

Wind turbine blades slow down

How does wind affect a wind turbine?

The wind starts to slow down even before it reaches the blades, reducing the wind speed through the "disc" (the imaginary circle formed by the blade tips, also called the swept area) and hence reducing the available power. Some of the wind that was heading for the disc diverts around the slower-moving air and misses the blades entirely.

Why do wind turbines have a slower downwind flow?

As wind flows past the rotating blades of a wind turbine, some of its momentum is devoted to moving the blades and generating electricity. As a result, the downwind flow is slower and more turbulent 1,2.

Why do wind turbine blades wear out?

Wind turbine blades can become damaged and wear out due to several reasons, including fatigue damage from wind, lightning strikes, blade edge erosion, and icing. Despite these challenges, wind turbine blades must be extremely effective in helping the turbine convert kinetic energy into mechanical energy.

How fast do wind turbine blades move?

Wind turbine blades begin to move with wind speeds of around 11.5 feet per second and reach their maximum power output at wind speeds of 36 feet per second. In very strong winds, around 82 feet per second, the blades are "feathered" to slow the wind turbine down to prevent excessive voltages.

Why do two-bladed wind turbines wobble?

Two-bladed wind turbines wobble when they turn to face the wind because their angular momentum in the vertical axis changes depending on whether the blades are vertical or horizontal. This instability is not present in wind turbines with three blades, as the angular momentum on these turbines stays constant when one blade is up, and the other two are pointing at an angle.

Why are wind turbine blades feathered?

In very strong winds, around 82 feet per second, the wind turbine blades are adjusted to approximately 90°, a position known as feathering, to slow the turbine down and prevent excessive voltages.

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