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Available at:
www.powernaturally.org
October 2005
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This document is one of a series of reports and guides that are all part of the NYSERDA Wind Energy Tool Kit. Interested parties can find all the components of the kit at: http://www.powernaturally.org/. All sections are free and downloadable, and we encourage their production in hard copy for distribution to interested parties, for use in public meetings on wind, etc.

Any questions about the tool kit, its use and availability should be directed to: Vicki Colello; vac@nyserda.org; 518-862-1090, ext. 3273.

In addition, other reports and information about Wind Energy can be found at http://www.powernaturally.org/ in the on-line library under "Large Wind."

NOTICE

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Introduction

When developing, constructing, and operating a wind power plant, the developer needs access to land with a viable wind resource (see www.awstruewind.com). Wind power developers typically obtain long-term leases on land for use by the project. Often, this is done in two steps: an option phase and a long-term lease phase. To determine whether a parcel of land has a strong wind resource, the developer must first gain access to the land to install wind monitoring equipment. This short-term access often is gained through an Option Agreement. If testing reveals a good wind resource and other factors indicate the project is feasible, the developer would normally exercise the option, and the long-term lease would be completed. If not, the option can expire. It is also possible for the short-term option phase and longer-term lease agreement to be included in a single agreement.

When preparing a wind power project land lease or option agreement a number of elements should be considered. These include payment structures, pricing, terms, and land use issues. The perspectives and interest of landowners and project developers are discussed in this section as well as the typical ways in which the needs of the participants are met by the agreements.

The legal tool used to obtain the rights to develop and operate a wind power project on another person's land will vary depending on local laws and customs. There are several common but legally different methods of obtaining these rights, including leases, easements, rights-of-way, and land trusts. For the purposes of this document, the word "lease" is being used despite the fact that leases, easements, rights-of-way, and land trusts are legally different.

This document helps explain the reasoning for a land lease and important concepts to consider when negotiating a land lease for a wind power project. Readers are urged to consult their own legal counsel to ensure that their objectives will be achieved and their legal interests will be protected before entering into any binding agreement.

Background

Reasons for a Landowner to Participate

Often, land suitable for wind power projects is owned by rural landowners or by communal or government (federal, state, or county) entities. Landowners may be interested in leasing their land to wind power projects for one or more of the following:

- Increased Income – Leasing the wind rights to a wind power developer can provide valuable additional income. At the same time, most of the leased land remains available for farming or ranching around the turbines, which in typical multi-turbine projects occupies less than 5% of the land on which the project is located.
- Income Diversification – Whether a farmer's fields lay fallow or are in production, a farmer will receive payments from a wind power lease.

- Economic Development for the Local Community – Wind energy development can bring a boost to the local economy through the creation of skilled jobs, including manufacturing turbines or building and operating wind power projects, and through increased taxes to the local government.

Leasing versus Purchasing

Broadly speaking, developers have two alternatives for acquiring the right to install wind turbines on land: leasing or purchasing. Sometimes developers purchase land outright for wind projects, but this is not very common. Most land purchases occur for electric utility project ownership or for a research project (i.e., not in a competitive, commercial environment). Land purchase is uncommon because it results in an expense that must be added to an already capital-intensive project. Furthermore, because the wind turbines occupy a small portion of the land, and are compatible with most existing land uses on the property, the developer does not need to acquire all of the land for the wind power project.

Land ownership does have the advantage of providing a wind power developer with long-term control of the project site, which would allow for new projects to be constructed after the useful life of the original project without the need to negotiate a new lease. Though not common, in the United States, electric utilities that own their wind power projects are the most likely to own the underlying land. Land ownership gives the utility the benefits of long-term control of the power-generating asset, and the land purchase can often be included in the utility's rate base (investments and expenses the utility is allowed to recover from customers).

Leasing the land or obtaining easements from the landowner is the most common type of arrangement made by wind power project developers for three key reasons. First, for non-utility independent power producers (IPPs), a leasing agreement is more beneficial to the cash flow of the project because land lease payments are usually spread out over the life of the project and therefore do not have a disproportionate impact on the project's financial returns at the beginning of the project. For wind projects that are only marginally profitable, the land payment arrangement can make a meaningful difference in the project cash flow and economic viability.

Second, wind turbines occupy only a small portion of the overall land used for a project and wind developers have no use for the remaining land. Leasing the land for wind energy development provides the landowner with additional revenue without significantly interrupting existing operations. Wind project developers—whether utilities or IPPs—generally are not interested in expanding their business to take over agricultural pursuits; and, therefore, a leasing agreement may make more economic sense.

Third, land purchase is uncommon because many farmers or ranchers are reluctant to sell land that may have been in their families for generations. Supplementing their income with lease payments from wind developers allows them to retain their property, continue with their long-established activities, and maintain a lifestyle with which they are comfortable.

Option Agreements

Once potential sites are identified, the developer will enter into an Option Agreement with the landowners to gain access to the land for testing and to secure the rights to the land if the project goes forward. The developer normally needs to obtain at least six months to two years worth of hourly wind data at a specific location to evaluate the wind resource.

The option period typically lasts three to five years to allow sufficient time to procure testing equipment and test the resource. The term may be extendable. Before the term is over, the developer can either exercise the option to lease the land, request an extension, or let the option expire. This way, both the landowner and developer are protected during that option period if it is decided that the wind project development will not be carried out. If the project does not go forward, the expiration of the option means the developer is not tied to unwanted property and payments, and the landowner can put the land to other use.

During the option period, the developer often pays modest fees to landowners for the right to place the wind resource measurement equipment (i.e., meteorological towers with anemometers to measure wind speed and other instruments to measure wind direction and temperature) on the site, and sometimes pays fees to compensate for construction-related disruptions. In the United States, these fees can amount to a few hundred dollars per year, and vary depending on the wind resource and the desirability of the land.

Major Issues to be addressed in a Lease

Leases should be carefully developed so they clearly address issues important to the project developer and landowner at the time the lease starts, as well as years later during project operations. In many cases, the people who originally negotiate a lease will not be involved later in the operating period of the project, so it is important that any understanding between the parties be properly addressed in the written lease to prevent future misunderstandings.

A well-executed lease is an important part of the project development process. Before allowing wind turbines to be purchased and installed, investors will want to be sure the lease provides clear, unimpeded rights to access and use of the land over the long term.

The most important portions of the land lease are the length of the agreement (term), what other uses are acceptable on the land surrounding the wind turbines, the payment structure, and decommissioning. These and other major land lease provisions are described below.

Term

Wind power leases generally have terms of 20 to 50 years, often with an option for extending the lease. A typical wind power project has a useful life of 15 to 25 years. A term of 20 years allows one project to be developed and operate for its useful life, while a term of 40 or 50 years would likely cover two project cycles (one project, and then a second project on the same site at the end of the useful life of the first project). Some contracts include clauses specifying the conditions under which either party has the right to terminate the contract. These termination clauses need to be reasonable so that the risk of installing the wind turbine equipment and having the lease terminated is low and manageable.

Area Leased

The lease should clearly state where wind turbines, roads, construction storage areas, and operations and maintenance areas can be located. Any desired setbacks from residences and property lines should be stated. Because construction and major repairs require more activity on the land than routine operations, the lease should include a provision for temporary land use during such periods for equipment storage, cranes, and other construction, operations, and maintenance activities.

The developer will want the right to install wind turbines and infrastructure anywhere on the property (taking into account required and desired setbacks) and may find it difficult when the lease is written to be specific about where turbines will be located, and what size they will be. The location and size of individual turbines will depend upon detailed wind studies throughout the project site, which typically includes many landowners for one project.

A typical lease would state that "Developer shall determine the size, type, manufacturer and exact location of wind turbines at its sole discretion, but developer will not locate, position, or place any wind turbines within 150[1] meters of an occupied residence that exists on the effective date of the lease without the landowner's prior written consent."

Approved Uses

The lease should clarify what land uses the landowner reserves for the land around the turbines. The landowner typically reserves the right to continue to grow crops, raise cattle, or otherwise use the land. Most rural land uses are compatible with wind power projects; however, there can be some restrictions. For example, a developer may ask that hunting be restricted in the area around the turbines, for fear that bullets would damage expensive equipment. In these cases, it is possible that the income a landowner can earn from leasing his or her land for wind power project development can more than offset any income that might be lost by switching to another land use. Developers also will be concerned with any uses that could affect the wind in the area of the turbines. For example, tree crops or large structures could be restricted.

[1] The setback will be negotiated between the developer and landowner for a particular project.

Access

The wind power facility needs to be accessible both by road and via electrical cabling. Easements are frequently used for this purpose.[2] Additional payments may be made for these items, particularly if a different landowner owns the land where the roads or cables cross. For this type of arrangement, smaller fixed payments are common and the amount is typically based on comparable local land values.

Upwind Blockage

Developers have an interest in protecting the project site from any future upwind development that could adversely impact the wind resource on the project site. If the same landowner owns the upwind land, the lease may include provisions addressing this issue. The developer may want an easement that prohibits any development within the upwind property that might impact the wind at the turbine sites. The extent of this potential problem depends on the topography of the land and the wind characteristics. The extent to which upwind development affects a project depends on the distance to the project. While properties more than 2 km away usually are not of concern, the appropriate distance of concern depends on the size of the upwind project and atmospheric conditions.

Noise and Other Disturbances

Wind turbines generally are unobtrusive neighbors. However, landowners may want to include sound standards for construction activities, including reasonable construction hours, or sound standards for the wind turbines (measured at the turbines themselves or at nearby homes). Noise and other disturbances can be difficult and expensive to measure. If such provisions are included, care must be taken in writing them so that they can be interpreted unambiguously and not used unfairly by one party against the other.

Access Control

Wind power projects often involve the construction and use of new roads to access the wind turbines. Provisions for signs, gates, locks, and security patrols should be included in leases as appropriate.

Crop Protection

Normally wind turbines can operate in productive fields with minimal interference. However, crop damage may occur in some situations, and the lease should address how this will be handled. Typical lease provisions require developers to use best efforts to minimize damage, but allow for the possibility that damage may occur, and subject the party causing the damage to paying appropriate compensation. For example, if a wind turbine suffers damage to a blade from lightning, it may be necessary to bring a crane in to remove the blade, place it on the ground, and install a new blade. During the growing season this activity might require some crop areas near the turbine to be flattened so the blades could be placed on the ground. Typically a landowner would receive payment from the wind power project for such crop damage calculated as the lost amount of

[2] An easement is a non-possessory interest in land which only entitles the easement holder to a limited use of the land, such as for crossing the land with vehicles from time to time, or for running a power line over or under the land.

product multiplied by the market price for such crops in the season in which the crop was damaged or destroyed. If this example incident occurred when the field was fallow or not producing, no crop damage payments would be made. The exact formula and conditions must be spelled out in the lease to protect the property owner.

Road Maintenance

The lease should identify responsibilities for maintenance of existing and new access roads. Generally the wind power developer is responsible for such maintenance. The provisions should provide protection to the property owner by allowing for penalties if maintenance is not performed after a reasonable request and time passage.

Decommissioning

Leases should include provisions for "decommissioning" the project at the end of its useful life. This includes removing wind turbines, transformers, wiring which penetrates above-ground, and the top part of foundations, and returning the land as nearly as is practical to its original condition. The lease should also address the timely removal or disposal of damaged equipment.

In practice, this typically means that:

- Turbines, blades, towers, transformers, and transformer foundations are removed from the site.
- Turbine foundation hardware and protrusions such as anchor bolts and tower levelers will be removed, but foundations will remain completely in place, or be removed to a specified distance (for example, 1 meter) below ground level.
- The project substation generally becomes the property of the utility purchasing the power and, therefore, is not removed by the developer.
- Underground electrical wiring remains in place because removing it after the project's life will create more disturbance than leaving it in place.
- Access roads are left in place.

Taxes

Responsibility for payment of property taxes should be clearly specified in the lease. The wind power project developer generally assumes responsibility for any increases in property taxes associated with the wind power project.[3]

Compensation

A key reason for allowing wind power development on one's land is the payment received. Leases should clearly identify how payments are calculated, and when payment needs to be made. Payment structures and typical payment amounts are described later in this paper.

Other Common Terms

In addition to the issues described above, there also are standard terms that are needed for the lease to be binding. These terms include, but are not limited to:

[3] Some landowners are concerned about the impact of wind turbines on property values. This issue is not commonly addressed in lease agreements. However, for more information please see the Property Values paper of the NYSERDA Wind Energy Toolkit.

- Liens and Tenants – in which the lessor warrants that there are no liens, encumbrances, leases, mortgages, deeds of trust, fractured interests, mineral or oil and gas rights, or other exceptions to the title of ownership except as disclosed in a title report or other writing delivered to the project developer
- Encumbrances: Required Notices to Mortgagees – including the right to encumber and covenants for the project lender's benefit
- Assignment – granting the developer the right to sell, assign, encumber, transfer, or grant easements under the lease without the landowner's consent
- Termination – granting either party the right to terminate the lease for non-performance and defining the events of non-performance which constitute default
- Force Majeure – excusing either party from fault to perform under the agreement due to acts of God or other uncontrollable circumstances
- Ownership of Installed Property – defining the installed property as owned by the project developer
- Memorandum – assuring that the lease will be legally executed and recorded.

Typical Payment Structures and Rates

Typical Land Lease Payment Structures

Royalties: The most common structure is the royalty payment. In royalties arrangements, the developer pays the landowner a percentage of the revenue received from the electricity produced by the turbines. This percentage is negotiated between the landowner and the developer. Royalties ensure an ongoing economic relationship between the developer and the landowner and guarantee benefits for the landowner (provided the turbines generate the expected power). Royalties fluctuate with production, which varies with the seasonal and yearly wind resource, and can also fluctuate if the price at which the electricity is sold by the wind power project is variable. Revenue can be measured by gross receipts or metered production multiplied by the price of power paid to the project. One well-accepted option is for the developer and wind power project operator to provide a summary of gross receipts along with each payment (quarterly, annually, or other payment period agreed to in the contract), with developers allowing owners access to the data upon request. The landowner, however, does not have a say in the price of the electricity that is sold.

Royalty and Guaranteed Minimum Payment Combination: Often, lease payments based on a percentage of gross revenue are supplemented by a guaranteed minimum payment. Minimum payments essentially serve as a floor price and guarantee that landowners receive some revenue, even if the wind turbines experience more than typical maintenance outages or if winds are lower than expected in any given year, producing less energy and generating less revenue than expected.

Flat- or Fixed-Fee: In a flat- or fixed-fee arrangement, the developer and landowner(s) agree on a fixed fee—per turbine or per unit of land or per MW of installed capacity—to

be paid by the developer on a monthly or yearly basis, reflecting the total amount of land made available by the landowner(s) for meteorological towers, turbines, turbine spacing requirements, access roads, and control and maintenance buildings. This type of payment arrangement ensures transparency and clarity of understanding, and provides both the landowner and project developer with certainty regarding future income or payment streams.

One-Time, Lump-Sum Payment: This type of contract is the least common arrangement, but may be satisfactory to both parties if the landowner is in need of immediate cash and is willing to forego the prospect of a steady income stream, and the developer has the ability to release a large amount of cash up front. This arrangement generally is not optimal since it removes the ongoing economic agreement between the landowner and developer, and because of potential problems if ownership of the land is transferred without economic benefits flowing to the new landowner.

The principal advantages and disadvantages of each lease payment structure are summarized in Table 1. Based on a review of 23 actual contracts, the most frequent payment structures were royalties (13) and flat or fixed fee (7). In general, most of the larger projects (>25 MW) employed the royalty type of contract arrangement. All of the royalty structure leases reviewed based payments on *gross revenue*, not on *net income* or *profit*. Gross revenue is defined as the amount of energy (kWh[4]) delivered times the power purchase price (price per kWh). The gross revenue is equivalent to the amount the project developer is paid by the local utility (or other power purchaser) for delivering electricity. Because gross revenue is determined before any other project expenses are considered, it is fairly easy to verify and document through the official transactions and payment records between the buyer and operator of the project.

Most of the cases that used a flat-fee structure were for smaller wind projects (e.g., 2 to 5 turbine range, usually small demonstration or test projects). When a flat fee is used, it is usually because of its simplicity and the fact that the overall amounts are fairly small. Although industry representatives mention that payments can also be based on a fixed amount per MW per year, the agreements sampled did not yield any contracts of this type. However, two examples of larger projects (25-50 MW, and >50 MW) use a fixed or flat payment per turbine, which suggests that a fixed payment (per turbine or acre or MW installed) is also a reasonable approach for larger projects.

Additional Royalty Payment Considerations: The discussion above assumes that royalties are paid on a per turbine production basis, which does not have to be the case. Royalties can be paid based on the average turbine production across the project (overall project generation divided by the number of turbines in the project), which is easier for the developer to determine and account for, and is more advantageous to the landowner because it reduces risk and it is easier to verify. The advantage of this arrangement versus payment on output of a specific turbine is that the pooling arrangement takes into

[4] One kWh (kilowatt-hour) is a unit of energy, equal to a 100-Watt light bulb burning for 10 hours, or a 1,000 Watt heater running for one hour. A 1,500 kW wind turbine operating at full output (i.e., in relatively high winds) would produce 1,500 kWh in one hour or 15,000 kWh in 10 hours.

account the production of the entire project and reduces the effects of variability of individual turbine production or the possibility that one turbine could suffer from operations problems.

In addition to land on which the wind turbines are physically located, land typically is needed for other project facilities such as anemometers (wind measuring stations), wiring, and the electrical substation, and landowners must be compensated for those uses as well. Sometimes separate leases are created for the other project facilities, and sometimes they are included in the same leases used for the wind turbines.

Table 1. Advantages and Disadvantages of Different Payment Structures

Arrangement	Advantages	Disadvantages

Royalties	• General:
	  • Take into account varying productivity
	  • Give landowner incentive to work with developer to place the turbines on the most productive locations
	  • Give landowners and developers incentives to ensure continuous power generation
	  • Easy to verify if based on gross revenue
		• Landowner: Difficult to verify electricity and revenue generated by each turbine:*
		  • Individual turbine generation information is hard to obtain
		  • Individual monitors on turbines do not reflect the energy sold because they do not account for energy losses in the electrical system
		  • Developers generally do not like to share turbine productivity data

Royalty/Minimum Guarantee Combination	• Same as above, with additional benefits from an up-front fee or a minimum guarantee	• Same as above

Flat or Fixed Fee (per turbine or per acre or per MW installed)	• Landowner:
	  • Provides steady, predictable income stream
	  • Protected in years of low power generation and/or revenue
	• Developer: Does well in high-production/revenue years
	• General:
	  • Can be used to compensate a landowner for use of land for an access road crossing the property, even if turbine is not installed on the land
	  • Clarity and transparency: Easy to verify
		• Landowner: Forgoes potentially higher, if fluctuating, level of income associated with royalty payments
		• Developer: Expenses are harder to bear in years of low power generation and/or revenue
		• General:
		  • Payments do not mirror actual revenue generated
		  • Eliminates the economic incentive for the landowner to cooperate with the developer to ensure maximum power generation

Lump Sum	• Landowner: Source of immediate cash • Developer: Does not have to provide payments in subsequent years	• Landowner: Does not provide steady income stream • Developer: Must provide lump sum up front • Both: Bad "fit" to have financial transaction complete but physical use ongoing over many years

* In the United States, information about the amount of power generated by a facility is often publicly available from grid operating managers or the utility purchasing the power. Even so, such information does not indicate how much is generated by individual wind turbines within a project.

Prices Paid for Leased Land

As discussed above, the arrangements most often found in the projects reviewed (from the United States) were the flat-/fixed-fee arrangement and the royalty arrangement, with the royalty arrangement often supplemented by a minimum guaranteed payment. Table 2 and Table 3 present a summary of the prices paid under different payment arrangements in the contracts reviewed. Presentation of payment information as dollars per MW is useful because it "normalizes," or corrects, for the variation in turbine size. Table 2 and Table 3 do contain a few "outliers" that represent unique circumstances.

Royalties and Combined Royalty/Minimum Guarantee Arrangements: Today in the United States, wind power project land leasing royalties tend to be within the range of 1% to 4% of gross revenue, with the majority being between 2% and 3% of gross revenue. This royalty payment can also be expressed in terms of a percent of production (MWh). In most cases, the percentage is a fixed number throughout the term of the lease.

In some cases, the royalty percentage escalates over time. In California, for example, an escalating payment was common in early wind projects because some of the contracts had escalating prices for power, allowing the inclusion of escalating clauses in the lease contracts. For most leases with escalating payments, the percentage tends to be fixed at a lower rate in the initial years of operation, escalating to a higher fixed rate in later years as the loan on the equipment is repaid.[5]

Flat-/Fixed-Fee Arrangements: Without considering the outliers, the average of the fixed payment lease agreements reviewed was US$2,200 per MW, with values ranging from US$1,100 to US$3,800 per MW. The average rate equates to a fixed payment of approximately US$3,300 for a 1.5 MW wind turbine per year.

However, in New York State, current experience is showing payments associated with wind projects may be as high as $4,500 per MW.

Other sources of data support the figures presented above. For example, the Wind Powering America (WPA) program of the United States Department of Energy (DOE) provides materials on rural economic development of wind, citing annual revenue to farmers of US$1,500 per turbine. Although a turbine size is not mentioned in the WPA documents, the most commonly deployed turbine size in the Midwest region of the United States during the preparation of the WPA documents is in the 600-750 kW range. Normalizing the WPA's data to a per-MW price suggests that payments range from US$2,000 to US$2,500, which is consistent with the average $2,200 per MW figure presented above.

[5] In many cases, project names and specific locations cannot be provided because land lease terms are considered confidential by project participants.

Table 2. Summary of Prices Paid in Project Leases Reviewed – Royalty Arrangements

Project Size (MW)	Type	Initial Annual Rate	Escalation	Minimum Payment	Other Payment Agreements	Annual $ per MW
<10	royalty (% of gross revenue)	3%	No	Unknown	Construction fee, amount unknown	*
<10	royalty (% of gross revenue)	3%	Yes	Yes	Additional per acre quarterly payment	*
<10	royalty ($ per MWh)	$5,000	Yes	Yes	Set annual fee	$2,222
10-25	royalty (% of gross revenue)	2%	Unknown	Unknown		$2,660
10-25	royalty (% of gross revenue)	3%	Yes	Unknown	Initial rate first 10 yrs, 6% next 10 yrs; initial down payment, amount unknown	*
Multiple Projects (~40)	royalty (% of gross revenue)	2%	No	No		**
25-50	royalty (% of gross revenue)	2%	Yes	Yes	Initial rate first 15 yrs, 4% subsequent; $1,500 minimum; $5,000 one-time easement fee	$1,657
>50	royalty (% of gross revenue)	6%	No	Unknown		$5,463
>50	royalty (% of gross revenue)	3%	No	Yes	Minimum of $1,000/MW	$3,046
>50	royalty (% of gross revenue)	3%	No	Unknown		$4,284

* Capacity factors or power purchase rates for these projects were not available, so it is not possible to calculate the effective land payment per MW.

** This contract example was actually applied to approximately 40 different projects on land owned by the U.S. Federal Bureau of Land Management (BLM). BLM used a standard land lease contract for all 40 projects, based on 2% of gross revenues. Due to variations in the 40 projects' capacity factors and power purchase agreements, it is not possible to estimate the payment per MW.

Table 3. Summary of Prices Paid in Project Leases Reviewed – Fixed-Fee Arrangements

Project Size (MW)	Type	Initial Annual Rate	Escalation	Minimum Guarantee	Other Payment Agreements	Annual $ per MW
<10	fixed fee (per turbine)	$2,500	Yes	Yes	5-yr inflation adjustment by index	$3,788
<10	fixed fee (per turbine)	$400	No	Yes	Per turbine fees paid regardless of production	$6,235
<10	fixed fee (per turbine)	$1,270	Yes	Yes	Minimum $1,500; $7,500 construction	$2,117
<10	fixed fee (per year)	$500	No	Yes	No payment info available	$500
25-50	fixed fee (per turbine)	$1,000	Unknown	Yes	Per turbine fees paid regardless of production	$1,111
>50	fixed fee (per turbine)	$1,500	No	Yes		$2,145
Unknown	fixed fee (per turbine)	$1,500	Unknown	Unknown		$2,000

Another source of comparable data for the numbers cited above is the Turbine Verification Program (TVP), a U.S. DOE and Electric Power Research Institute (EPRI) program, in which cost-share or "risk-share" funds were provided to several utilities to develop and operate wind projects. While the data generated by the TVP program are not directly comparable to that of wind power projects developed without government aid, they help corroborate the data presented in Table 2 and Table 3. Table 4 summarizes data for several TVP wind power projects comprising a wide range of effective payment per MW values. Three projects (Fort Davis, Glenmore, and Algona) are within or near the above-mentioned range. However, some of the projects are outside the norm. The Kotzebue project, for example, has an unusually high per MW payment because it is based on a per-turbine amount and small turbines are used in the project (10 turbines at 50 kW each). The Springview project's payment per MW is exceptionally low because the project was promoted as a small-scale demonstration project. In addition, the land was not being used for any other purpose and a significant amount of similar land in the region with comparable wind resources was available. Finally, several of these projects required no spacing between rows because they required only a single row of turbines.

Table 4. Land Requirements and Payments for TVP Projects

Project Location	Land Use/ Type	Total Land Area Leased (acre)	Acres Leased per Turbine and (per MW)*	Leased Land Occupied by the Turbines	Annual Land Cost/ Acre Leased	Approximate Payment per MW (US$ per year)
Fort Davis, Texas	Ridge tops/ ranch land	75.1	6.4 (11.4)	5.0%	$266	$3,022
Searsburg, Vermont	Heavily forested ridgeline	35.1	6.4 (5.7)	9.8%	$114	$648
Kotzebue, Alaska	Treeless coastal tundra	148.3	14.8 (296.5)	0.3%	$27	$8,000
Glenmore, Wisconsin	Agricultural plains	2.5	1.2 (2.0)	34.2%	$1,058	$2,090
Algona, Iowa	Cropland	52.1	17.3 (23.2)	2.8%	$96	$2,228
Springview, Nebraska	High plain/ ranch land	33.1	16.6 (49.4)	2.9%	$15	$740
Big Spring, Texas	Ranch land/mesa tops	7,131	154.9 (209)	0.3%	Unknown	Unknown

* In some cases, the acre/MW figure appears low. This is likely because land for turbine spacing between rows was not needed and leased because several of these small projects had only one row of turbines.

Other Pricing Considerations: In addition to the base lease amounts, an up-front or initial payment is fairly common but not universal. Up-front payments generally are in the range of US$1,000 to US$3,000 per turbine. A lump-sum payment may also be made during the construction period, particularly in cases where the landowner is inconvenienced or loses other short-term revenues due to the construction activities. For example, during construction, additional land may need to be removed from crop cultivation and used for equipment storage areas.

In cases where land is leased from multiple landowners for one project, developers typically take one of two approaches: 1) they make payments based on the electricity output of the specific turbines located on each individual land parcel; or 2) they make payment based on the average output of all turbines in the project multiplied by the number of turbines located on each individual land parcel. The second approach is easier to document and verify, and poses less risk to landowners, who will receive payment as long as the project generates electricity, regardless of whether the turbines produce electricity on their individual parcels.

Lease payment terms also depend on alternative uses for the land, the local market for wind energy, and the availability of similar land with comparable development potential, as shown by these two U.S. examples. In the Altamont Pass area of California, leases were

negotiated to escalate to fairly high rates because the land was being sought for residential development in a rapidly growing area near San Francisco. In the Midwest, lease rates generally are fixed at lower rates over the lease period because of the remoteness and/or the low land values of the areas being considered for wind development. In addition, many locations possess an abundance of equally good wind areas, and the ability of a developer to move on to another landowner can drive down the lease price.

On the other hand, a number of examples exist where lease rates were escalated because of an action that established a short-term market for wind. For example, the Bonneville Power Administration, a federal power agency in the northwest United States, announced an intention to buy a significant amount of wind energy and issued a request for proposals (RFP) in 2001. Developers attempting to sign leases with landowners and prepare proposals in response to the RFP created a "land rush." In such cases, property owners with known wind resources and documented wind resource information are in a position to negotiate with multiple developers and shop for the highest rate.

There also are many examples of landowners who have signed leases with developers or companies that do not submit competitive bids. As a result, the landowner does not receive any revenue because the project is not developed. To avoid this situation, it is advisable for landowners to insist that the Option Agreement include a provision that permits them to withdraw from the agreement if the developers do not begin constructing a project within a certain number of years.

When considering royalty payment amounts, it is important to consider what they are based on, and the extent to which project owners financially benefit by means which are not included in the calculation of the royalty payment. For example, the gross revenues used as the basis for the royalty payment typically are based on the power sales revenues, but they may or may not include revenues from other sources, such as "green premium" revenues or government incentives. In particular, tax credits (such as the federal performance tax credit, or PTC, in the United States) generally are not included in any calculation of royalties. Because the PTC effectively allows project developers to offer lower power purchase prices, which the royalty is typically based upon, they can offer landowners a higher percentage of revenue since energy sales prices represent only a portion of their financial benefit from the project.

Consider these two examples of 20 MW projects generating 60,000 MWh per year. One project sells power at $35/MWh, for gross power sales revenues of $2.1 million per year. A 2% royalty on this amount would provide the landowners with $42,000 per year, or $2,100 per MW installed per year. For a different 20 MW project that sells power at $70/MWh, a 1% royalty would result in about the same annual project royalty payment (and payment per MW installed). A per MW installed payment of around $2,000-2,500 is approximately the current industry standard. This is lower than for projects that were built ten years ago, as a result of increased competition, industry consolidation, and technological advances which have lowered the cost of energy production.

Regardless of industry norms or market conditions, actual land lease payment amounts will have to be negotiated between the developer and landowner, and many unique

possibilities exist as to both the methods of calculating payments, and the payment amounts.

Additional Sources of Information

Land, N. and Grant, W. Landowner's Guide to Wind Energy in the Upper Midwest. Izaak Walton League, 2001.

National Wind Coordinating Committee. Permitting of Wind Energy Facilities, A Handbook. 2001. Available at www.nationalwind.org.