

# Harvesting the Wind

Colorado ranch evaluates the potential of harnessing wind energy.

There are days when the wind blows fast and long at Wagon Wheel Ranch of Yuma, Colo. On those days, owner Kenny Rogers glances skyward, fixing his eyes on a set of rotating black cups mounted nearly 70 feet (ft.) above on a large antenna. The cups, which measure wind speed, are connected to a control box near the ground where wind data is continuously logged into a removable storage chip. Every 30 days, a fresh chip is inserted and the previous month's data is downloaded onto a computer, adding to a growing database of site-specific wind speed and directional data.

Rogers installed the wind-monitoring equipment before Christmas 2008. By December this year, 12 full months of wind speed and directional data will have been collected, and Rogers will know more precisely what his wind resource is — and its potential economic value.

Wagon Wheel Ranch is actually in the second phase of a wind study that began last year. Running an irrigated farming and registered Angus operation with a small backgrounding feedlot, Rogers buys his share of electricity. And the cost for that electricity continues to rise — as much as 17% per year recently — so Rogers is looking at options to get control over his costs.

Living on the plains of eastern Colorado, wind power seemed a natural fit. But how could he know for sure?

With the help of Brink Inc., an environmental solutions consulting firm for the livestock industry, Rogers sought to answer that question. They studied Wagon Wheel Ranch's electricity usage and costs over a multiyear period and looked at its average wind speed based on data from the National Renewable Energy Laboratory.

They also estimated the electricity output of eight wind turbines, ranging in size from a small 1.9-kilowatt residential unit to a commercial-scale, 1.6-megawatt turbine.

"By comparing each turbine's projected electricity output and cost with Wagon Wheel's electricity usage and costs," Phil Brink, CEP (certified environmental professional), says, "we were able to estimate the value of wind-generated electricity and the payback time of each of the eight turbines."

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Inflation, loan interest, and local utility buyback rate for excess electricity were also factored into cost and payback estimates.

Of the eight wind turbines studied, payback times ranged from as little as 9 years to nearly 30 years, depending on individual turbine cost and output. The cost to produce electricity ranged from 7¢ per kilowatt hour (kWh) to 14¢ per kWh.

The largest turbines could generate energy for the lowest cost per kilowatt hour. However, because of their high initial cost and the large amount of excess electricity that would have to be sold back to the utility's grid at the wholesale rate, the largest turbines had the longest payback times.

The most cost-effective turbines for Wagon Wheel Ranch were 10- and 20-kilowatt turbines. The installed cost of these units ranged from \$45,000 to \$85,000, and payback times ranged from about nine years to 17 years, depending on the specific turbine and whether financing was utilized.

The most important variable influencing the economics of harnessing wind power is average wind speed. For most of the United States, the National Renewable Energy Laboratory ([www.windpoweringamerica.gov](http://www.windpoweringamerica.gov)) has wind speed maps that provide a general idea of the average wind speed in a given area.

However, like Wagon Wheel Ranch, anyone considering a wind turbine purchase should first determine their actual wind energy potential by measuring on-site wind speed for a year, since average wind speed can vary greatly even within a short distance.

Livestock producers like Rogers increasingly are looking at their renewable energy options. The idea of harvesting crops and forage on the ground and energy in the sky can make good financial sense and reduce dependency on external energy sources.

"Instead of cussing the wind, we can put it to work," Rogers says. On windy days, when his spinning anemometer is just a blur, that brings a smile to his face.



**Editor's Note:** Philip Brink of Brink Inc. Environmental Consulting, Lafayette, Colo., provided this article. For more information, contact Brink at 720-887-9944.