

# Wind Turbines 2001



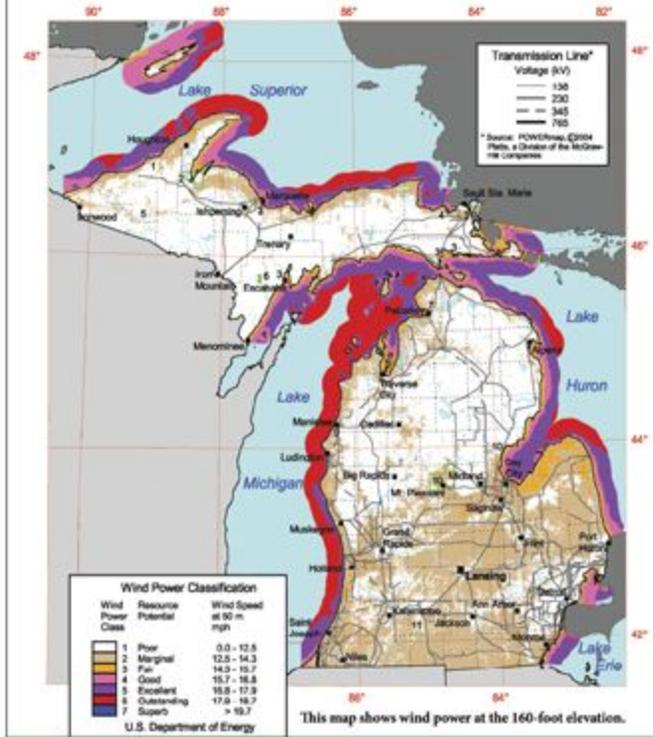
## WHY ARE THESE TURBINES HERE?

### Wind - Power Lines - Political Support

Michigan has many sites with the two critical ingredients for wind turbines - wind and nearby power transmission lines, but in 2001 Mackinaw City was unique in having a village council that was extremely supportive of putting wind turbines on village land. People make all the difference!

### Where the waves meet the shore there the winds doth blow.

During the day the land heats more quickly than the water. As the hot air rises an on-shore "sea breeze" fills the void. At night the process reverses with an off-shore "land-breeze." Thus the lake shore is a windy place.



## SIZE IS POWER

These two towers produce 2.8 million kilowatt-hours of electricity per year, enough for more than 400 homes.

The hubs of these wind turbines are 237 feet above ground. Each blade is 85 feet long. (Notice the tiny-looking maintenance truck in the photo below.)

This height puts the blades above any turbulence and drag caused by ground structures. Higher and longer blades produce more power but are more costly to construct. This turbine cost approximately \$1 million and had a 20-year life expectancy when new.

This was a very large turbine in 2001. In 2008, a turbine with five times the power output was being developed in Germany.

The turbines are used to train new professional wind turbine technicians from EVCC (Kalamazoo Valley Community College) as part of their curriculum. They take care of the preventative maintenance and even the trouble-shooting repairs on the wind turbines.



The power cables and communications cables drop to the base of the tower beside the access ladder.



112 anchor bolts attach the tower to its base. The base is a steel plate buried under a concrete cylinder 19 feet in diameter and 25 feet deep weighing about 380 tons.

## WHERE DOES THE POWER GO?

It goes on the grid, the network of power lines used to deliver electricity.

Six hundred volts of electricity are generated at the top of the tower. Large electric cables deliver the power down to the base. A transformer converts the electricity to 14,700 volts. Electrical cables take the power to a nearby substation where the voltage is increased again for transmission over longer distances.

