The number of farmers and ranchers benefiting from wind power is growing. Here are some examples:

Chuck Goodman, retired farmer near Alta, Iowa, as quoted in Successful Farming. Goodman has three turbines that take up about 1.3 acres of land, including an access road. Goodman gets $750 per year per turbine, plus two percent of the revenue, for a total income of about $6,000 per year.

Donald and Irene Decker, farmers in Pennsylvania, quoted in Environmental News Network, June 21, 2000. The Deckers have four 200-foot-tall wind turbines installed on their family farm.

Keith & Myrna Roman, ranchers in Weld County, Colorado.

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National Wind Technology Center
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www.nrel.gov/wind

National Wind Coordinating Committee
1255 23rd Street NW
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www.windyday.org

To find out more about renewable energy and agriculture, visit the Clean Energy section of the UCS website at www.ucsusa.org/clean_energy. Or, write to: Clean Energy Program, Union of Concerned Scientists, Two Brattle Square, Cambridge, MA 02238, or call (617) 547-5532.

FACT SHEET

Farming the Wind:
Wind Power and Agriculture

"I didn't really expect them to come all the way out here in northern Iowa to start a wind farm. But this is really great. Now we grow corn on the ground and generate power in the air—all on the same piece of property."

Delbert Watson, farmer near Clear Lake, Iowa, quoted in the Christian Science Monitor.

The first heyday of wind power in America lasted from 1870 to 1930, when thousands of farmers used the wind to pump water and generate power. The second heyday is just beginning. Wind power is the fastest-growing energy source in the world, with annual average growth of 32 percent between 1998 and 2002. In the United States alone, nearly two billion dollars’ worth of wind turbines are projected to come on line in 2003—enough to power 800,000 homes.

The U.S. Department of Energy’s (DOE) “Wind Powering America” initiative has set a goal of producing five percent of the nation’s electricity from wind by 2020. DOE projects aimed to achieve this goal will provide $60 billion in capital investment to rural America, $1.2 billion in new income to farmers and rural landowners, and 80,000 new jobs during the next 20 years.

Until recently, wind power was concentrated in California. Now it can be found in most states. Farming regions in the Midwest, Great Plains, and West have emerged as major growth areas. Wind power is growing partly as a result of technology improvements and cost reductions and partly in response to state and federal laws and incentives.

While many people will benefit indirectly from the clean air and economic growth brought about by wind power development, farmers can benefit directly. Wind power can provide an important economic boost to farmers. Large wind turbines typically use less than half an acre of land, including access roads, so farmers can continue to plant crops and graze livestock right up to the base of the turbines.
**The Wind Resource**

In theory, the wind could produce five times more electricity than the United States currently uses. Some of the best wind resources in the country are on farmland, especially in the plains states. However, the wind resource varies greatly from one location to another. Many states have developed wind resource maps and have been measuring the wind and collecting data that farmers could find useful for determining the wind potential on their land.

The market potential for wind also depends on the cost. The cost of producing wind power has fallen by as much as 90 percent since 1980. By 2010, electricity from new wind power projects will be cheaper than electricity from new conventional power plants, according to the DOE.

**How the Wind Can Help Farmers**

Farmers and ranchers are in a unique position to benefit from the growth in the wind industry. To tap this market, farmers can lease land to wind developers, use the wind to generate power for their farms, or become wind power producers themselves.

**Working with Wind Developers**

One of the easiest and most attractive ways for farmers to benefit from wind power is to allow developers to install large wind turbines on their land. The royalties are typically around $2,000 to $5,000 per year for each turbine, depending on its size. These payments can provide a stable supplement to a farmer’s income, helping to counteract swings in commodity prices.

Wind developers may offer landowners a fixed annual lease payment, a single up-front payment, a share of revenues from a wind project, or some combination of these. Although fixed payments may be lower than a share of revenues, they offer less risk to the landowner. Up-front payments may be attractive too, but if the property is sold within the timeframe of the contract, it could complicate the sale. A new landowner who doesn’t receive any income from the wind turbines may want to pay a lower price for the property. Also, up-front payments are often structured so that the developer receives a perpetual lease to the wind resource rights on the property. This can be a disadvantage, as the value of wind power is expected to increase over time. Basing the lease on a share of revenues is likely to be the best option for capturing future increases in the value of wind power.

**Owning a Turbine**

Farmers and ranchers can generate their own power from the wind, just as their predecessors did in the 1930s and 1940s. Small wind generators, ranging from 400 watts to 40 kilowatts or more, can meet the needs of an entire farm or can be targeted to specific applications. In Texas and the West, for example, many ranchers use wind generators to pump water for cattle. Electric wind generators are much more efficient and reliable than the old water-pumping fan-bladed windmills. They may also be cheaper than extending power lines and are more convenient and cheaper than diesel generators.

“Net metering” enables farmers to get the most out of their wind turbines. When a turbine produces more power than the farm needs at that moment, the extra power flows back into the electricity system for others to use, turning the electric meter backwards. When the turbine produces less than the farm is using, the meter spins forward, as it normally does. At the end of the month or year, the farmer pays for the net consumption or the electric company pays for the net production. Net metering rules and laws are in place in most states.

**Typical Expenses for a Wind Turbine**

The economics of owning a turbine depend on many factors, including wind speeds, the size and cost of the wind turbine, interest rates, taxes, and electricity prices. One key issue is how much of the power the farm uses and how much is sold back to the utility. A study by the Izaak Walton League found that a wind turbine investment pays for itself most quickly when most or all of the power is used on the farm, since the farmer is saving power at the retail price, rather than selling it at a wholesale price.

With smaller wind turbines, most farm operations can use all of the power. But the cost per unit of electricity generated from smaller turbines is higher than that from larger turbines, so the payback period is longer. Since a well-maintained wind turbine can last 30 years, it can be a profitable investment. Like any other long-term investment, a thorough engineering and financial analysis is important before making the investment.

**Costs and payback of typical wind turbines**

<table>
<thead>
<tr>
<th>System Size</th>
<th>Capital or up-front cost</th>
<th>Annual energy production</th>
<th>Payback using all farm power needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 kW</td>
<td>$32,000</td>
<td>20,000–28,000 kWh</td>
<td>18–27 years</td>
</tr>
<tr>
<td>50 kW</td>
<td>$130,000</td>
<td>100,000–150,000 kWh</td>
<td>12–18 years</td>
</tr>
<tr>
<td>225 kW</td>
<td>$325,000</td>
<td>425,000–600,000 kWh</td>
<td>9–13 years</td>
</tr>
<tr>
<td>660,750 kW</td>
<td>$800,000–$900,000</td>
<td>1,500,000–2,300,000 kWh</td>
<td>6–8 years</td>
</tr>
</tbody>
</table>

Assumes a retail electricity cost of 7.5 cents per kilowatt-hour, increasing three percent per year, and annual average wind speeds of 15 mph to 17.4 mph at 50 meters above the ground. Source: Based on data from wind turbine manufacturers and estimates from Thomas A. Wind, Wind Utility Consulting.