

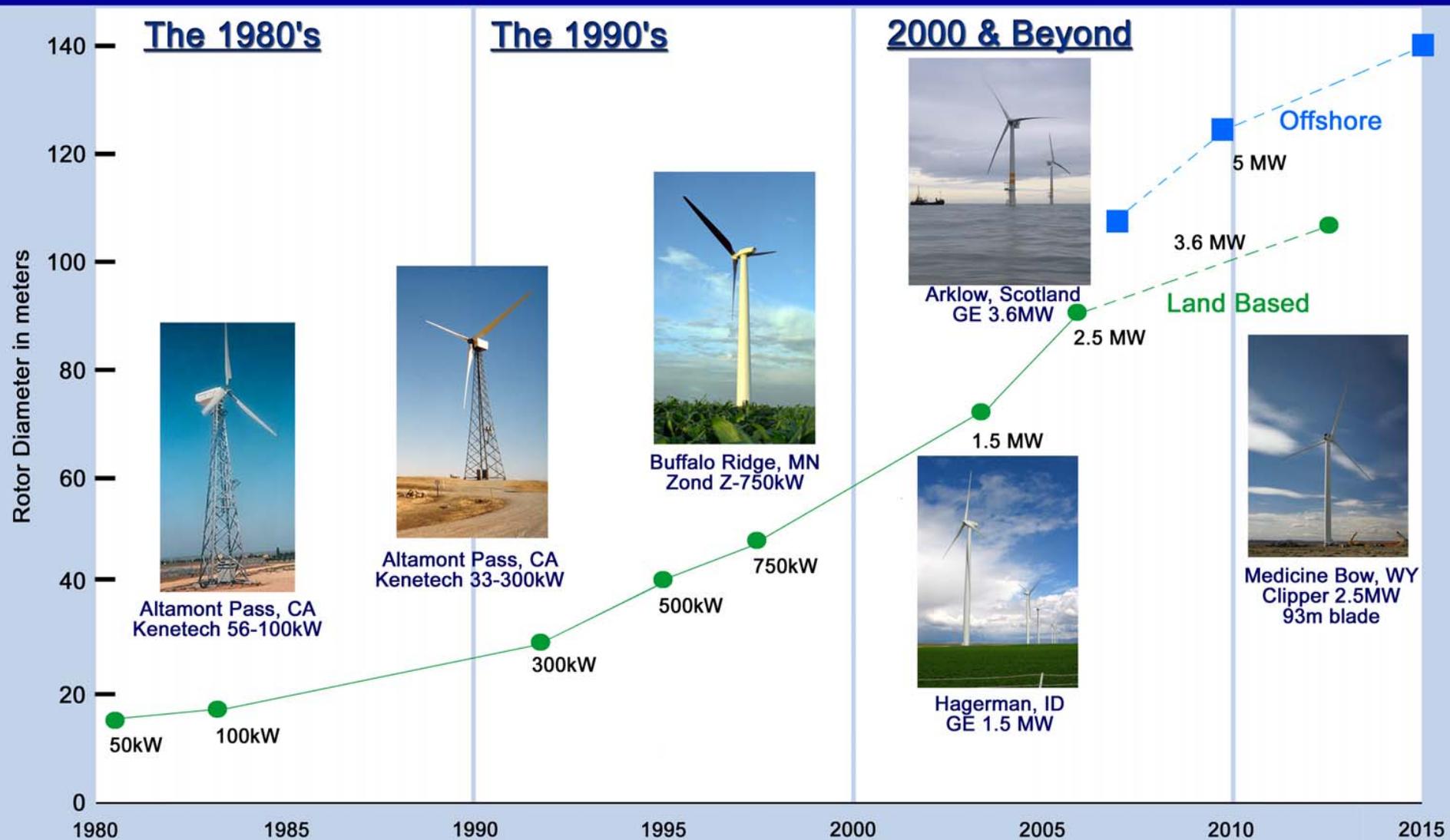
# Wind Powering Michigan



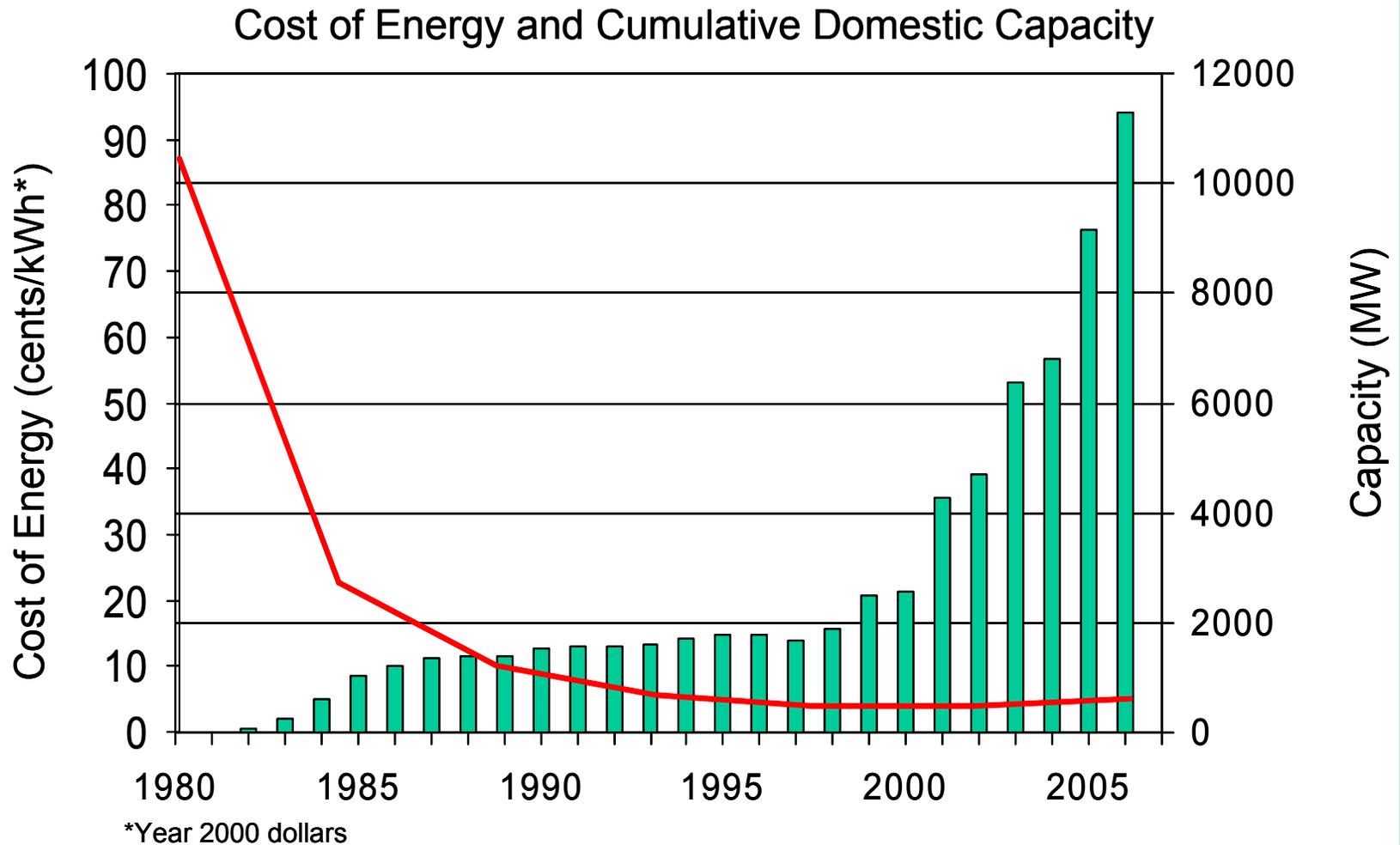
# Topics Today

- Background
- Michigan Wind Potential
- Benefits from Wind Power
- Tour of Michigan Installations
- Policy Issues
- Grants
- Siting Issues
- Information Resources

# Evolution of U.S. Commercial Wind Technology



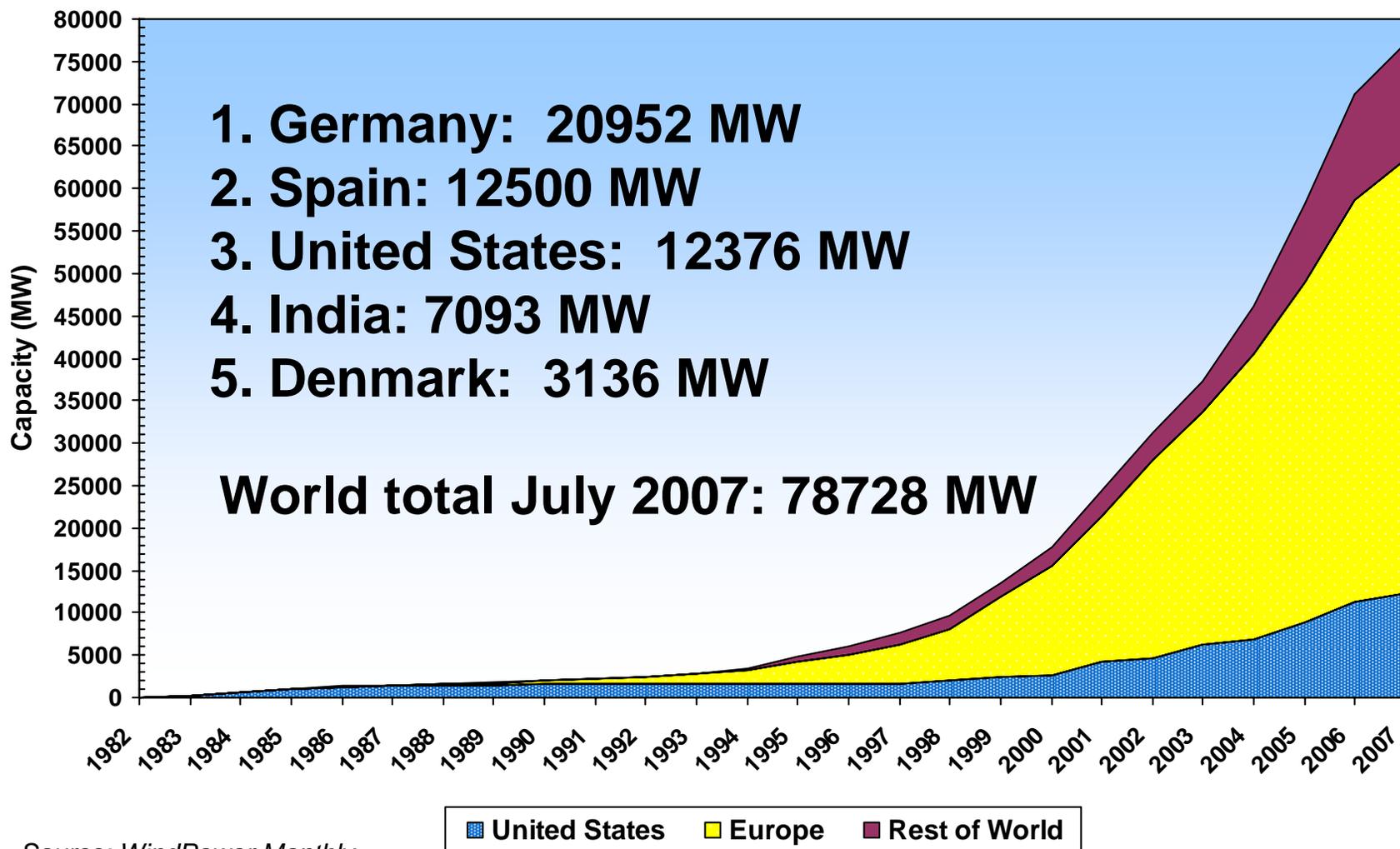
# Capacity & Cost Trends



Increased Turbine Size - R&D Advances - Manufacturing Improvements

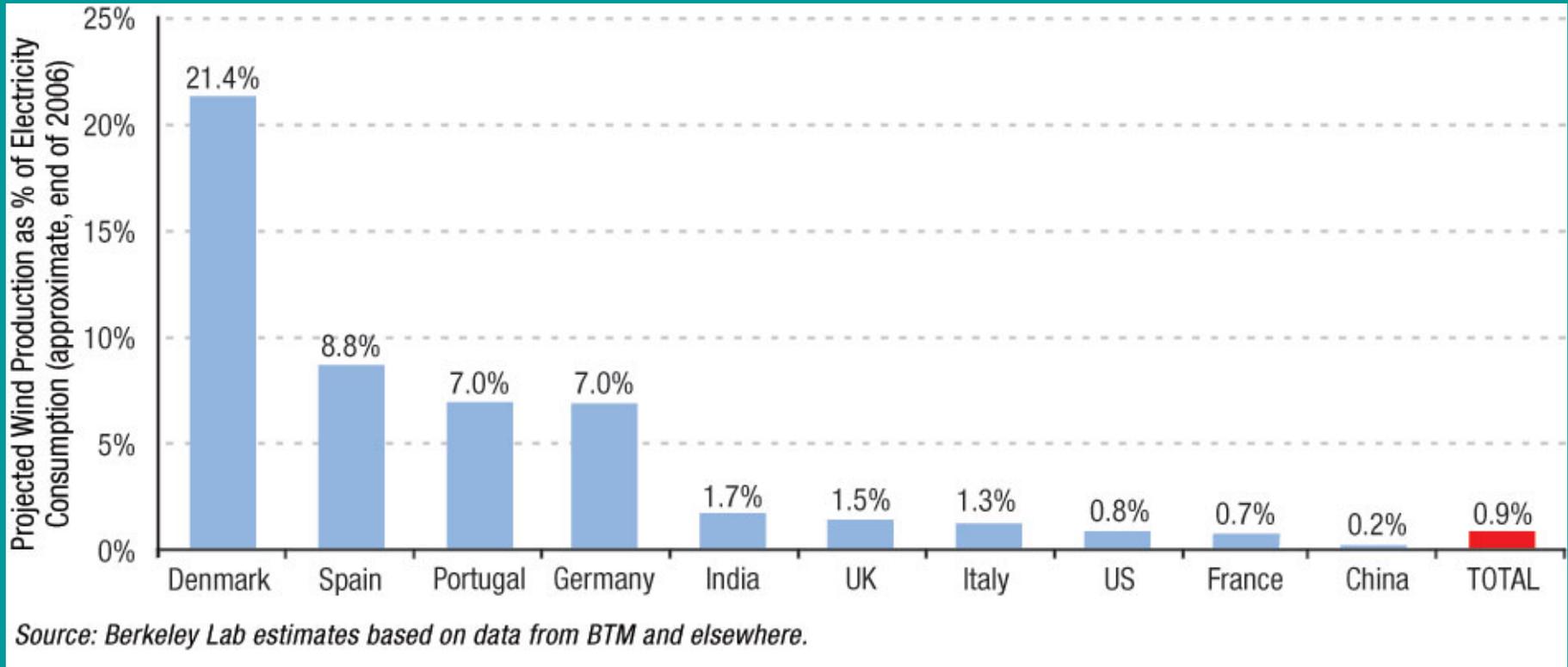
# World View

## Total Installed Wind Capacity

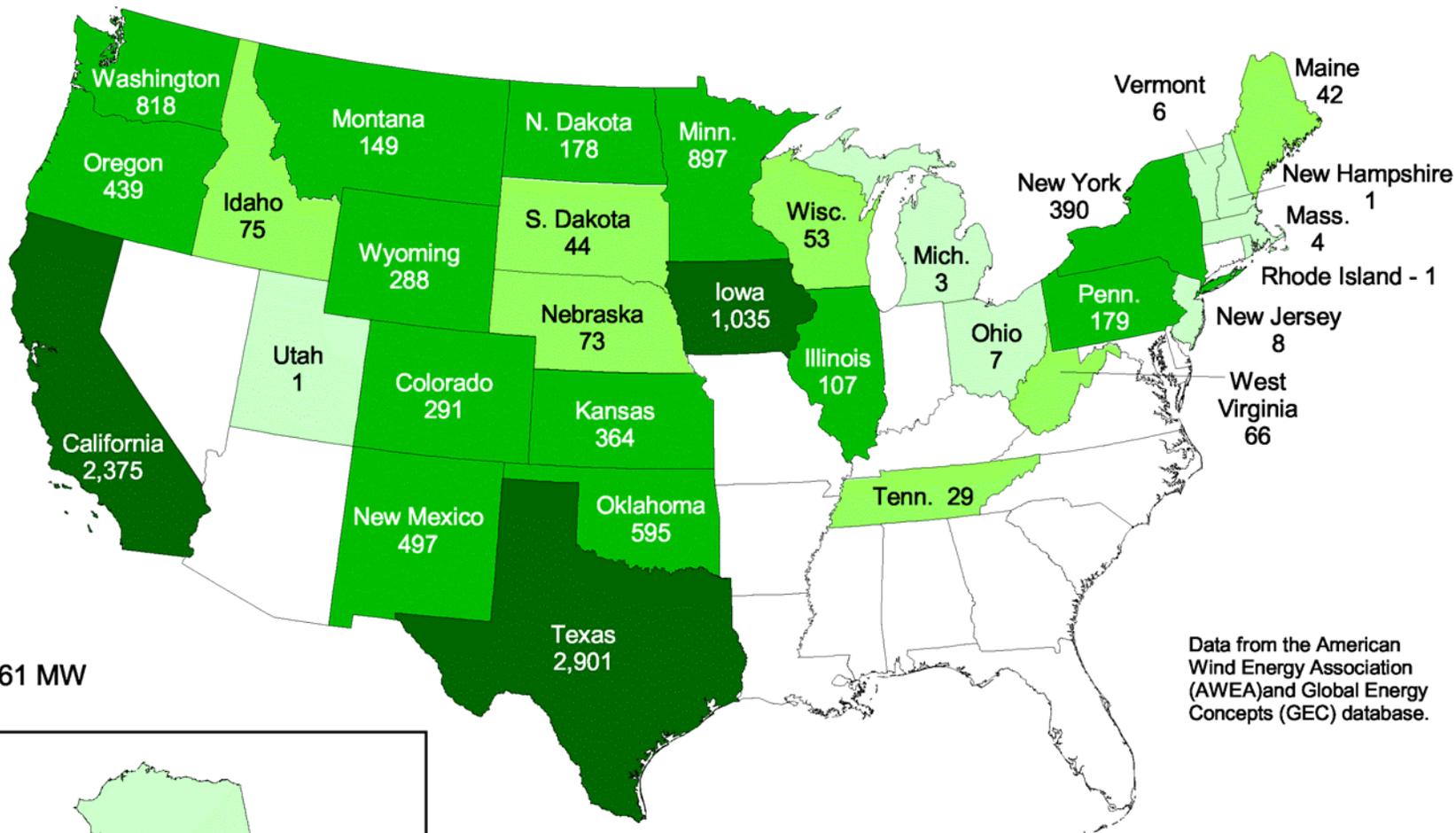


Source: WindPower Monthly

# U.S Lagging Wind % of Electricity Consumption

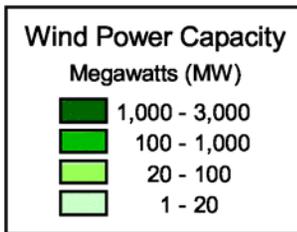
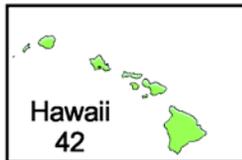


# United States - Current Installed Wind Power Capacity (MW)



Total: 11,961 MW  
(As of 5/31/07)

Data from the American Wind Energy Association (AWEA) and Global Energy Concepts (GEC) database.



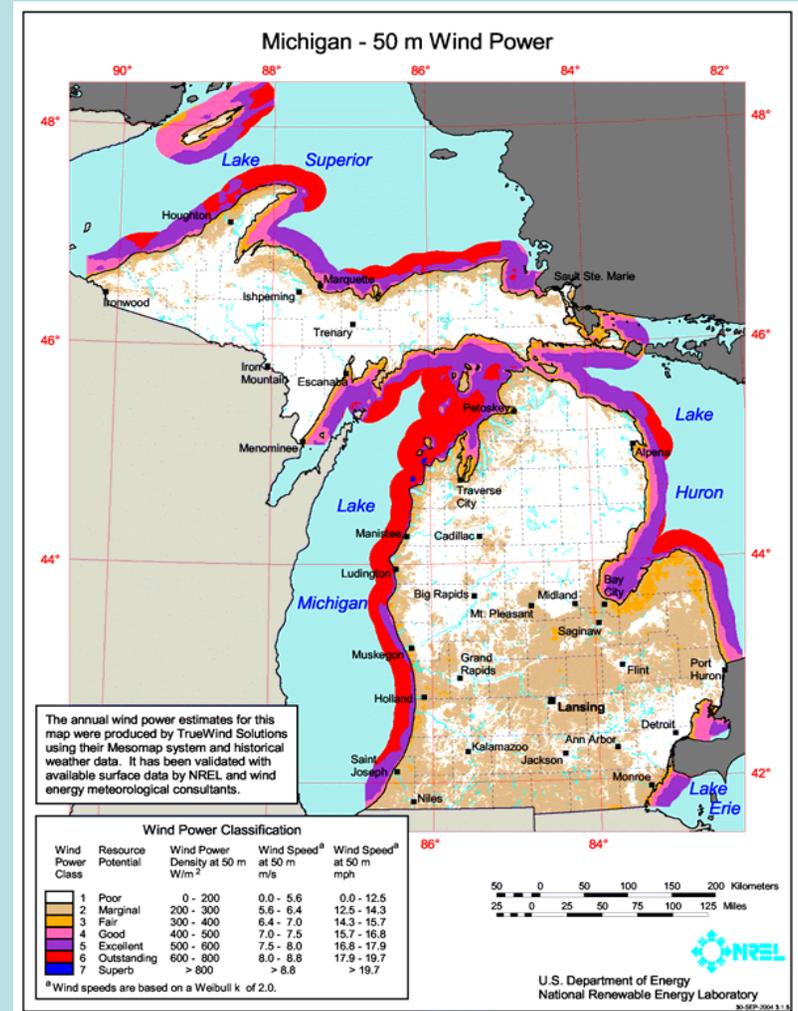
U.S. Department of Energy  
National Renewable Energy Laboratory



27-JUN-2007 1.1.23

# Great Lakes, Great Winds

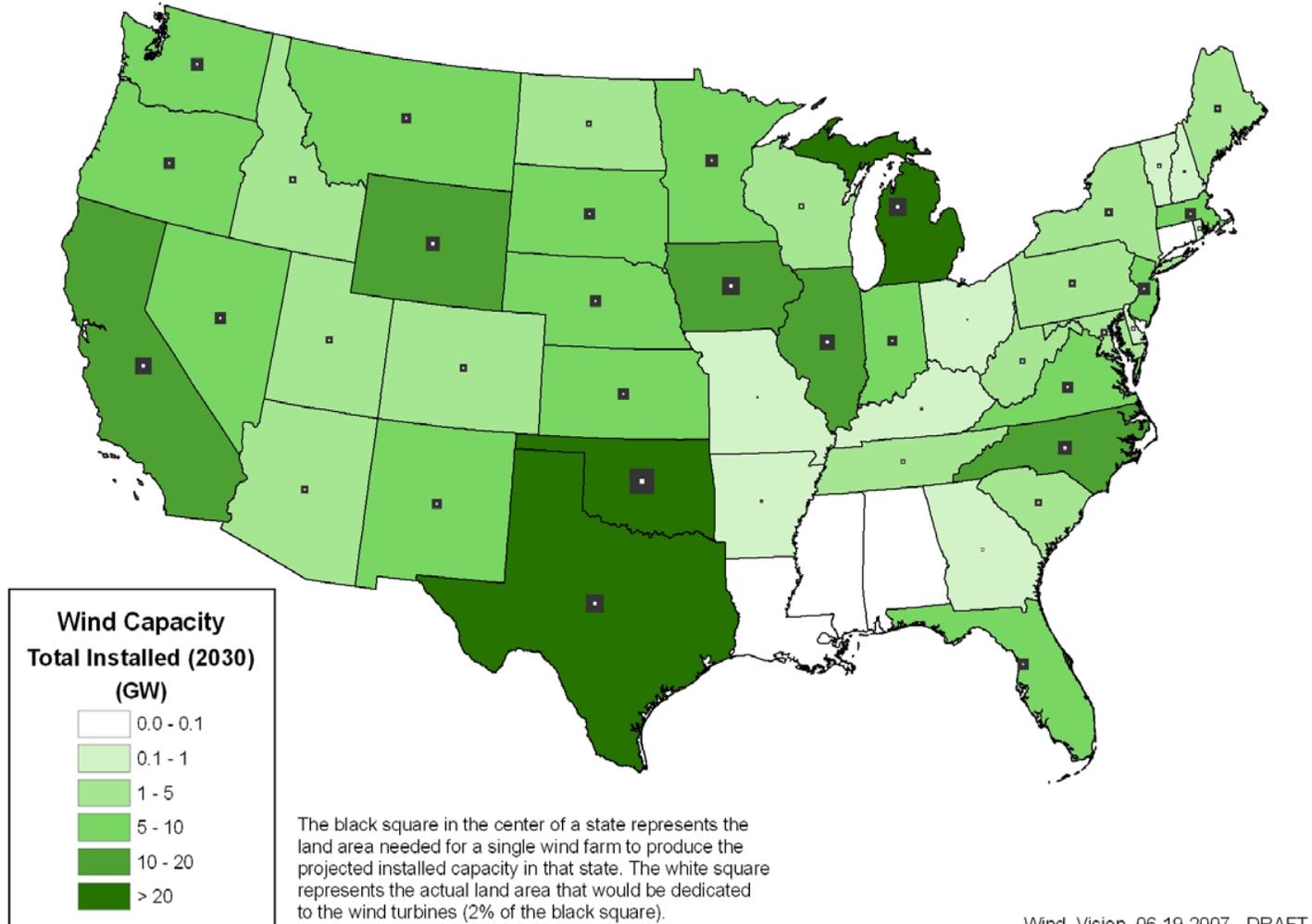
- Now – 55.5 MW
- Includes Harvest Wind Farm – 52.8
- On-Shore Potential 16,564 MW
- Off-Shore Potential 44,876 MW



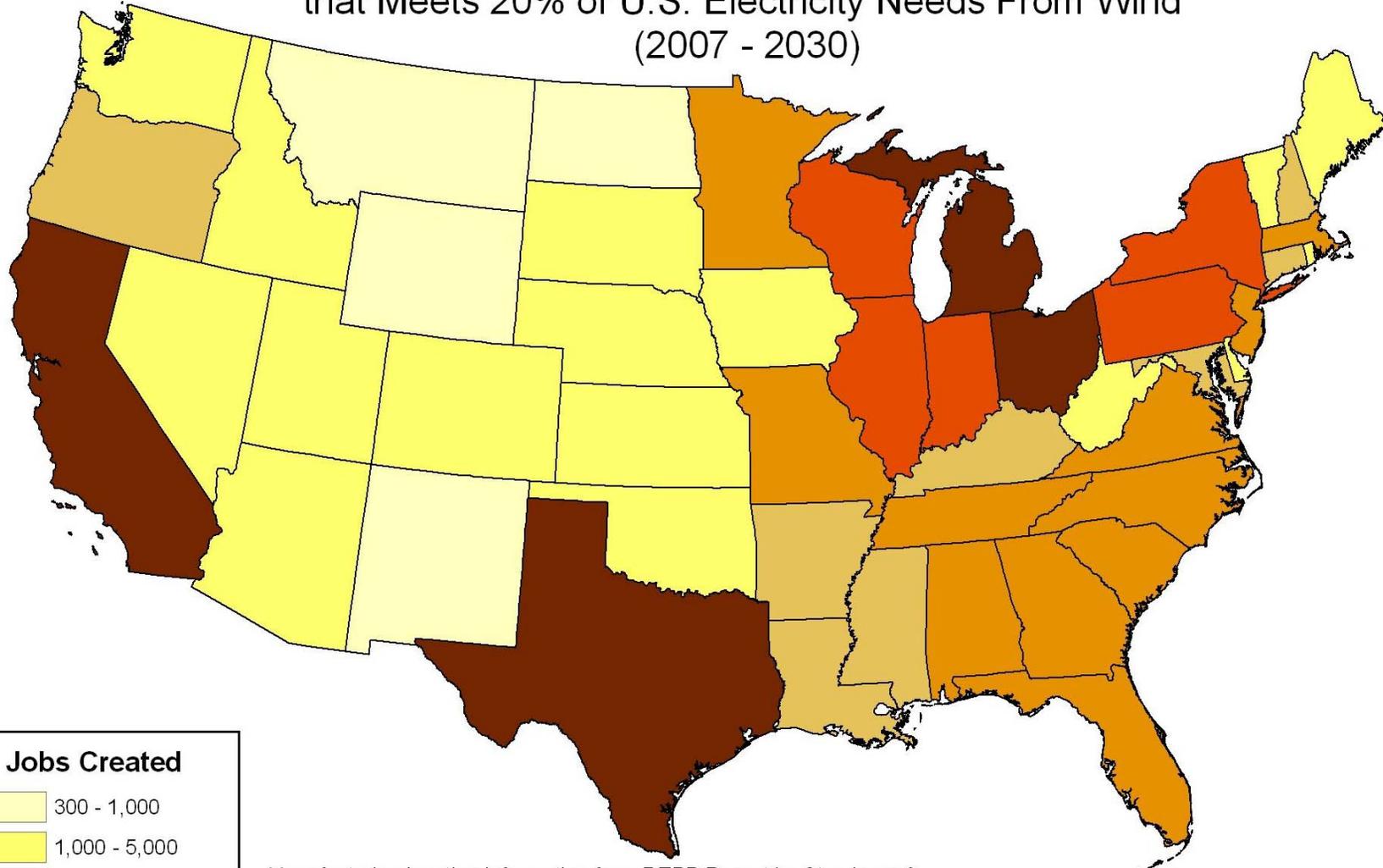
# 20% Wind Vision

## 20% of U.S. Electricity by 2030

Installed Wind Nameplate Capacity by State (2030)



# Total Cumulative Manufacturing Jobs Created by Scenario that Meets 20% of U.S. Electricity Needs From Wind (2007 - 2030)



## Jobs Created



Manufacturing location information from REPP Report by Sterzinger & Svrcek (2004)

Major component assumptions: 50% of blades are manufactured in U.S. in 2004 increasing to 80% in 2030, 26% of towers are from the U.S. in 2004 increasing to 50% in 2030 and 20% of turbines are made in the U.S. increasing to 42% by 2030.

# 20% Vision Conclusions

- 20% wind energy penetration is possible
- 20% penetration is not going to happen under business as usual scenario
- Policy choices will have a large impact on achieving a 20% goal
- 20% Vision action plan: Fall 2007

# Buy Local/Buy Wind

- Out of State
- 100% coal
- 96% oil
- 75% natural gas
- \$20 billion leaves MI each year



# Wind Power = Jobs



- Harvest Wind Farm
- 32 turbines
- 80 construction jobs
- 6-10 permanent jobs
- \$90 million investment

# Michigan – Economic Impacts

from 1000 MW of new wind development

*Wind energy's economic "ripple effect"*

## Direct Impacts

### Payments to Landowners:

- \$2.7 million/year

### Local Property Tax Revenue:

- \$18.6 million/year

### Construction Phase:

- 1426 new construction jobs
- \$188.5 M to local economies

### Operational Phase:

- 230 new long-term jobs
- \$21.2 M/yr to local economies



## Indirect Impacts

### Construction Phase:

- 560 new jobs
- \$53.5 M to local economies

### Operational Phase:

- 60 local jobs
- \$6.6 M/yr to local economies

## Induced Impacts

### Construction Phase:

- 844 new jobs
- \$83.4 M to local economies

### Operational Phase:

- 217 local jobs
- \$21.5 M/yr to local economies

## Totals (construction + 20 yrs)

Total economic benefit to Michigan = \$1.3 billion

New local jobs during construction = 2830

New local long-term jobs = 507

Construction Phase = 1-2 years

Operational Phase = 20+ years

# Kalamazoo: Windmill City

- Smith & Pomeroy Windmill Co.
- Phelps & Bigelow
- 1880's annual production of 4,000
- Exported windmills Europe, South America, Africa, & Australia



# Wind Power = Manufacturing Jobs



- Nov 2006 study by Renewable Energy Policy Project
- MI ranked 4th for potential activity
- Over 900 potential firms
- 8,000-24,000 jobs depending on state & national policies

K&M Machine Fabricating  
Cassopolis

# Want a Job in the Wind Industry

- Research

American Wind Energy Assoc. [www.awea.org](http://www.awea.org)

Great Lakes Renewable Energy Assoc.

[www.glrea.org](http://www.glrea.org)

North American Windpower Magazine – Wind Jobs

- Network, Network, Network

Calendar of Events

Michigan Wind Working Group

[www.michigan.gov/energyoffice](http://www.michigan.gov/energyoffice)

# Wind Power = Clean Power

- No sulfur dioxide
- No nitrogen oxides
- No carbon dioxide
- No particulates
- No mercury
- No water

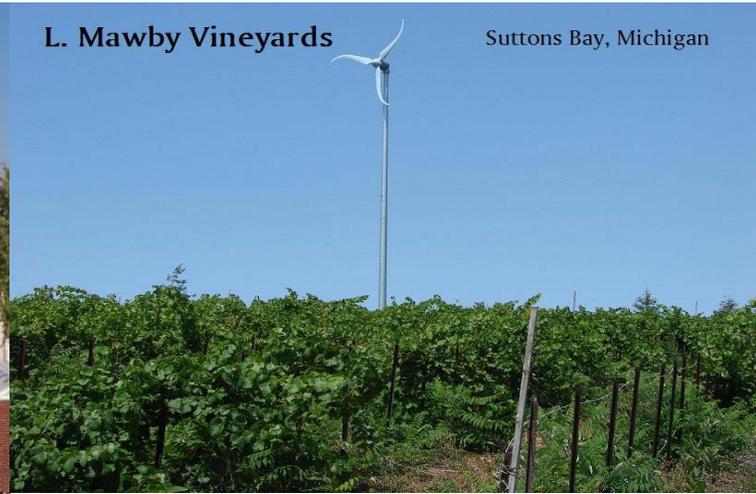


# Available Today Small, Medium & Large



L. Mawby Vineyards

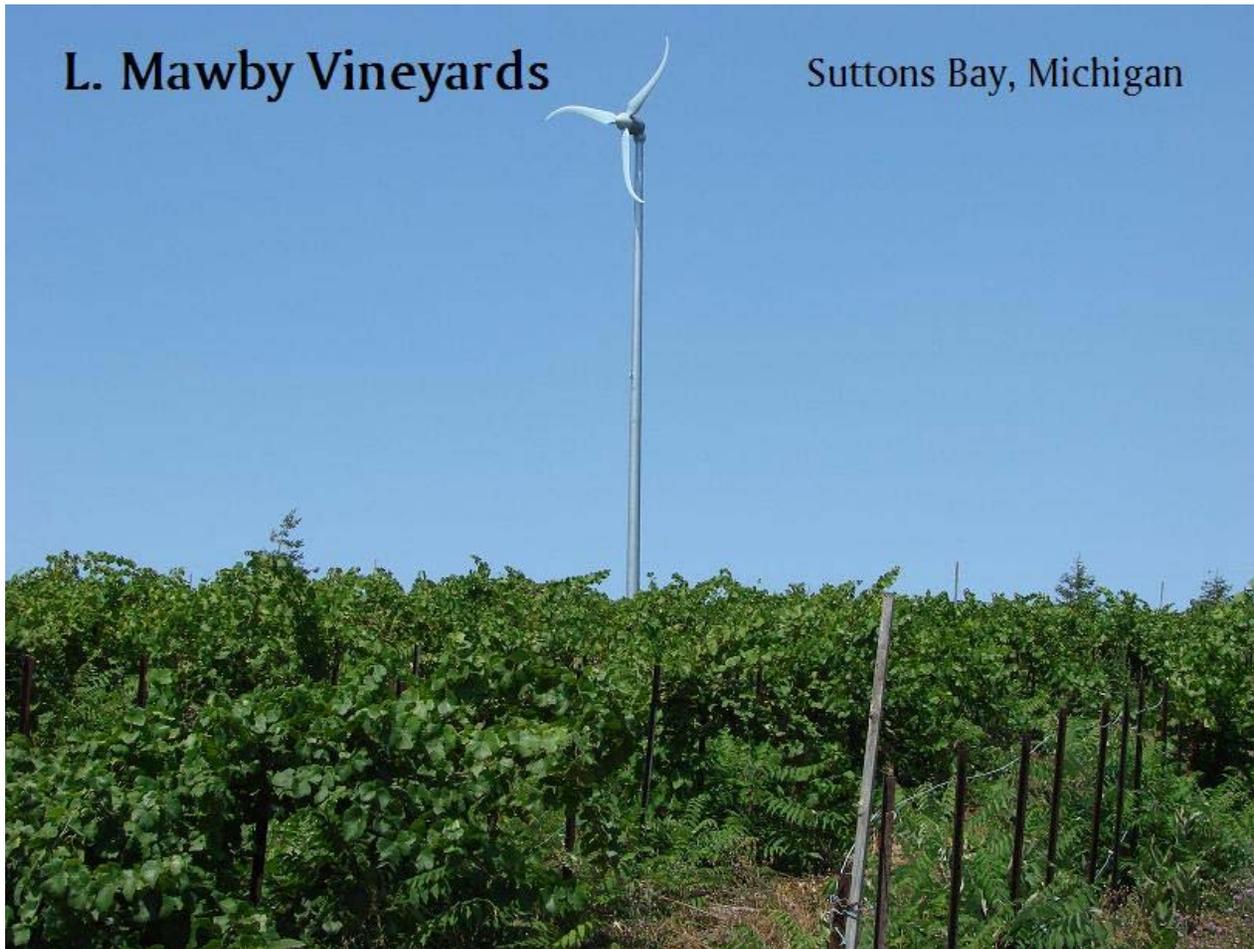
Suttons Bay, Michigan



# St. Elizabeth's – 400 watt



# 1.8 kW Skystream



# Detroit EITC – 6 kW



# Northwestern Michigan College 10 kW



# Laker Public Schools – 65 kW



# Mackinaw City – two 900 kW



# Harvest Wind Farm

- **John Deere Wind Energy Project**
- **Huron County**
- **32 Wind Turbines, 1.65 MW each**
- **52.8 MW / Enough to Power 15,000 homes**
- **Commercial Operation: Early 2008**

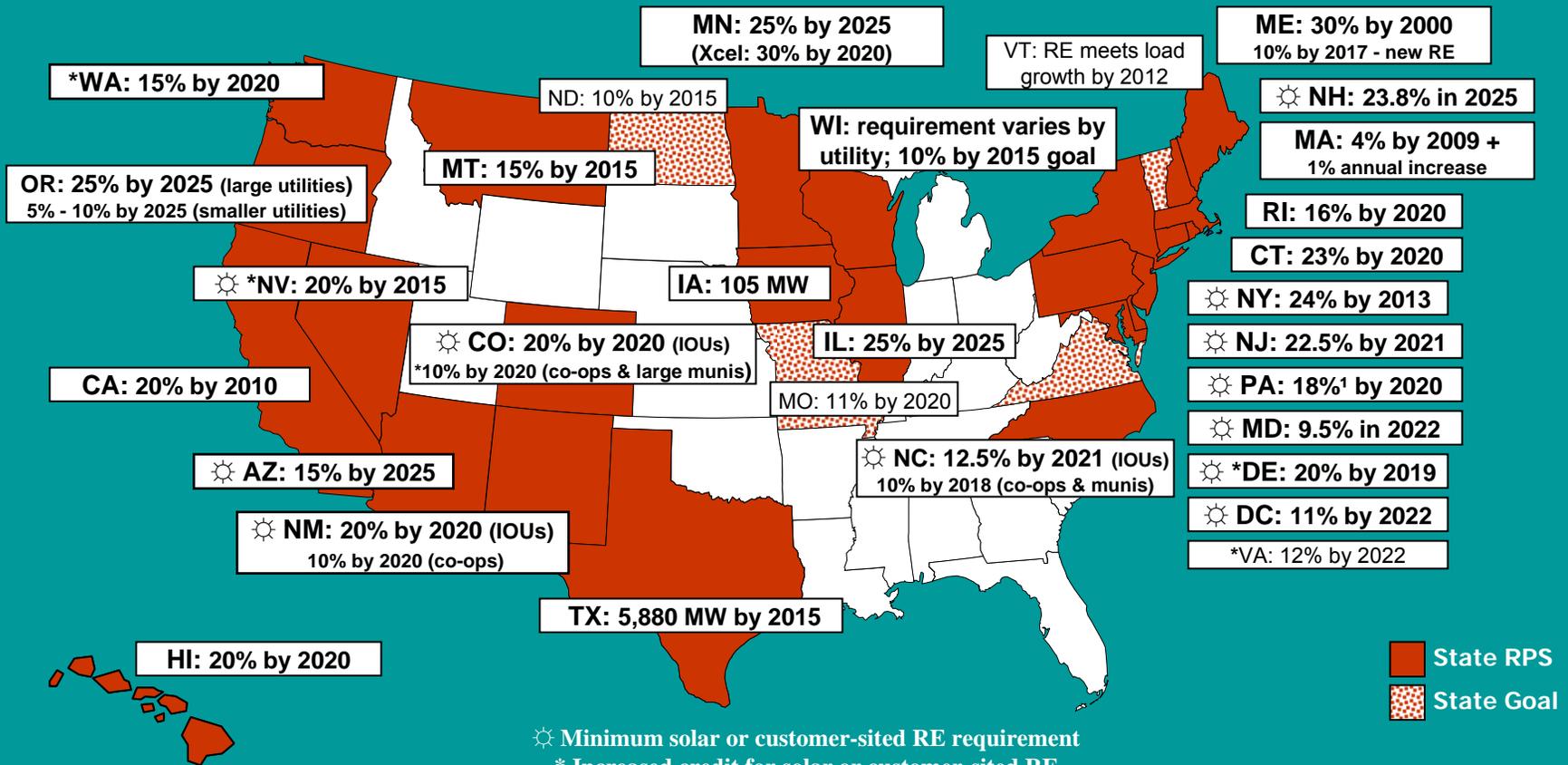
# Great Lakes?



# Renewable Portfolio Standard

- 25 states & D.C.
- Mandate on electric suppliers
- % electricity from renewables by ?
- Governor Granholm has proposed 10% by 2015 & 20% goal by 2025
- Would count existing 3% renewables toward goal

# Renewables Portfolio Standards



\*PA: 8% Tier I / 10% Tier II (includes non-renewables); SWH is a Tier II resource

# Net Metering

- Customers provide excess electricity to utilities
- Renewables up to 30 kW
- Credit, no payment
- Alternative to batteries
- MPSC and utilities working on improvements
- [www.michigan.gov/mpsc](http://www.michigan.gov/mpsc)

# Energy Legislation

[www.legislature.mi.gov](http://www.legislature.mi.gov)



# Community Energy Project Grants

- Federal funds thru Michigan Energy Office
- Non-profit & public orgs eligible
- Wind Energy Education is 1 category of 5
- Up to \$6,000, 20 projects in all categories
- Deadline – Sept 2008 for 2009 grants

# USDA 9006 Grants

- Biomass, Solar, & Wind
- Up to 25% of project costs
- Minimum - \$2,500
- Maximum - \$500,000
- Agricultural producer or rural small business

# Siting Guidelines

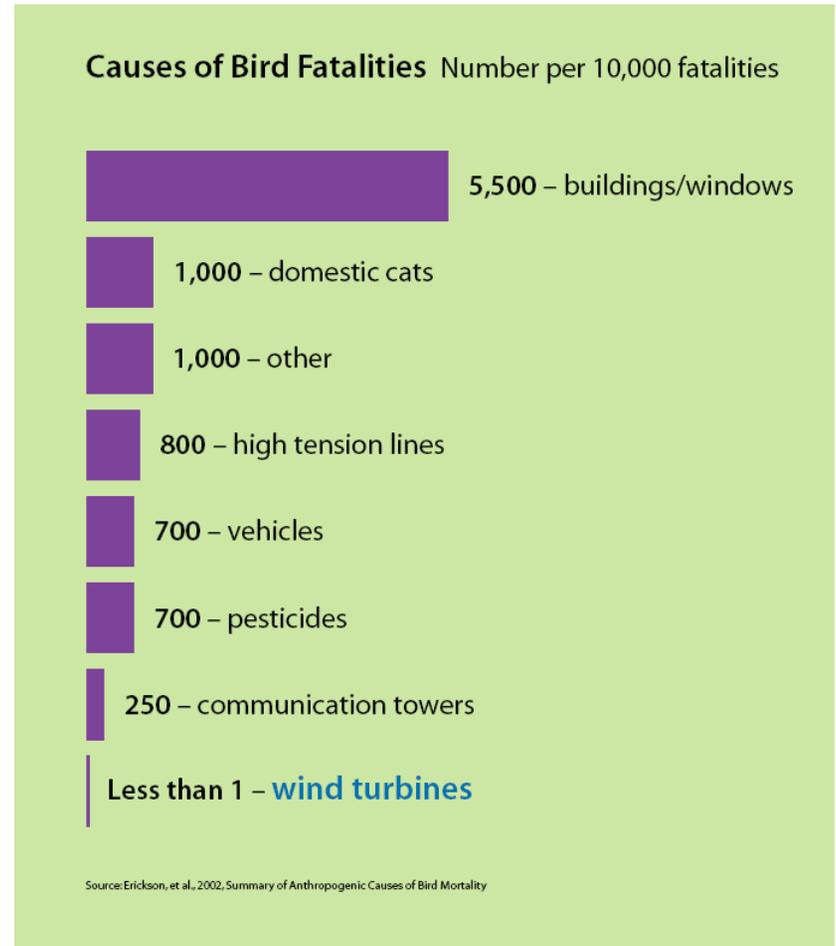
- Siting & zoning are primarily township or county responsibility
- There are state and federal requirements, e.g. Federal Aviation Administration
- Energy Office has voluntary guidelines
- Different requirements for “On-Site Use” & “Utility Grid”
- [www.michigan.gov/eorenew](http://www.michigan.gov/eorenew)

# Siting Topics

- Set-Backs
- Sound Levels
- Construction Codes & Utility Interconnection
- Safety
- Visual Impact
- Environmental Impact
- Avian & Wildlife Impact
- Electromagnetic Interference
- Shadow Flicker
- Decommissioning
- Complaint Resolution

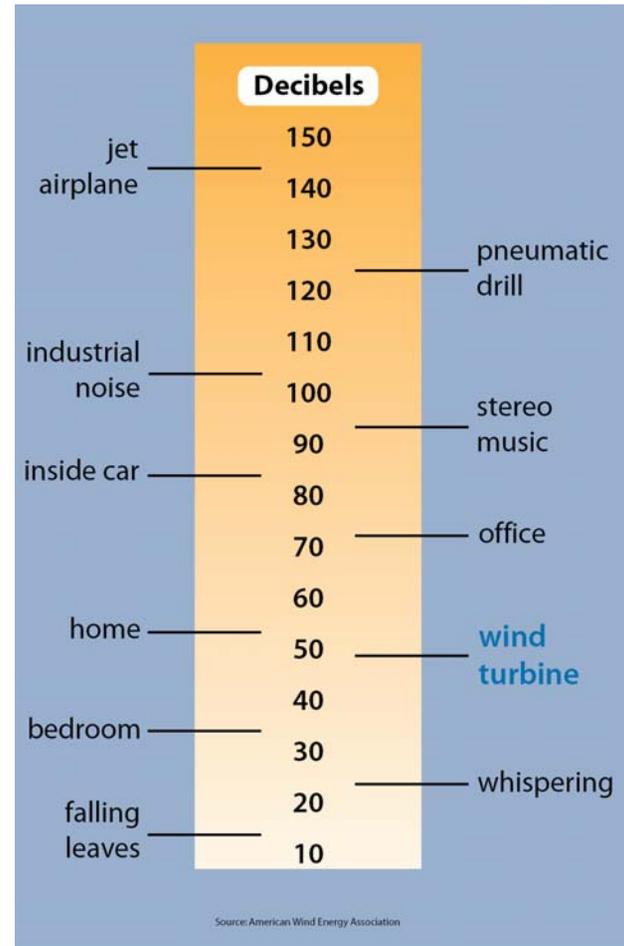
# Avian Impact

- Siting guidelines require third party analysis
- Look at endangered species, wildlife refuges, bat hibernacula, wooded ridge tops, migration pathways
- 4 Midwest studies have shown minimal impact – ave 2.7 birds/turbine/year



# Sound Levels

- Siting guidelines  
55 dB(A) at property line
- Normal conversation  
50-65 dB(A)
- Refrigerator  
70 dB(A)
- Today's turbines are much quieter than older turbines



# Visual Impact

- Siting guidelines require
- Tubular towers
- Single, non-reflective matte color
- Similar design, size, & appearance
- No advertising, nacelles may have lettering
- Avoid scenic areas

# Kinetic Art?



Photo Credit  
Brion Dickens

# Information Resources

- Great Lakes Renewable Energy Assoc.  
[www.glrea.org](http://www.glrea.org)
- MSU Extension  
<http://web1.msue.msu.edu/wind/>
- Michigan Energy Office  
[www.michigan.gov/eorenew](http://www.michigan.gov/eorenew)



# Michigan Energy Fair

- Over 70 workshops
- Over 130 exhibitors
- Manistee June 27-29

