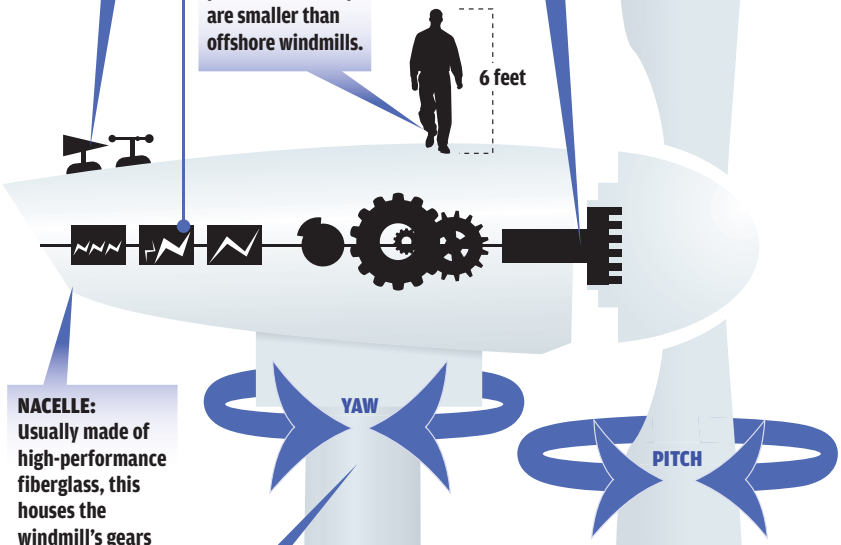
WIND ENERGY | How it works

ELECTRICAL INSIDES: Wind turns the blades, which turn the generator. The electricity generated is converted to direct current and to a voltage suitable for long-distance power lines. The electricity finally is fed into the power grid.

IN MOTION: The blades on a windmill are intended to turn at 20 to 60 rpm (more than 200 mph at the very tips). A series of gears in the nacelle convert that motion into 1,000 to 1,800 rpm and turn the generator. A standard disc break, such as the one on a car, can be used to stop all motion.

WEATHER MONITORS: The anemometer measures the wind speed while the vane measures wind direction.

SIZE: Windmills come in all sizes, but those intended for electricity resale typically are about 100 feet tall with two to three blades that can reach 60 feet long. Windmills intended for land placement usually are smaller than offshore windmills.



NACELLE: Usually made of high-performance fiberglass, this houses the windmill's gears and the rest of its internal parts.

PITCH AND YAW: Windmills are designed to either face directly into or away from the wind, respectively known as upwind and downwind. Using data from the anemometer, motors adjust the nacelle's positioning, or yaw, to ensure maximum effect. The blades themselves can twist - or pitch - to prevent turning in wind that is unsafe (faster than 55 mph) or unproductive (slower than 8 mph).

TOWER: As tall as 100 feet, towers usually are made from tubular steel, concrete or steel lattice. Wind moves faster at higher altitudes, so taller towers can generate more electricity.

SOURCES: U.S. DEPARTMENTV. OF ENERGY, U.S. ENERGY INFORMATION ADMINISTRATION, ENERGYADVOCATE.COM, AMERICAN WIND ENERGY ASSOCIATION

RYAN MARX | THE TIMES