



FOR LANDOWNERS

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INTRODUCTION TO HORIZON WIND ENERGY

Horizon thinks of its partnerships with landowners as more than business transactions. We're partners and neighbors, and we share with you a mutual respect and concern for the land. When we build a wind farm, we lease property from landowners for the life of a project. We're thinking about the same things you are: the beauty of the land, its value as a working piece of property, and its connection to the environment.

If we find that you've got good wind on your property, we can help you transform this endless natural resource into capital. We give straight answers about financial agreements and royalty payments. We've streamlined option and lease agreement structures through years of experience. Horizon looks forward to strong alliances with landowners who see the possibilities of conscientious land stewardship combined with profitability.

Landowners who team up with Horizon benefit from our familiarity with a variety of geographical areas. We partner with farmers and ranchers across the United States and around the world. We understand the land and answer specific questions about your property early in the development process. *What effect will wind turbines have on my current grazing management methods? What impact will wind turbines have on local watersheds or wildlife management operations?* Our engineers and developers have answers for you—and for us, as well—to ensure the success of the project and the protection of your land.

PARTNERING WITH HORIZON WIND ENERGY

Horizon is in one business: wind energy. We build and operate wind farms, and it's the only thing we do. We're specialists. What does this mean for you? We work efficiently. We work quickly. And we will always be there to respond personally as issues arise.

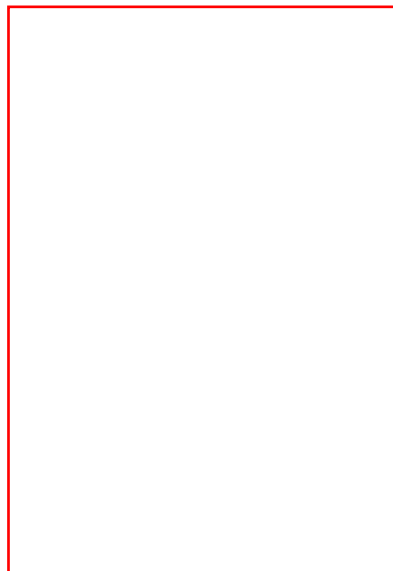
Horizon operates with a philosophy of caring for the land. We're focused on making real improvements to the environment to help alleviate the global climate challenges our generation and future generations will face. We are also in the wind business to make a profit from an abundant natural resource. Combining profitability with

land stewardship is an exciting proposition.

BUILDING A WIND FARM

The first step to building a wind farm is finding the best location to catch the wind. We initiate a wind resource analysis to identify the best place. We're looking for average wind speeds above 17 MPH.

Transmission of electricity is also a key consideration. It is important that a robust transmission line be located within a reasonable distance from the prospective area. So when we're assessing the wind at a particular location, we're also making sure that we will be able to convey the electricity generated to the main power grid.



When we find the right match of wind and transmission resources, we contact landowners within the prospect boundaries. Horizon likes to do this a couple of ways. After our landman has introduced us, we like to sit down for a cup of coffee to talk about wind energy. We also like town meetings if a large number of landowners and members of the community are interested in a wind farm. In both cases, we're happy to answer your questions—for example, how royalty payments are

calculated, why we're interested in your land, and the time frame for a project. We also gather feedback on what items need to be addressed at the community and individual levels. Finally, we hand out copies of the proposed option and lease agreement to interested parties.

A Horizon Project Development Director negotiates a financial arrangement with the landowner. 50-meter (or higher) meteorological test towers are then erected within the prospect boundary. Two to three *met* towers are installed over the entire prospect area for an average project size of 100 MW. Met tower installation does not require any major construction or land disturbance. Depending on the availability of publicly available data, which is used to corroborate on-site test tower data, it can take 6 months to 2 years to verify the wind resource within the prospect area.

OPTION AND LEASE AGREEMENT STRUCTURE

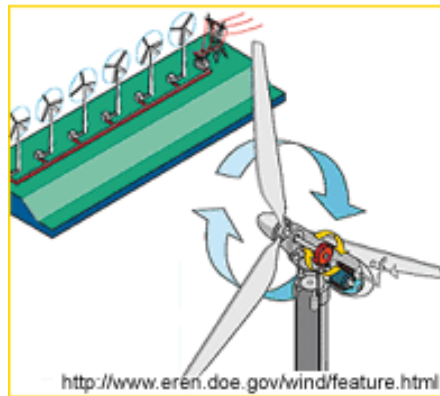
Horizon works with landowners interested in long-term business relationships. There are two phases to this relationship: the option phase and the lease phase.

The option phase gives Horizon the option to exercise the lease once on-site wind resource assessments have concluded. The option

period usually does not last more than 7 years. In some cases, the option is exercised more quickly, but in other cases an extended option period is needed due to regulatory variations at the state or federal level. Landowners are typically compensated on a per acre versus a per turbine basis during the option phase because the number of turbines on a particular landowner's property could change depending on the wind resource assessment and evolving turbine technology. Our cost is about one million dollars per MW. Therefore, it is important to thoroughly analyze the wind resource and understand all legislative hurdles that could affect the economics of the project.

Lease terms range from 30-40 years with escalating royalty schedules and detailed damage provisions. Horizon typically engages local land companies to act as unbiased intermediaries during the option/lease negotiation process. The local landman resides in the prospect area throughout the majority of the option/lease phase to ensure good communication between Horizon and the landowners. We make frequent visits to the site during the landowner negotiation phase.

THE MODERN WIND TURBINE



This aerial view of a wind power plant shows how a group of wind turbines produces electricity for the utility grid. These three-bladed wind turbines operate upwind, with the blades facing into the wind.

Modern wind turbines sit on 150-300-foot (60-80-meter) feet towers. The diameter of the rotor and blades can reach more than 200 feet (70 meters). Set on the ground, a rotor can almost cover a football field.

Horizontal-axis wind turbines consist of three main parts: the tower, the blades, and a box behind the blades called the *nacelle*. Most of the action takes place inside the nacelle, where motion is turned into electricity. Large turbines don't use tail fans for direction control; instead hydraulic controls orient the blades into the wind.

In a typical design, the blades are attached to an axle that runs into a gearbox. The gearbox, or transmission, steps up the speed of the rotation, from about 30 RPM to 1,800 RPM. The faster spinning shaft rotates inside the generator, producing AC electricity. Electricity must be produced at just the right frequency and voltage to be compatible with the utility grid.

THE BENEFITS OF WIND ENERGY

Wind energy benefits the local and national economy by creating jobs while reducing reliance on imported energy. Several studies have established that wind energy provides more jobs per dollar invested or per kilowatt-hour (kWh) generated than most conventional energy resource options. In addition, wind power plants pay substantial property taxes to local communities and provide supplemental income to local landowners. Wind power has proved to be particularly popular with consumers, many of whom are willing to spend more for *green power*.

The environmental benefits are substantial—wind energy reduces a utility’s pollutant emissions. Because it produces no pollution or hazardous waste, wind energy has far-reaching benefits for public health and the economy.

FREQUENTLY ASKED QUESTIONS

Are wind turbines noisy? Large, modern wind turbines are very quiet. At distances of more than 600 feet, the swishing sound of rotor blades is usually masked completely by wind noise in the leaves of trees or shrubs. One of the biggest reasons today’s wind turbines are quiet is because most are engineered to be acceptable for installation in Europe, where higher density land use means the turbines are often installed near houses. There are two potential sources of noise from a wind turbine: mechanical noise from the gearbox or generator, and aerodynamic noise from the rotor blades.

Mechanical noise has virtually disappeared from modern wind turbines because of better engineering with more concern about avoiding vibrations. Modern wind turbine gearboxes use “soft” gearwheels—i.e., toothed wheels with hardened surfaces and relatively elastic interiors.

Aerodynamic noise—i.e., the “swish” sound of the rotor blades passing the tower of a wind turbine—primarily occurs at the tip and the back edge of the rotor blade. The higher the rotational speed, the louder the sound. Aerodynamic noise has been cut dramatically over the past ten years due to better design of rotor blades (particularly blade tips and back edges) and lower RPM machines. Pure tones can be very annoying to a listener, while *white noise* is barely noticed at all. Rotor blade manufacturers take extreme care to ensure a smooth surface, which is important to avoid pure tones.

Do wind turbines really save energy?

The energy produced by a wind turbine throughout its 20-year lifetime (in an average location) is eighty times larger than the amount of energy used to build, maintain, operate, dismantle, and scrap it again. In other words, on average it takes only two to three months for a wind turbine to recover all the energy required to build and operate it.

Wind turbines use energy only from the moving air to generate electricity; therefore, a modern 600 kW wind turbine will annually displace 1,200 tons of carbon dioxide from other electricity sources, usually coal-fired power stations.

Are there enough wind resources around? Wind resources are plentiful. Wind will not run out.

Can wind contribute significantly to electricity production? Wind turbines have grown dramatically in size and power output. Far more capacity is installed each year in wind turbines than in nuclear energy. Worldwide, 10,000 MW have been installed.

Is wind energy expensive? Wind energy has become the least expensive renewable energy technology in the world. The economics of wind energy depend heavily on how windy a site is. In addition, there are also economies of scale when building larger wind parks.

Is wind energy safe? Wind energy leaves no harmful emissions or residue in the environment. Wind energy has a proven safety record.

Are wind turbines reliable? Yes. High quality modern wind turbines have an availability factor above 98% (i.e., the turbines are on average operational and ready to run during more than 98% of the hours of the year). This availability factor is beyond any other electricity generating technology. Modern wind turbines require maintenance checks only every six months and are built to very exacting industrial standards.

How much land is required to site wind turbines? Wind turbines and access roads occupy less than 3% of the land area in a typical wind farm. The remaining land can continued to be used for farming or grazing without inconvenience. Since wind turbines extract energy from the wind, there is less energy in the wind shade of a turbine (and more turbulence) than in front of it. In a wind farm, turbines generally have to be spaced between three and nine rotor diameters apart in order not to shade one another too much. (The most commonly used spacing is a distance of 5-7 rotor diameters.) If there is one particular prevailing wind direction—e.g., from the west—turbines may be spaced very closely in an orientation that is at a right angle to that direction—i.e., north-south—to avoid shading.

Can wind turbines blend into the landscape? Wind turbines are obviously highly visible, since they must be located in windy, open terrain to be economical. Good design, careful choice of paint colors, and precise visualization studies before siting is decided can improve the visual impact of wind farms dramatically. As other well-designed structures do, wind turbines and wind parks can furnish the landscape with new architectural values.

How is the landscape affected after a wind turbine has been dismantled? Wind turbine manufacturers and wind farm developers have substantial experience in minimizing the ecological impact of construction work in sensitive areas such as moors or mountains, or when building wind farms in offshore locations. Restoring the surrounding landscape to its original state after construction has become a routine task for developers. After the useful life of a wind farm has elapsed, foundations can be reused or removed completely. Because there is so much steel in a wind turbine tower, the scrap value of a turbine more than covers the costs of restoring a site to its initial state.

Do wind turbines bother wildlife? Deer and cattle habitually graze under wind turbines, and sheep seek shelter around them. While birds tend to collide with man-made structures such as electrical power lines, masts, or buildings, they are very rarely affected directly by wind turbines.

Can wind turbines be placed anywhere? Landowner safety is a primary concern. Typically, wind turbines are placed a minimum of 1000-1500 feet from houses and 300 feet from non-participating landowner property lines and 1500 feet from non-participating landowner houses.

Terrain is also important. The energy content of the wind varies with the cube (i.e., the third power) of the wind speed. Twice as much wind yields eight times as much energy. Manufacturers and wind farm developers, therefore, take care to site wind turbines in the windiest areas possible. The roughness of the terrain, its contours, and even the presence of buildings, trees, plants, and bushes affect the local wind speed and may create turbulence, which may decrease energy production and increase wear and tear on the turbines.

Does wind energy create jobs? The wind industry in 1999 provided more than 40,000 jobs worldwide. The wind industry is becoming more international, with turbine manufacturing happening all over the world.

What is the wind energy market like? Since 1993, growth rates in the wind turbine market have been around 40% annually, and growth rates of 20% per year are expected for the next ten years. Wind energy is gaining ground in developed and developing countries alike. In developed countries wind energy is in demand because of its pollution-free qualities. In developing countries its popularity is linked to the fact that turbines can be installed quickly, and they require no subsequent fuel supplies. The wind turbine industry is now a \$1.5 billion industry with a bright future.

THE FUTURE OF WIND POWER

Wind energy has been the fastest growing source of electricity

generation in the world since the 1990s. The majority of this growth, however, has been in Europe, where government policies and high conventional energy costs favor the use of wind energy.

In the United States, from June 1998 to July 1999, the wind industry installed a total of 1,073 MW in new wind turbines and generating equipment, with total investment well over \$1 billion. New American wind power will prevent 2.2 million tons of carbon dioxide, 11,000 tons of sulfur dioxide, and 7,000 tons of nitrogen oxide from being released annually into the air. These amounts would have been emitted if the average U.S. utility fuel mix had been used to produce an equivalent amount of electricity.

The U.S. Department of Energy recently announced the Wind Powering America initiative with goals to power at least 5% of the nation's electricity with wind by 2020.

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