

SOLAR ENERGY

Leelanau County has a higher solar potential than previously thought, especially during the spring, summer and fall

- ***Solar voltaic*** generated electricity is growing in popularity and it's easy to install.
- Some ***feed-in-tariff*** programs are available. Net metering is also available.
- Time from initiating project to completion is short.
- ***Concentrated solar*** potential is being explored
- Used mostly for residential areas in Leelanau so far and a few small businesses
- Can add additional revenue or electrical generation on farms
- There actually are solar panels at Sleeping Bear Dunes, National Lakeshore, North Manitou Island and Fox Island.....

SOLAR ENERGY

➤ Community solar not yet in Leelanau County

➤ Small solar water heaters available

Solar PV is now considered “Win-Win”

➤ **New/Clean Source of Energy** - Solar energy systems can contribute greatly to reducing greenhouse gas emissions. A 1-kilowatt system can keep as much as 300 pounds of carbon dioxide from being released into the Earth's atmosphere.

➤ **Payback 10 years for Residential and 7 – 9 years for Commercial and Residential**

➤ Produces energy on the grid demand cycle

➤ Manufacturing and installation prices are expected to remain low and may even be lower

➤ Systems last over 25 years with virtually no maintenance

➤ Now some systems are made locally, which helps local economy.

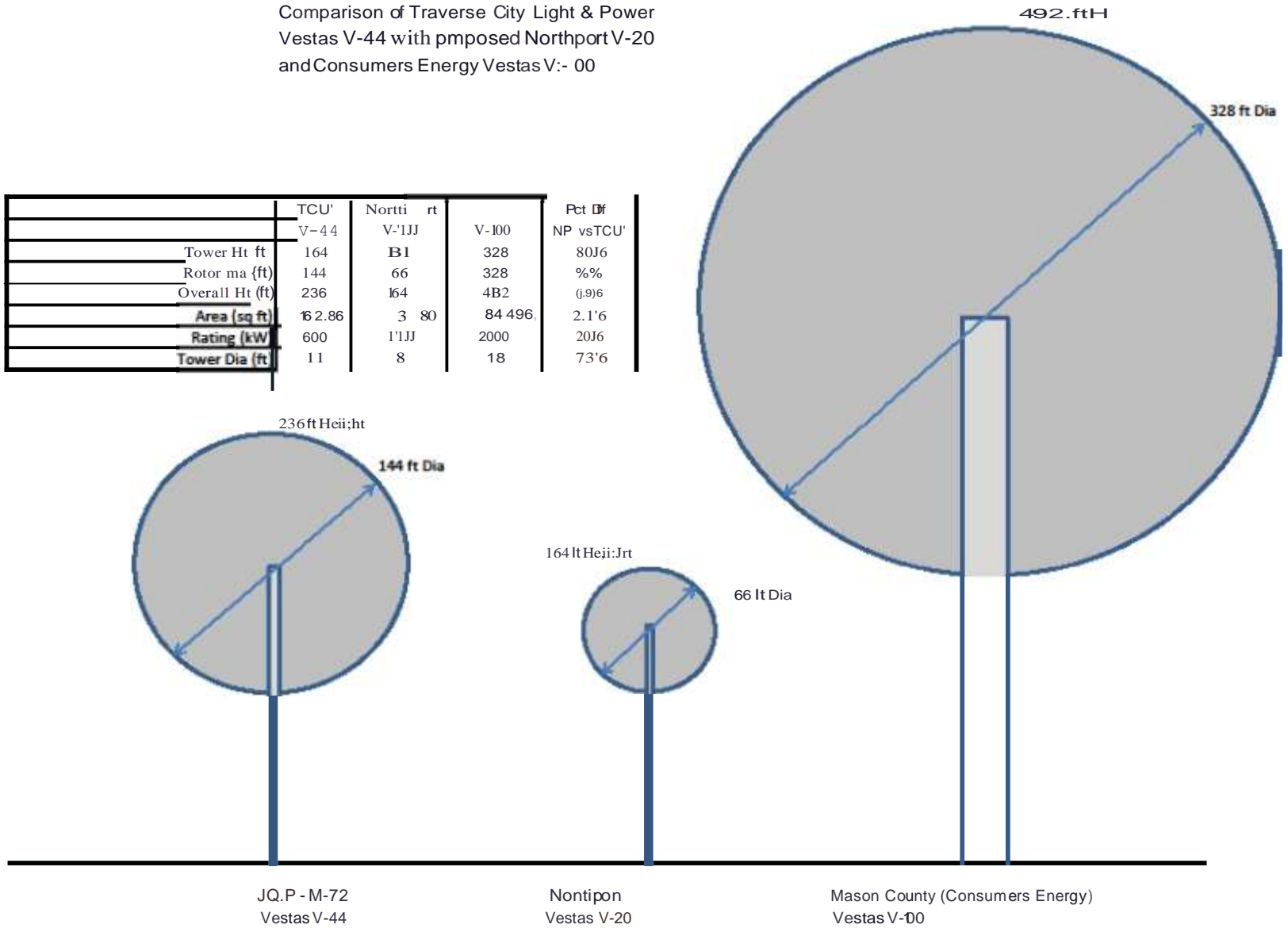
➤ **Fast build-out (1-4 months)**

WIND ...Doug McInnis



Comparison of Traverse City Light & Power
 Vestas V-44 with proposed Northport V-20
 and Consumers Energy Vestas V-00

	TCU'	Northport	V-100	Pct Dif NP vsTCU'
	V-44	V-11J	V-100	
Tower Ht (ft)	164	164	328	80%
Rotor dia (ft)	144	66	328	%%
Overall Ht (ft)	236	164	482	(1.96)
Area (sq ft)	162.86	3.80	84.496	2.1%
Rating (kW)	600	111J	2000	20%
Tower Dia (ft)	11	8	18	73%



Michigan Wind Farm Locations

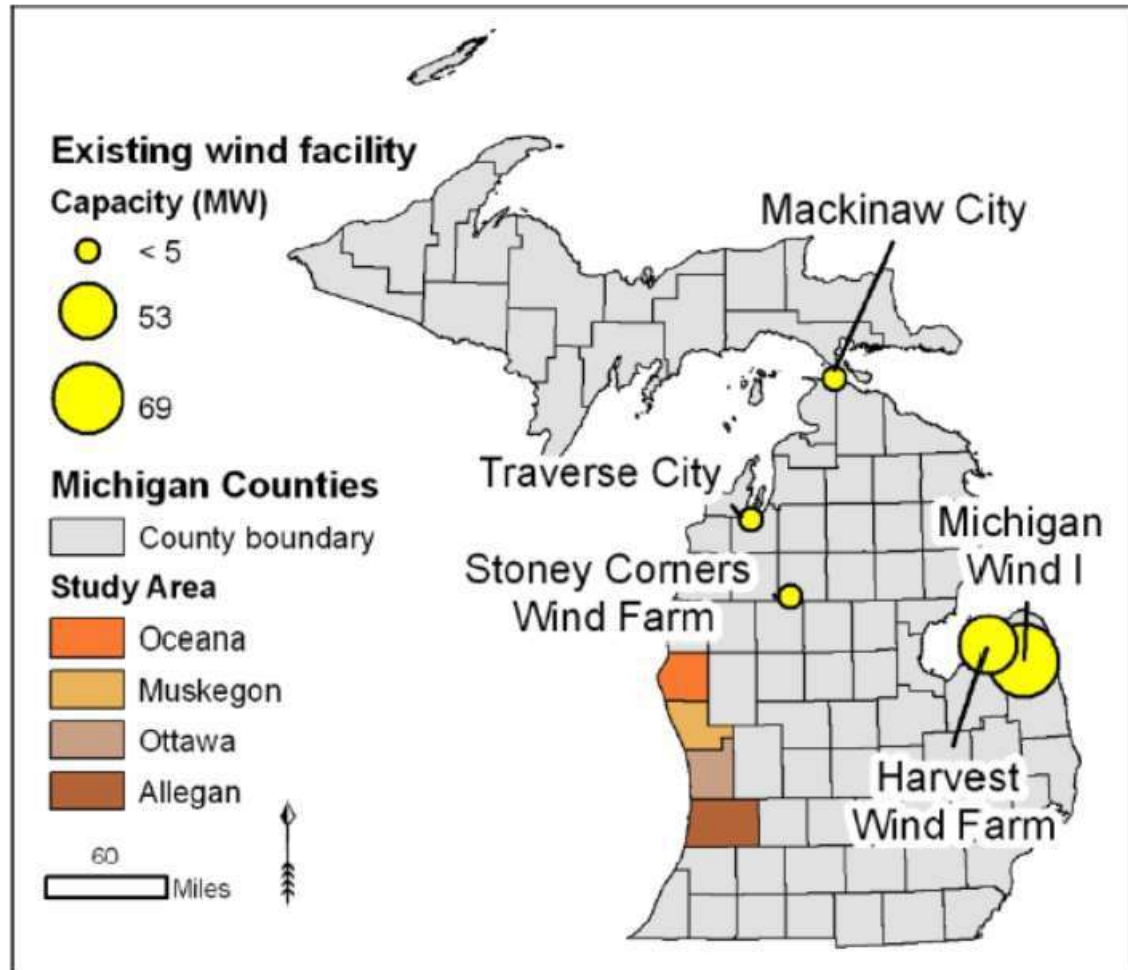


Figure 4: Study area with existing wind energy resources.

(from the GVSU preliminary report)

Northport wind turbine

- A. Vestas 120 kW wind turbine
- Village Site
- Provides 50 % waste water treatment plant electrical needs
- Net metering



Distributed Energy

- Energy resources – small, modular
- Located near where energy used
- Grid connected or off-grid

Distributed Energy Benefits

- Strengthen local economies
- Reduces energy transmission losses
- Reduces number of power lines
- Minimal impact to environment and view- sheds

What are PETS?

- **P...politics**
- **E...economics**
- **T...technology**
- **S...social**



BIOMASS, BIOFUELS, WASTE to ENERGY

Peter Wolcott



Biomass...What is it?

- Electrical power generated by wood, wastes or methane from landfills, plants
- Residential wood as a source for heat
- Ethanol used as transport fuel (largely from corn)...very low energy return on investment....has to be subsidized

Potential Fuel Sources

- Fuel sources
- Timber harvest residues
- Mill byproducts
- Clean “recycled” wood
- Crates, pallets
- Construction materials
- Urban “green wood”
- Storm cleanup

More potential fuel sources

- Utilizes trimmings from orchard agriculture
- Utilizes saw mill scraps
- Landscape debris
- Right-of-way maintenance
- Treated wood
- Railroad ties
- Non-renewable fuels
- Scrap tires (tire-derived fuel)

Biomass Benefits

- Is a renewable resource if replanting occurs to offset the emissions from burning of these fuels
- Can utilize methane from landfills, manure, agricultural wastes (biogas)
- In conjunction with composting can be low cost energy generation and waste management
- When done properly...**minerals** are separated from organic matter and recycled
- Grid support...doesn't require new grid
- Stabilization in rural areas
- Dispatch able...available upon demand
- Provides electricity not provided by wind & solar

More Biomass Benefits

- Recycling is required by heavy industry
- Contributes to forest health management (like diseased trees) & stewardship
- Fire risk mitigation when some of potential fire fuel wood is removed
- Thinning....for habitat enhancement
- Certification and sustainability requirements must be met
- Beneficial use vs. landfill, decay
- Aids forest products manufacturers

Biomass Economics

6 operating in Michigan already

- Local resources...
- \$30 million in fuel generated power
- Makes markets for low-, no-value fiber
- Local jobs... 400 direct fuel-related jobs
and 130 power plant jobs
- Local communities...benefit from property taxes
- \$11 million annual payroll
- Local goods & services

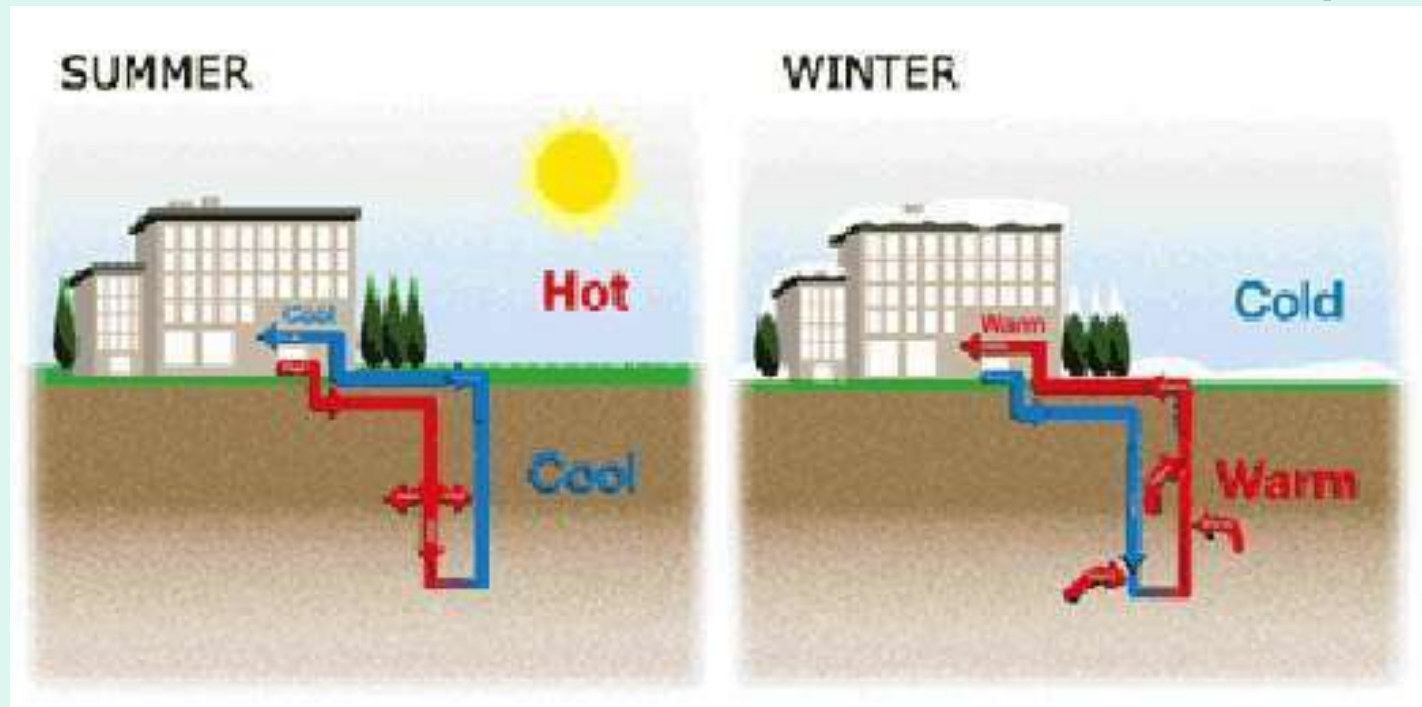
Source: Michigan Biomass member facilities. April Mi. Energy Forum
Presentation in T.C.

Issues with Biomass

- Particulate matter from wood burning compromises air quality
- Could lead to deforestation and depletion of important ecological woodland decomposition if done improperly
- Corn used for ethanol displaces food and often is an inappropriate use of agricultural land

Geothermal Heat pump

- **Geothermal...**in Michigan heat is extracted from water or the air...cuts electrical costs in half. A Leelanau option.



Hydro...in Leelanau?

- In other Michigan locations.. some rivers and dammed up lakes are used with turbines to generate electricity
- Ludington Pump Storage...works like a battery

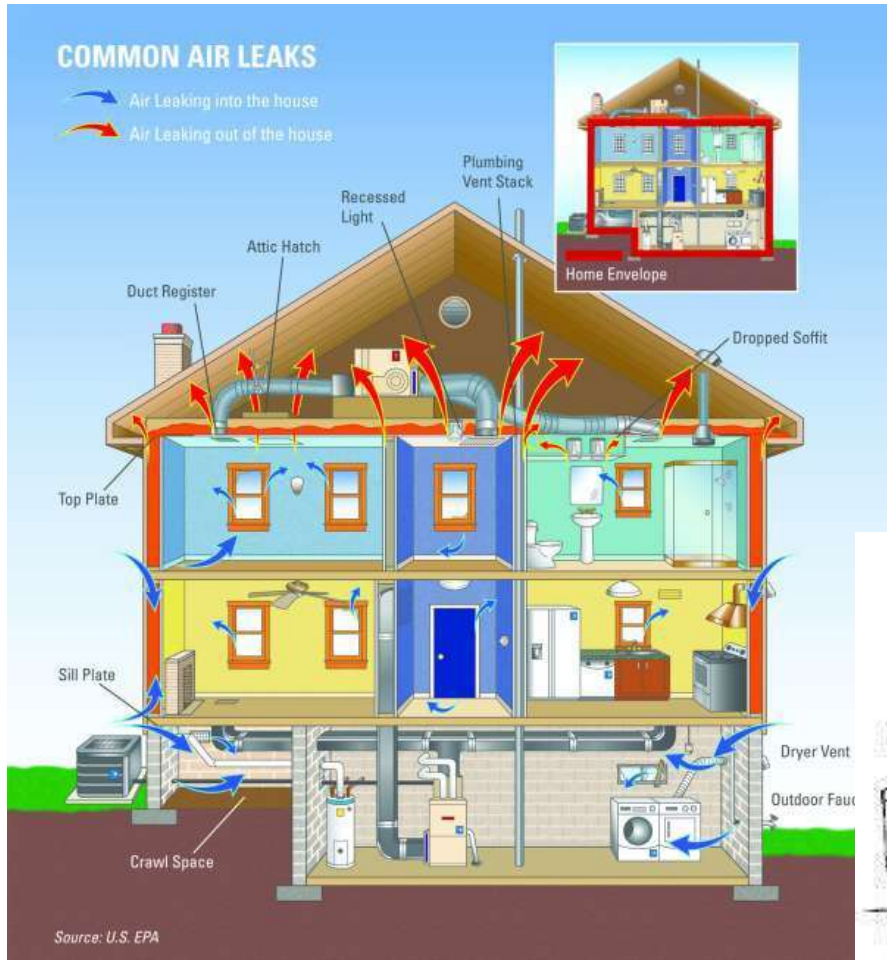


Future Renewable Energy

- According to the mayor of Grand Rapids...
“we are on track to accomplish 100 % renewable energy by 2020 using wind, solar, biofuels, waste to energy, hydro, and energy efficiency programs.”
- National Renewable Energy Laboratory’s [Renewable Electricity Futures Study](#). Electricity generation by 2050
 - *60% wind and solar
 - *12% hydro
 - * 8% biomass and geothermal
 - *20% natural gas, coal and nuclear

• (June 2013)

What are the most effective and quickest resources to exploit?



The answer is....

- Energy Conservation
- Energy Efficiency

“one-third or less the cost of any other generation supply option, and one-third the forecasted cost of wholesale natural gas” (MPSC)

