

**Keyword** Windmill

**Title** Windmill Blade Efficiencies

**Author** Dr. John Lovett Jr.

**Windmill blade efficiencies:**

I think you have some excellent questions regarding windmills. My area of expertise is waterpower, so I can only provide some general information about windmill power. The highest efficiency possible from a windmill or wind generator is said to be 59%. Efficiency is simply a ratio of the energy output to the energy input. Friction from the wind traveling across the blades, as well as from the bearings, the transmission devices that carry the motion of the blades to the operating equipment (such as generators, water pumps), etc., cuts the efficiency. Most well designed windmills operate around 50% efficient. The output of a typical windmill (in watts) is approximately equal to the product of the square of the rotor or propeller radius and the square of the wind velocity. The more blades you add, the less the rotational speed of the windmill, as a general rule. The higher speed wind generators, such as those along the California coast, usually have only two or three blades. The old windmills that were used to grind grain typically had four blades, and rotated rather slowly because the blades were so large and heavy, and there was such a drag due to the power requirements of turning a heavy set of millstones. I know this may not be adequate information. What I would suggest is that you visit your local library and search for a publication on alternative energy sources. Many of these were published during the artificially created oil crisis of the early 1970's. There was much windmill data printed at that time. Also, you may want to contact the editors of Mother Earth News (I'm sure they have a Web site). They have published in past issues information on wind power.