



## **Wind Energy Blueprint**



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## Introduction: Why Wind Energy? Why Shift Your Farm

We believe that farmers hold the key to better food, a safer planet, and a sound future. By working with farms, the true source of our food, we have the opportunity to "farm our future."

We want to disrupt the food system for the better, while improving social welfare for farmers, ensuring animal welfare and contributing to a positive environmental impact for our future. Part of this shift is encouraging a shift towards plant-based farming and usage of renewable energy, such as wind energy, on farms, which farmers can use themselves or sell for additional income.

In the United States, currently, most large turbines are being installed in the Midwest, Great Plains, and West, where state policies provide support and incentives. But farmers in many more states could benefit from eolic power (wind energy) since some of the best wind resources are found on agricultural lands.

Producing and selling eolic power is ideal for farmers looking for additional income while still growing crops. Each wind turbine uses less than half an acre, so farmers can plant crops right to the turbine's base.



## Types of Wind Energy Projects

1. Utility-scale projects (> 1 Megawatt) with a big potential where wind power energy prices could be competitive with wholesale power prices.
2. Distributed wind market sector: community or small-scale wind projects. These can be off-grid or connected to the grid but usually only to offset the power demand and without overproduction that can also be sold.
  - a. Small-commercial scale (10-50 kW) is best for farms to simply produce the amount of energy they consume.
  - b. 50 to 250 kW is enough to power campuses, large facilities, and communities.
  - c. 500 kW to 1.5 MW is ideal for large communities and large industrial loads.

## Market Potential of Wind Energy

In 2018, 6% of the U.S. Energy was eolic energy, but this number could be [20% by 2020](#). Wind energy could provide 80,000 new jobs and \$1.2 billion in new income for farmers and rural landowners by 2020 (U.S. Department of Energy).

Where there are strong winds, developers may pay as much as \$2,000 to \$5,000 per year to each farmer for each turbine installed. Some farmers are starting to form wind power cooperatives.

The state with [most wind turbines](#) installed according to 2018 data is Texas ( over 25.000 MW), followed by Iowa (9000 MW), California (5800 MW), Kansas (5600 MW) and Illinois (4800 MW). Texas could produce up to 1.3 Mio MW and states with the potential to produce between 400.000 MW and 700.000 MW are Montana, New Mexico, Kansas, Wyoming, Nevada, Nebraska, Arizona, and South Dakota. Other U.S. states with some of the strongest winds and hence the potential to produce wind energy are Oklahoma, Minnesota, Oregon, Colorado, and Washington.

Most farms that have windmills have small ones, but there is the potential for much larger windmills on farms. The wind projects on farms could be utility-scale projects (> 1 Megawatt) or distributed wind market sector.

For more information about the wind energy market, see [WINDExchange](#).

## Financial Incentives and Funding:

1. [Department of Energy](#) (DOE)
2. DOE's [Advanced Research Projects Agency-Energy](#) (ARPA-E)

3. [Database of State Incentives for Renewables and Efficiency](#)
4. [Rural Energy for America Program](#)
5. [Economics and Incentives for Wind](#)

## Wind Energy Expert and Supportive Farm Affiliates

1. Companies that have large wind energy farms in the US:
  - a. Vestas
  - b. Siemens Gamesa
  - c. GE Energy
  - d. Mitsubishi
  - e. Enercon
  - f. Suzlon
  - g. Wind Energy Solutions (WES)
  - h. Neg Micon
  - i. ACCIONA
  - j. Northern Power Systems
2. National Renewable Energy Laboratory (NREL)

3. Union of Concerned Scientists USA (UCS USA)
4. USDA - [Wind Energy](#)
5. [American Wind Energy Association](#)
6. [Distributed Wind Energy Association](#)
7. U.S. Department of Energy Wind Energy Technologies Office
8. [Wind Power Engineering](#) - great resources and a map of 600 wind farms, including wind project owner, developer, constructor and manufacturer

## Relevant Articles and Tools

1. [Wind Power Engineering](#) - Videos, Webinars, Podcasts
2. [WINDEXchange](#) has great models and tools:

### Models:

- Performance and financial modeling
- Bulk power system, generation, and transmission, from present-day through 2050 or later

### Tools:

- Permitting toolkit
- Energy zones mapping tool

- Wind energy resources on public lands and resource sensitivities that may affect wind energy development opportunities
- Wind energy integration and optimization
- GIS-based wind resource datasets

