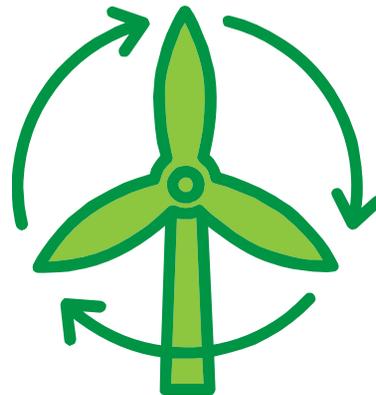




Wind Strategy



Revised 5-6-09

- Michigan State Government is committed to the development of alternative energy.
- Wind power is clean, renewable energy.
- How can wind power be developed as a feasible, attractive application for State Government?
- Installations that are not practical may diminish the viability of wind power.

What is a kWh?

- kW = 1,000 watts
- kWh (kilowatt hour)= The use of one kW over a one hour period.
- 1 MW (megawatt) = 1,000 kW or 1,000,000 watts

Typical Residence w/Gas Heat

- 20 kWh/day or 625 kWh/month or 7,500 kWh/yr
- At \$0.10/kWh this is \$62.50/month or \$750/yr.

Typical Office Cubicle

- Computer & 4-2 tube fluorescent light fixtures

Computer — 8 hrs/day x 250 days/yr x 150 W \approx 25 kWh/month

Lights — 4 fixtures x 2 tubes x 40 W/tube = 320 W or .32 kW
.32kW x 10 hrs/day x 250 days/yr \approx 70 kWh/month

Total — 95 kWh/month

- Cost is +/- \$9.50/month (at \$0.10/kWh)

State Facility Examples

- **Straits State Harbor Building:**
 - 50,000 kWh in summer (120,000 kWh in winter)
 - \$5,000 for summer
 - also rest areas, service centers, DNR field offices, etc.
- **Cass Building:**
 - 2,608,256 kWh/yr
 - \$171,833.70/yr
- **DOC Camp Baraga:**
 - 5,185,000 kWh/yr
 - \$585,428.17/yr

Wind Turbines Available



Grand Rapids, MI

1.5 kW



Skystream



1.8 kW

Harvest Wind Farm

- 32 wind turbines
- 1.65 mW each

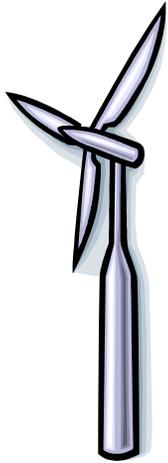


Straits State Harbor

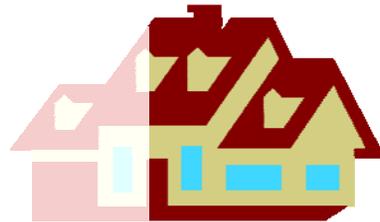
- 8 wind turbines
- 1.8 kW each



Turbines Needed



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- 1-1.8 kW turbine provides energy for almost 2/3 of a house for one year
- Estimated cost is \$12,000 - \$20,000 each for 1.8 kW turbine



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- 10-1.8 kW turbines for the Straits State Harbormaster's building
- Estimated cost is \$120,000 - \$200,000 for ten 1.8 kW wind turbines

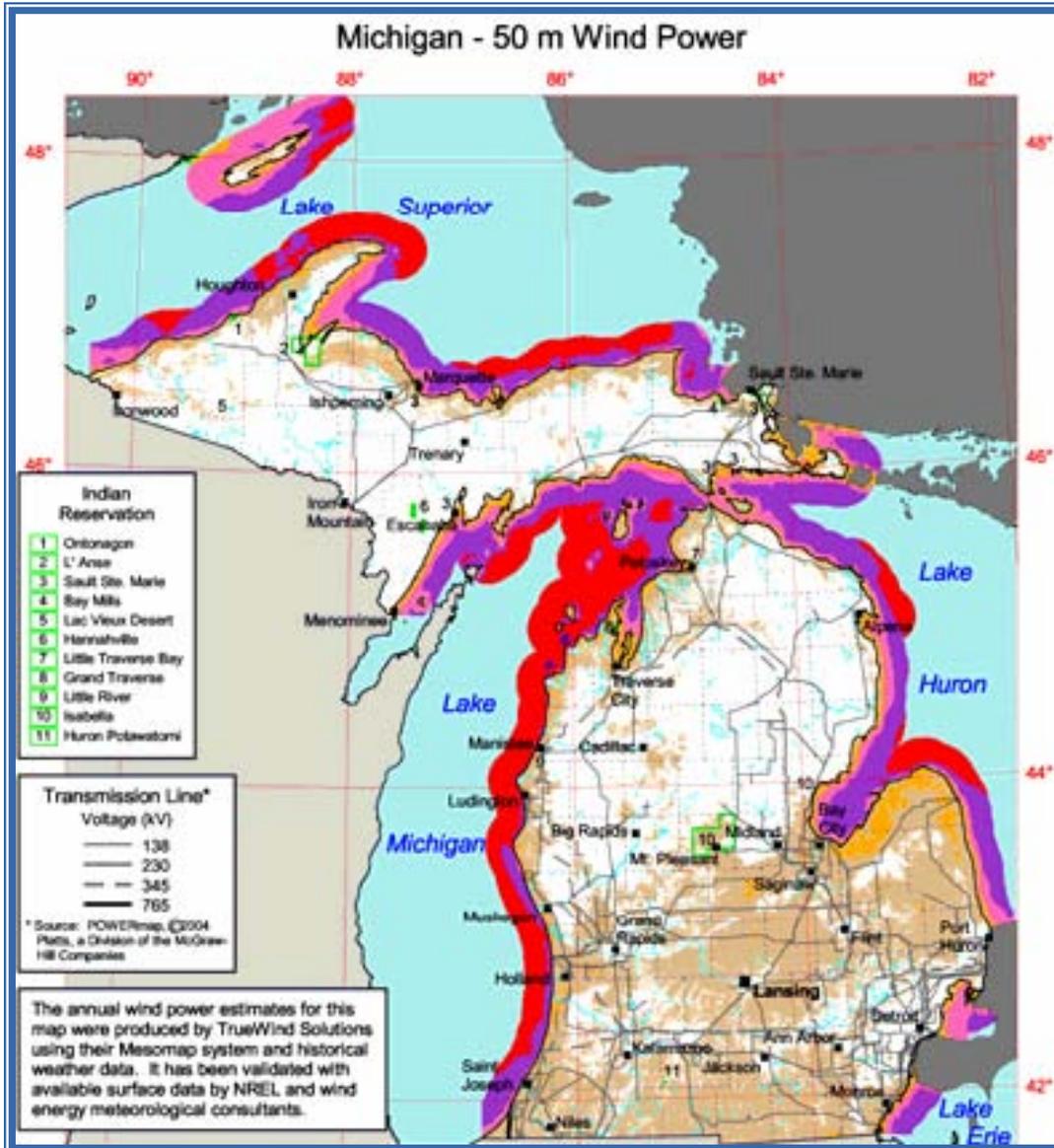
Turbines Needed cont...

- **Cass Building**
 - 550-1.5 kW turbines or 1-1 mW turbine
 - Estimated cost is \$2,000,000
- **Camp Baraga**
 - Over 1,000-1.5 kW turbines or 2-1 mW turbines
 - Estimated cost is \$4,000,000

Considerations

- Wind Resource
- Siting
- Environmental, Regulatory Concerns
- Net Metering/Public Utility Issues
- Economics
- Maintenance
- Implementation

Michigan Wind Power



	Poor
	Marginal
	Fair
	Good
	Excellent
	Outstanding
	Superb

Siting

- Zoning
- Open Land/Separation Required
- Terrain
- Trees, Buildings

Environmental Concerns

- Noise
- Visual Impact
 - Aesthetics
 - Shadowing
- Wildlife

Net Metering/Public Utility Issues*

- Less than 30 kW capacity
- For own use only
- Credit at wholesale rate
- Purchase at retail rate
- No carry over year to year

*Subject to MPSC ruling

Economics

1.5 kW Wind Generator Output

- There are $365 \text{ days/yr} \times 24 \text{ hrs/day} = 8,760 \text{ hrs/yr}$
- $8,760 \text{ hrs} \times 0.40 \text{ efficiency} = 3,504 \text{ hrs/yr}$ of production
- $1.5 \text{ kW} \times 3,504 \text{ hrs/yr} = 5,250 \text{ kWh/yr}$ or 438 kWh/month
- This equates to \$525/yr or \$43.80/month at \$0.10/kWh.

Economics, cont.

Other Costs Associated w/Turbines



- Design & Analysis
- Foundation & Electrical
- Surge Protection

Economics, cont.

1.5 kW Wind Generator Cost

- Initial Cost - \$15,000-\$20,000
- Payback Period – 28-38 yrs
- Does not include maintenance costs
- Machine life is expected to be 20 years

Economics, cont.

1 mW Wind Generator Cost

- Industry standard is +/- \$2,000 per kW capacity
- 1 mW = 1,000 kW
- Estimate of turbine cost is \$2,000,000

Straits State Harbor Application

- Installed 8-1.8 kW turbines to run ice suppression system
- Cost = \$22,000 each, including foundation & electrical work
- Estimated usage: 120,000 kWh/yr in winter
 50,000 kWh/yr in summer

Straits State Harbor



Individual Project Process

- Step #1: Identify High Potential Sites
 - Review Wind Resource & Electricity Needs
- Step #2: Evaluate Installation Viability
 - Preferred siting, installation method, etc.
- Step #3: Develop Installation Plan & Timeline
- Step #4: Secure Permits & Net Metering Agreement
- Step #5: Complete Installation & Servicing Plan

Acquisition Strategy

Four Strategies for Acquiring Wind Energy:

- Design/Build/Install/Maintain
- Analysis and Design
- Purchase/Install/Maintain
- Have an agreement with an entity to buy wind generated power

Wind Turbine Providers in Michigan

- Global Wind Systems, Inc (Novi, Michigan): Michigan's first manufacturer of delivery-ready, large-scale wind turbines. These are large turbines used by utility companies and developers.
- ATI Casting Service (Alpena, Michigan): Manufactures grey and ductile iron castings for wind energy and other markets.
- Cascade Engineering (Grand Rapids, Michigan): Manufacturer of 1.5 kW wind turbine. Has plans to construct all aspects of the turbine in Michigan.
- Lee Wind Energy (Pontiac, Michigan): Wind turbines (large) vertical axis, wind turbines (small), energy efficient lighting, wind energy towers and structures (large), wind power plants, wind turbines (small). Service types: consulting, design, installation, construction, project development services, research services, site survey and assessment services, financial services, contractor services, maintenance and repair services

Wind Turbine Providers in Michigan, cont.

- Michigan Solar & Wind Power Solutions, LLC (Commerce Twp, Michigan): Wind turbines (small) horizontal axis, wind turbines (small) vertical axis. Service types: consulting, design, installation, construction, site survey and assessment services, maintenance and repair services
- Mariah Power, Inc. (Manistee, Michigan): The Windspire is a low cost wind power appliance that provides a safe and attractive method for harnessing power from the wind. At only 30 feet tall and 2 feet in radius, Windspire is distinguished by its sleek propeller-free design, ultra quiet operation, rugged construction, and affordable pricing.

www.michigan.gov/documents/dleg/Solar_and_Wind_3-23-09_272055_7.pdf

Next Steps

- RFP for Analysis & Design
 - Review Responses
 - Contracting Process
 - Inform Agencies
- RFP for Purchase/Install/Maintain
 - Review Responses
 - Contracting Process
 - Inform Agencies
- Solar?