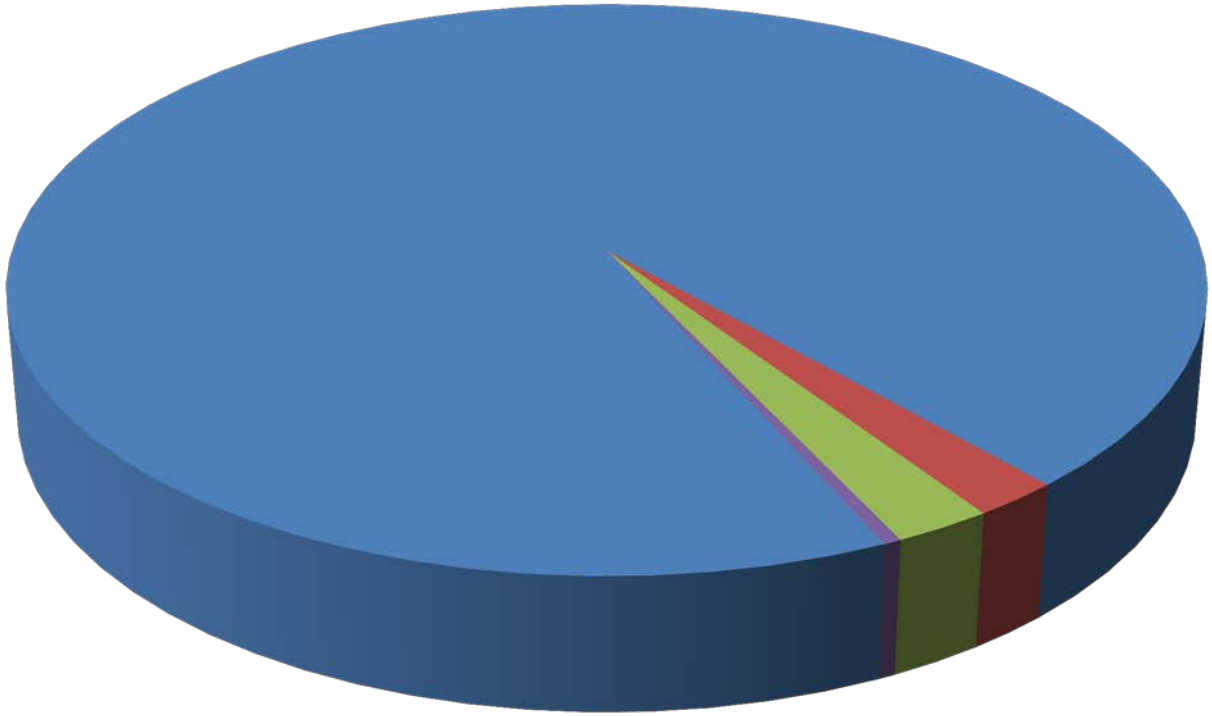
SOURCE: Research and findings from Michigan State University Land Policy Institute, 2009, prepared for WERZ Board.

Renewable Energy Plans

- All 76 of Michigan's electric providers have developed 20-year Renewable Energy Plans describing how the renewable energy standard will be achieved.
- Holland's plan includes the following renewable energy sources:
  - Wood-Burning Biomass
  - Landfill Gas
  - Possibly Wind Energy

Renewable Energy Implementation

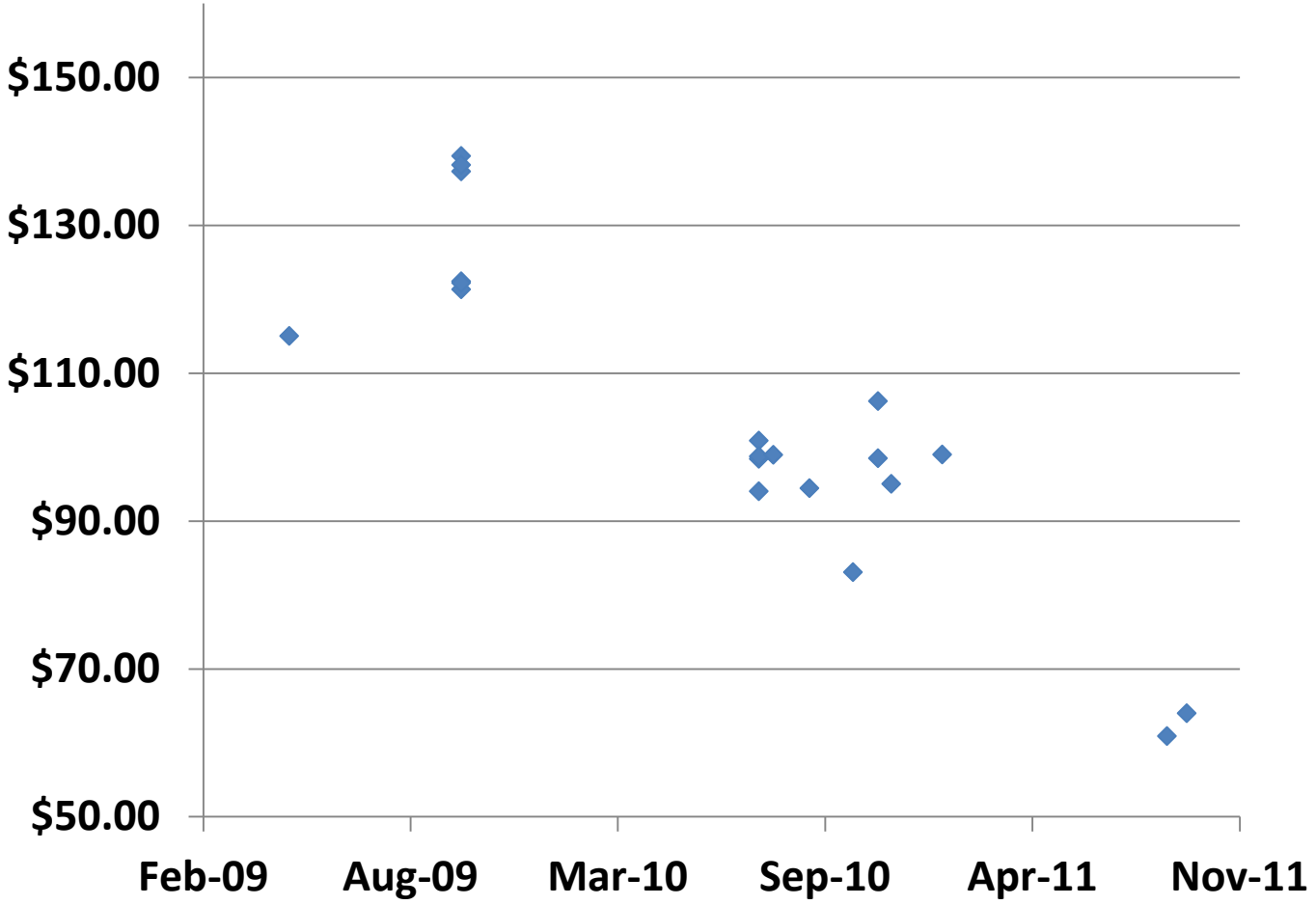
New Capacity (MW) by Technology to meet RPS



*As approved in contracts by the MPSC as of 9/30/11

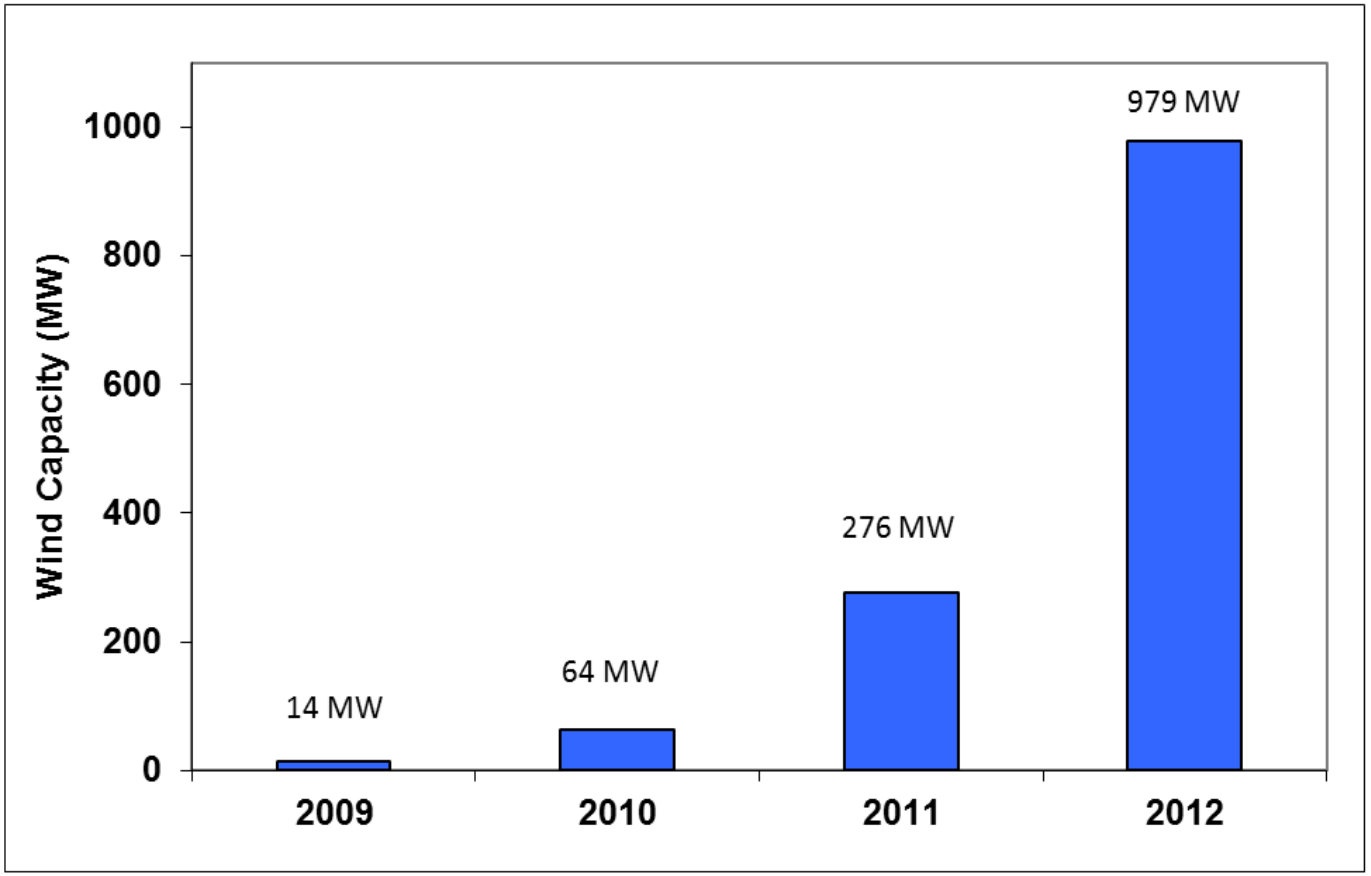
All MW expected to be operational by 12/31/12

Levelized Cost ($/MWh) of MPSC Approved Renewable Energy Contracts Over Time

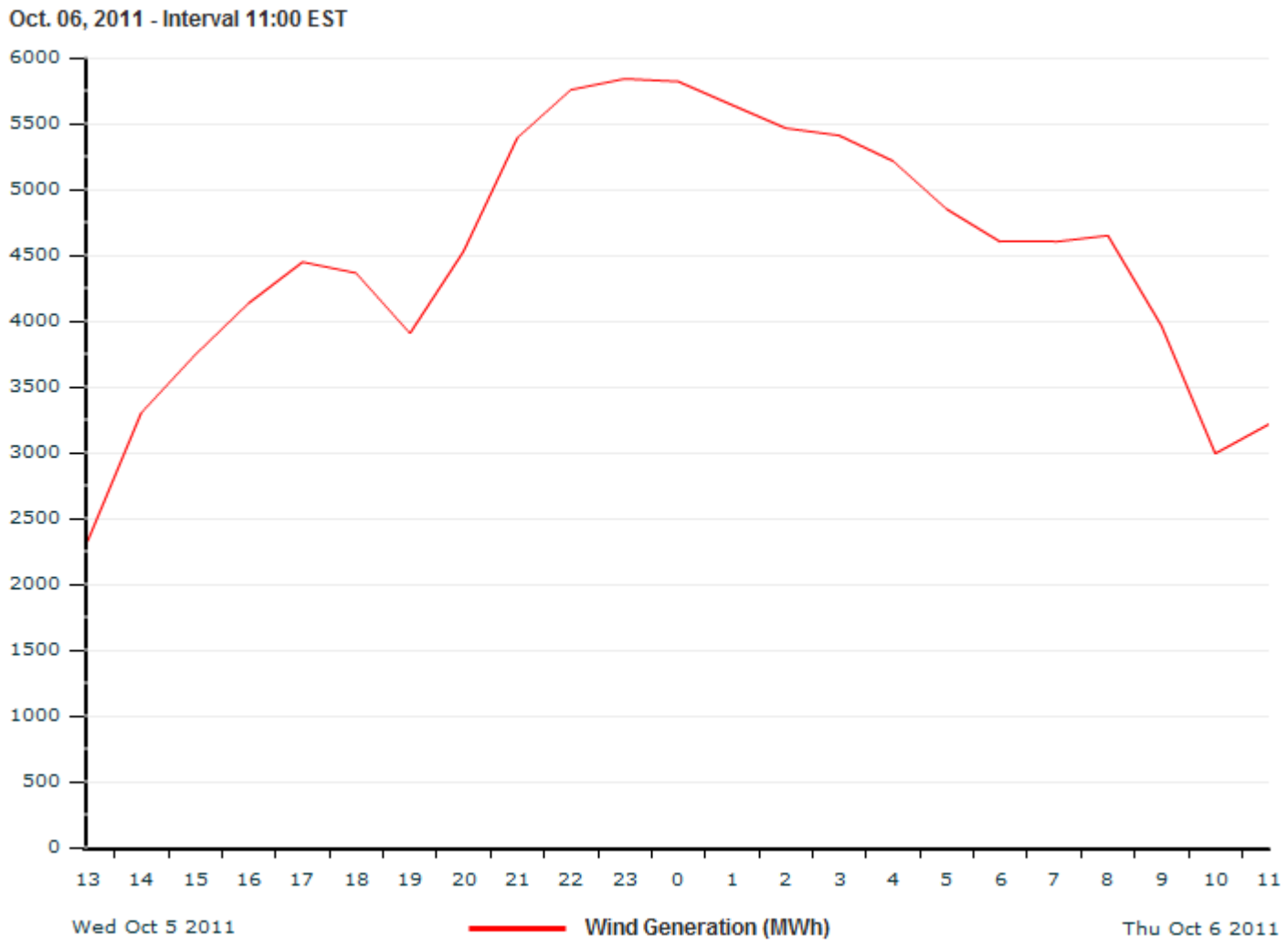


Wind Energy

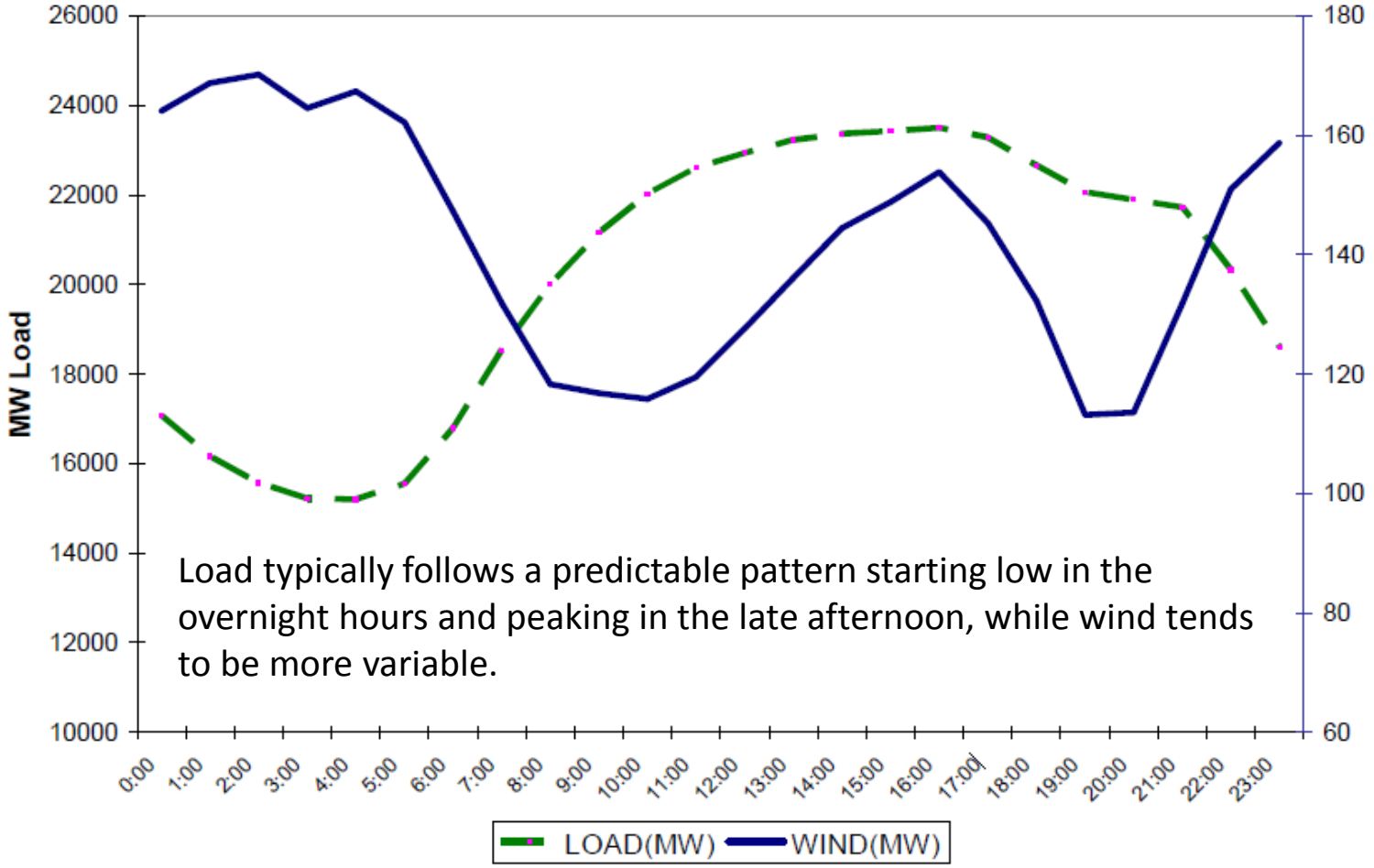
Cumulative New Wind Capacity



MISO Wind Generation



Wind Generation Intermittency



Load typically follows a predictable pattern starting low in the overnight hours and peaking in the late afternoon, while wind tends to be more variable.

: Average Hourly Wind vs. Load Profile in New York, June 2008

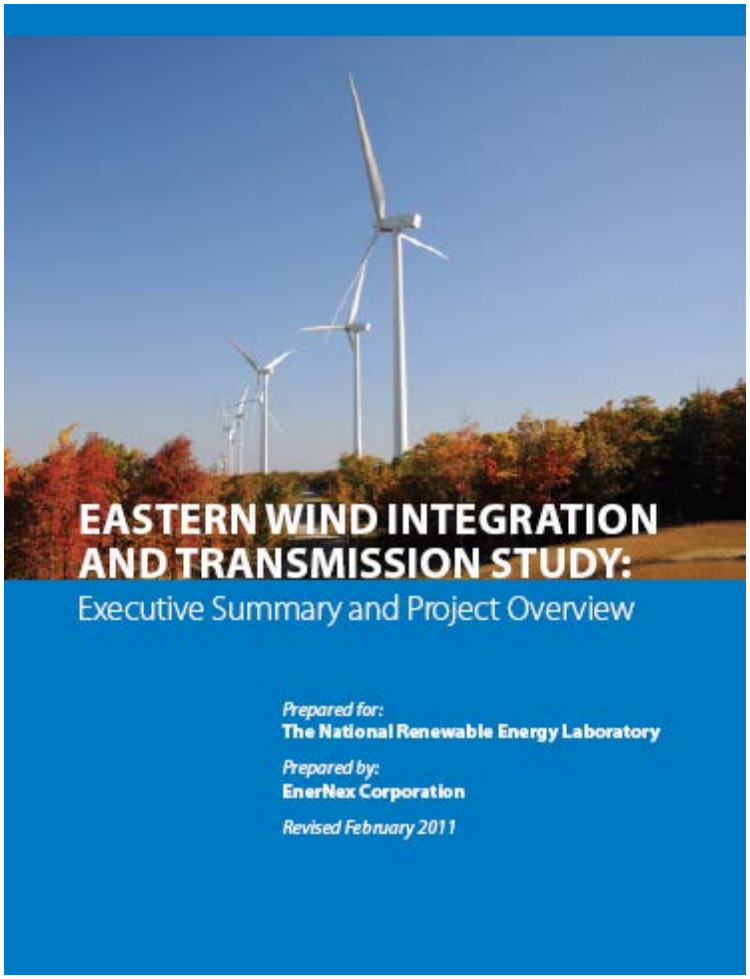
Integrating Wind Generation

- Market Purchases
- Energy Storage
  - Pumped Hydro (Ludington), emerging battery technologies, future electric vehicles all have the potential to be used to produce when the wind isn’t blowing.
- Diversified portfolio of resources
  - Solar, biomass, hydro and other renewable generation in addition to traditional fossil generation have the potential to be used when the wind isn’t blowing.

Improving the Integration of Wind Generation

- EWITS – Eastern Wind Integration & Transmission Study issued by NREL in 2010
  - Wind Resource Modeling
  - Transmission Analysis
  - Integration Analysis:
    - Evaluate operating and reliability impacts of 20% and 30% wind
    - Calculate costs and identify issues for 20% and 30% wind
    - Identify how other generation sources are affected

http://www.nrel.gov/wind/systemsintegration/ewits.html



Improving the Integration of Wind Generation

- ERGIS – Eastern Renewable Generation Integration Study initiated by NREL, September 2011.
  - Objectives
    - Explore grid planning and operations with significant renewable generation in an uncertain future.
    - Build on earlier studies, such as EWITS, ask new questions, examine stakeholder concerns.
  - Study expected to take 18 months

http://wind.nrel.gov/public/ergis/

Wind as a Fuel Source

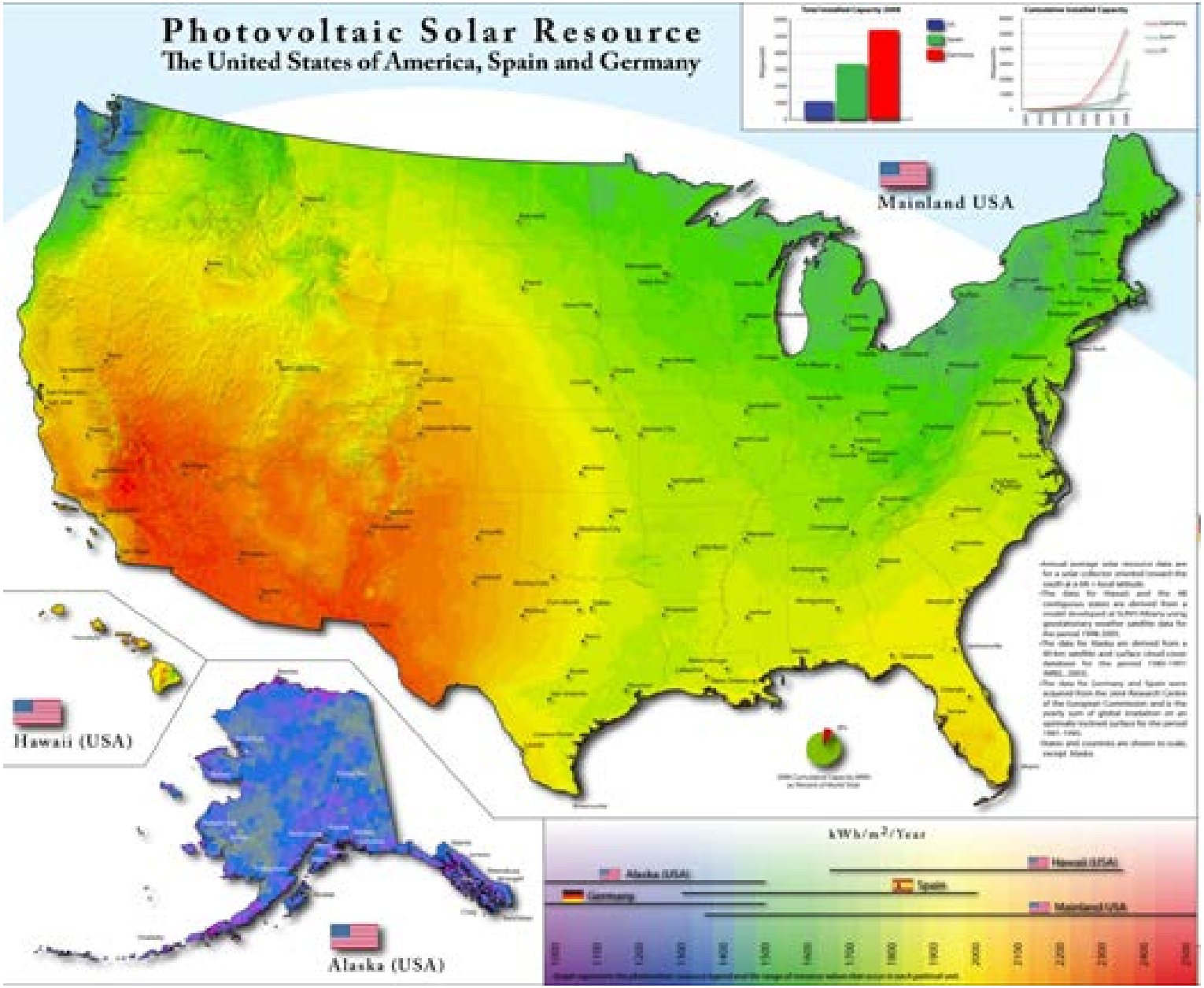
- Wind is a renewable fuel that may be used to meet the State RPS
- Price stability - wind is a zero cost fuel
- Zero emissions during generation
- Costs are continuing to decrease
- Short lead time to construct

- Wind generation is ***intermittent***
- Siting issues

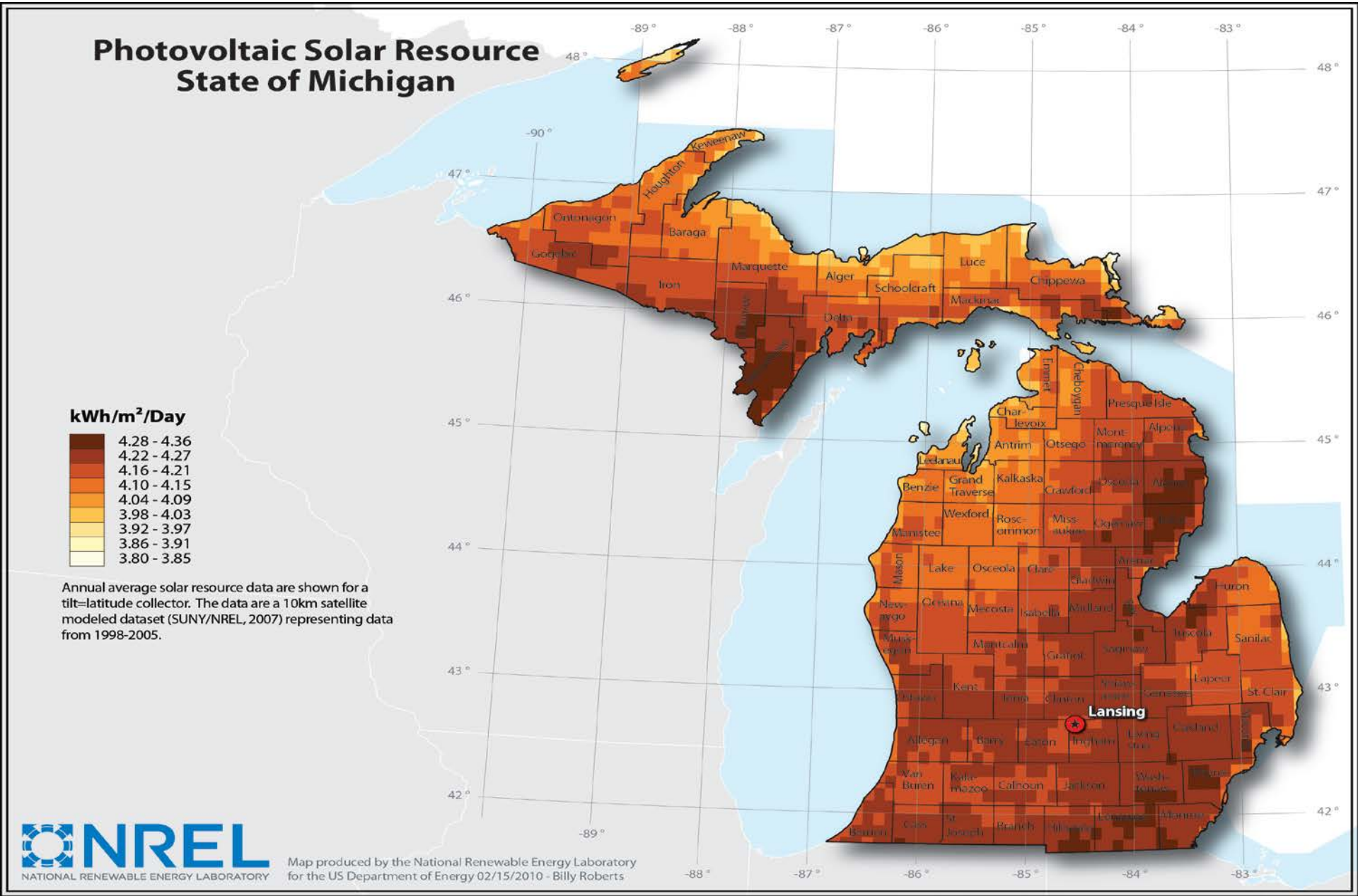
Solar Energy

Solar in Michigan

- Consumers Energy – 5 MW Solar
  - Customer program prices paid were initially 65 – 37 cents/kWh, now in the mid-20 cent range
- Detroit Edison – 20 MW Solar
  - Real Time Generation Info @ https://wap.load-watch.com/apps/solar/aggregate/
    Prices paid are approximately 30 cents/kWh
- Lansing Board of Water and Light – 55 kW

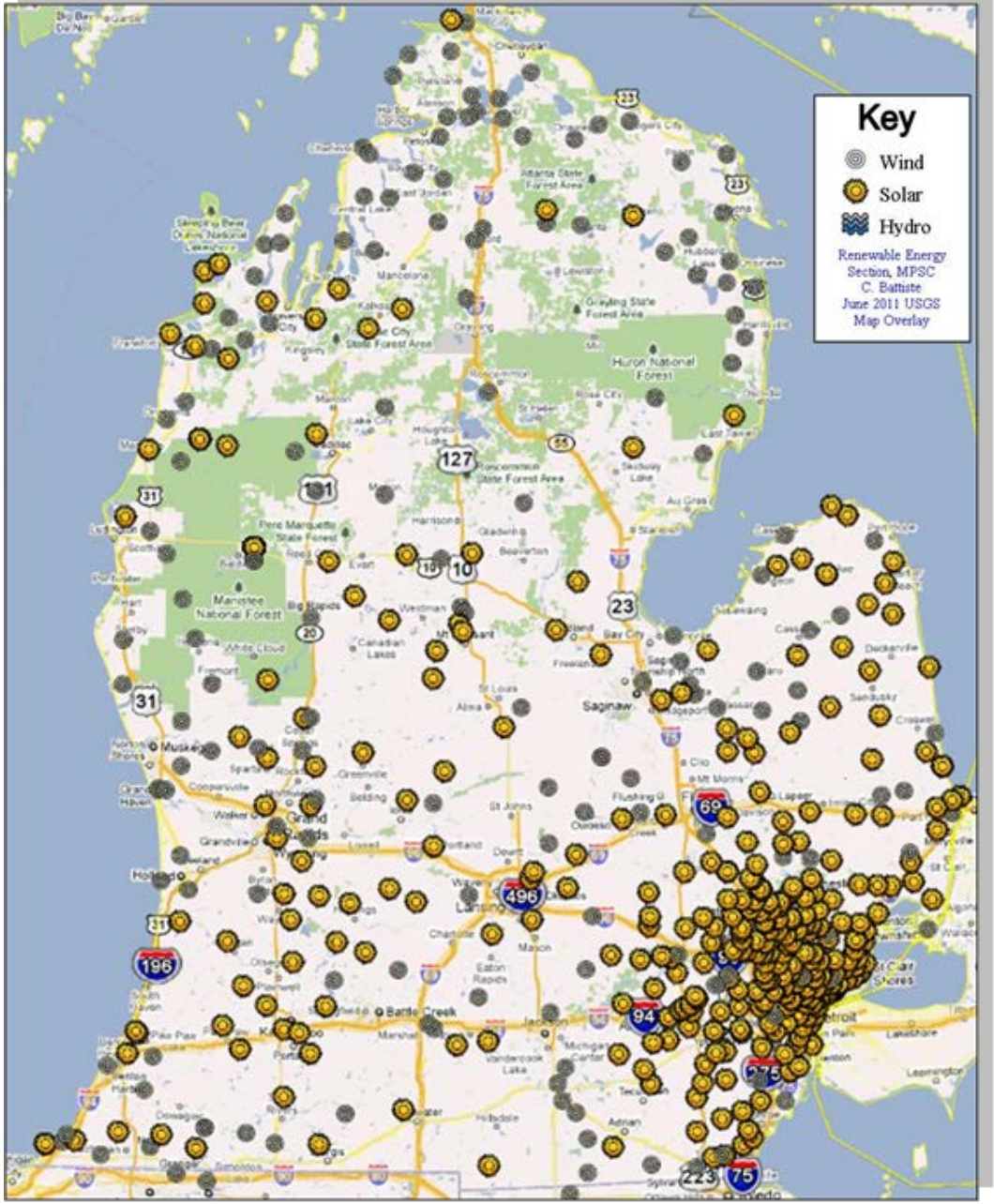

Photovoltaic Solar Resource
The United States of America, Spain and Germany
Mainland USA
Hawaii (USA)
Alaska (USA)
kWh/m²/Year
Alaska (USA)
Germany
Spain
Hawaii (USA)
Mainland USA

Statewide Solar Resource Uniformity

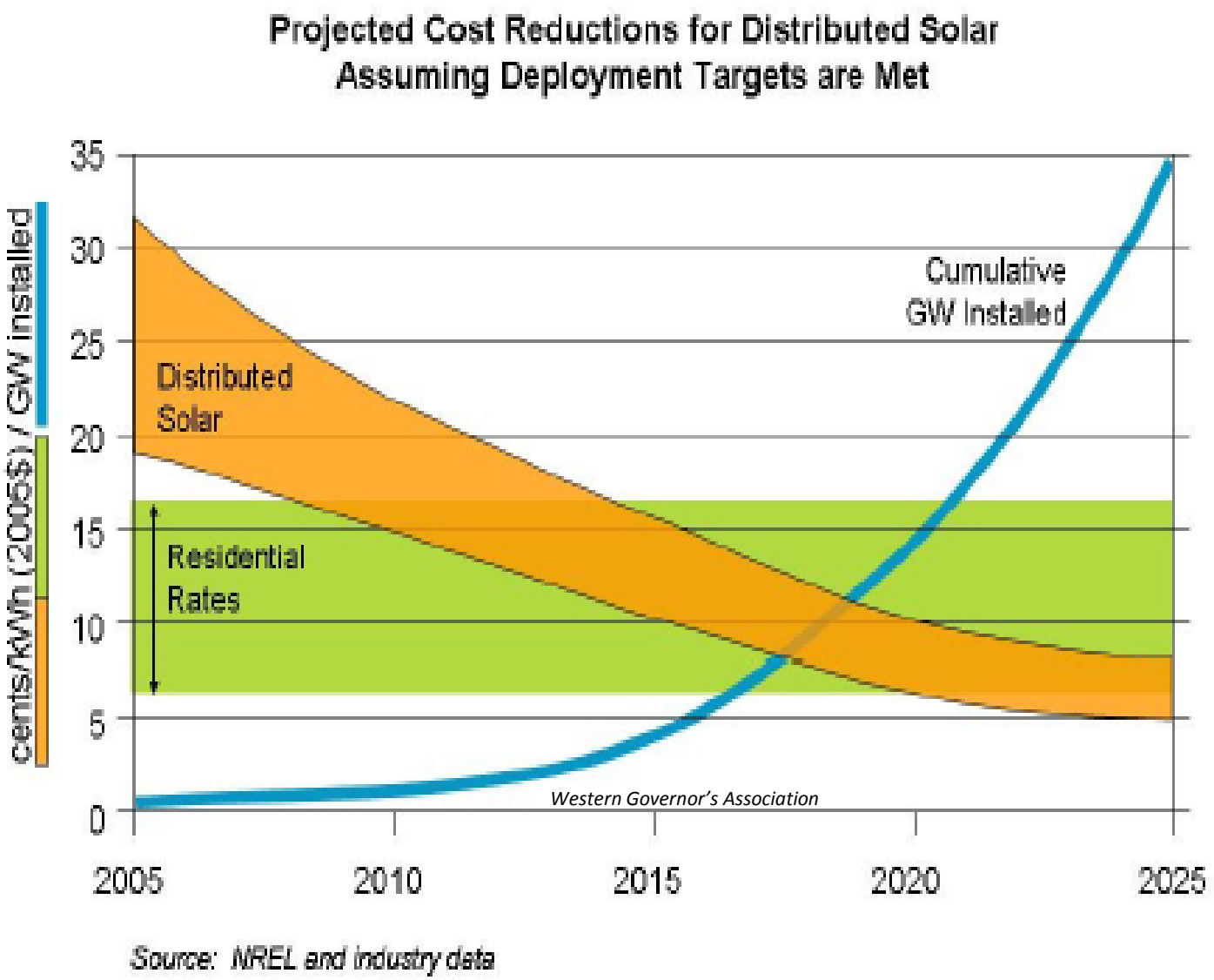


Locations of Michigan Net Metering Customers

(Yellow Dots Represent Solar Installations)



Increased demand for PV reduces cost



Solar as a Fuel Source

- Solar is a renewable fuel that may be used to meet the State RPS
- Price stability - Solar is a zero cost fuel
- Zero emissions during generation
- Solar is more likely to be available during times of high electricity usage
- Costs are continuing to decrease
- Low operation and maintenance costs

- Solar generation is ***intermittent***
- Solar generation is more costly than other alternatives

Questions?

www.michigan.gov/mpsc

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