Landowners' Frequently Asked Questions about Wind Development

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1. How much money can I make?

Based on wind projects in southern Minnesota and northern Iowa, landowners can expect to receive annual land-lease payments ranging from $2,000 to more than $4,000 per turbine. The amount depends on the size of the wind turbine and how much electricity it produces as well as the selling price of the electricity. The same turbine will produce more in one location than another depending on the annual average wind speed at the site. The payments typically represent from 2% to 4% of the annual gross revenue of the turbine.

2. How many turbines can be placed on a section of land?

Approximately 10 megawatts (MW) can be placed on a section of land. Wind turbines are usually spaced 5 to 10 rotor diameters apart. The spacing criteria allow approximately twelve 750-kilowatt (kW) turbines or six 1.5-MW turbines on a section of land. Developers usually place the turbines as close together as possible to reduce the costs for wire and roads, but they do not want to create wake losses by placing the turbines too close together.

3. Is my land a good wind site?

A small increase in wind speed results in a large increase in power output from the turbine, so developers want to find the windiest sites. The wind speed increases with altitude and is slowed down by surface roughness elements such as trees, rough hilly terrain, and buildings. For example, a high plateau surrounded by land with relatively low surface roughness out to a distance of 5 miles or more would be a good wind site. The site must also be accessible to large cranes and other construction equipment and be near the transmission grid.

4. How do I get wind turbines on my land?

Work with your community to attract developers interested in working in your area. When planning large wind farms, developers rely on meteorologists to determine the best locations for the turbines. Developers want maximum energy capture at the lowest installed cost.

5. How much will I have to invest?

In most cases, wind developers finance, own, and operate the wind farms. The local landowners are not expected to provide financial support. The landowner's role is typically to lease land to the developer for an annual fee.

6. Will my property taxes increase?

Installing a wind turbine may increase the property value because turbines produce long-term income. Most land-lease agreements have provisions stating that the wind developer will cover any increase in the landowner's property tax.

7. Can turbines be sited on Conservation Reserve Program (CRP) land?

Yes, wind turbines can be sited on CRP land. The square footage occupied by the turbines and access roads may have to be removed from the CRP agreement if the landowner is receiving land-lease payments.

8. Can turbines be sited on grassland easements?

The U.S. Fish and Wildlife Service has developed guidelines that will allow one wind turbine per 160 acres of land that is under the grassland easement program. However, there are some restrictions. Interested landowners should contact the U.S. Fish and Wildlife Service for details.

9. What are the steps leading to wind development?

Typically, wind developers need a power purchase agreement, a good wind resource, low-interest financing, and low transmission upgrade or construction costs. The steps leading to wind development include:

- Prospecting for good wind sites
- Negotiating land-lease agreements
- Monitoring wind speeds
- Investigating transmission access
- Negotiating power purchase agreements
- Arranging financing.

10. What does the local utility think?

In the past, most utilities did not favor wind development because of its high cost and low reliability. Over the years, incremental design improvements have lowered costs and increased reliability to the point at which wind energy is the

least-cost form of new generation, and reliability is better than 99%. Today, utilities across the country are involved in wind projects as a means of diversifying their portfolios, lowering their exposure to the risk of fluctuating fuel costs, and responding to consumer demand for wind energy.

11. How much do wind turbines cost?

Wind farms cost approximately $1 million per megawatt of installed capacity.

12. How much does a wind farm earn?

A 1.5-MW wind turbine will produce approximately 5,000,000 kWh per year—enough to power about 500 homes. At $0.04/kWh, the turbine would earn $200,000 per year in gross revenue.

13. Who owns the wind farm?

Investors typically own wind farms.

14. How much wind is needed?

Wind farm development becomes economically viable in wind regimes that have at least a 16-mph annual average wind speed (at the hub-height).

15. How much electricity do they generate?

A 1.5-MW wind turbine will produce approximately 5,000,000 kWh per year, which is enough to power about 500 homes.

16. Do wind turbines harm birds?

Birds collided with wind turbines on some of the early California wind farms, so the wind industry has carefully studied almost every wind farm project built since. The resulting studies indicate that the California experience was due to a unique set of circumstances that contributed greatly to the problem. Better siting practice has helped the industry avoid repeating the mistakes made in California.

17. How tall are wind turbines?

Modern wind turbines are placed on towers that range in height from 56 meters (184 feet) to 100 meters (328 feet). The blades are usually around 100 feet long, so at the top of its arc, a blade tip could be more than 400 feet in the air.

18. Are wind turbines noisy?

Modern wind turbines are very quiet. The noise produced by a wind turbine is a combination of the “swoosh” of the blades flying through the air and the hum from the gearbox and generator. The overall noise level has been compared to that of a modern refrigerator. When standing near a modern wind turbine, the background noise of the wind rushing past your ears will usually drown out any noise from the wind turbine.

19. How do turbines operate?

Wind turbines are sophisticated machines with computer controls. A typical operating sequence is as follows:

When the wind speed reaches the cut-in speed of the turbine (usually around 10 mph), the turbine blades will spin up to operating speed, usually around 14 to 29 rpm (varies by turbine model), and start generating electricity. As the wind speed increases, the generator output increases. When the wind speed increases to the rated wind speed (usually around 30 to 35 mph), the generator will output its nameplate-rated capacity (i.e. a 750-kW turbine would now output 750 kW). As the wind speed continues to increase, the generator output will remain at the rated capacity (i.e. 750 kW) until the wind reaches the cut-out speed (usually around 55 to 65 mph). At this wind speed, the turbine will deploy its tip-brakes and then apply its disk brake, stopping the blades in a few revolutions. It will then rotate itself 90 degrees out of the wind and park itself. If the wind speed drops to a level below the cut-out speed for a sufficient length of time, the turbine will point itself back into the wind, release the brake, and resume power production.

20. What happens when the wind doesn’t blow?

The existing system consists of two types of generating equipment, base-load equipment (coal-fired generators) that run at the same output level all the time, and load-following equipment (natural gas-fired generators) that are designed to vary their output to match the fluctuating load (lights and appliances going on and off). When wind turbines put electricity onto the grid, the natural-gas-fired generators respond by lowering their output. This automatic system is capable of compensating for wind energy added to the grid. Studies indicate that wind energy penetration levels of at least 10% on the grid are feasible under current control systems. In reality, it will be many years before we see wind penetration levels approaching 10%.