

## Chapter 6

# Turbine Purchase and Installation

Selecting and installing the turbines and other equipment needed for a wind energy project may seem like a straightforward part of the development process, one that does not present notable legal issues. However, there is a critical relationship between timely installation of properly functioning equipment and farmers' ability to meet their contractual obligations to lenders, investors, and power purchasers. And the success of a wind project will ultimately depend on the performance of the turbines and related equipment. It is therefore important for farmers to understand where there are legal risks in the purchase and installation of wind energy equipment, and what legal protections may be available to minimize those risks.

Other parties' failures to keep their commitments can be ruinous to a wind project that has been planned on a specific budget and timeline. As is true for all aspects of the wind development process, if a farmer is relying on a particular promise or assurance from another party, the farmer should insist that it be in writing. As discussed in this chapter, these assurances may include warranties about the performance and life of a turbine or other equipment, delivery commitments, construction timelines, or service contracts, among other things.

The issues that arise in the turbine purchase and installation process will vary greatly depending on the size of the intended wind project. Not surprisingly, the process can be significantly more complex for large commercial-scale wind turbines. Therefore, where appropriate, this chapter will distinguish small-scale and commercial-scale turbine purchase and installation issues.

## I. Equipment Selection and Purchase

In many ways, buying wind energy equipment is similar to buying any other major piece of equipment. Farmers should first determine what the generation capacity of the desired wind project is—that is, will it be a single small turbine for on-farm use, several very large turbines for generation and sale of energy to a utility, or something in between? Farmers should then research the types of



turbines available that would meet those requirements. A good place to start may be the American Wind Energy Association's list of Small Wind Turbine Equipment Providers or Windustry's list of Commercial-Scale Turbine Providers, both available on the Internet.<sup>1</sup> However, it is best to gather information from as many sources as possible. Interested farmers can learn more about the various wind energy products and the companies that manufacture them by asking for recommendations from wind development organizations and consultants, or looking for product reviews on-line.<sup>2</sup> Farmers installing commercial-scale projects should also ask the wind consultants or engineers working on the project for recommendations and technical advice.

Various aspects of each product should be considered, including cost, ease of installation and maintenance, capacity, durability, availability of replacement parts, reliability, compatibility with other project equipment, and any warranties or service contracts offered.<sup>3</sup> Choosing the right equipment for a particular location involves ensuring that service and parts are readily available, as well as considering the equipment's technical merits. Some turbines also are designed to suit a particular climate or specific wind resource characteristics.

In some markets, smaller-scale used turbines may be available from a variety of sources. There can be significant cost savings with used equipment, but farmers should carefully consider the extent to which the turbines have been refurbished or remanufactured. Important questions to ask include whether there are reliable

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<sup>1</sup> American Wind Energy Association, <http://www.awea.org/faq/smsyslst.html>; Windustry, *Commercial-Scale Turbine Providers*, [http://windustry.org/resources/companies\\_manufacturers.htm](http://windustry.org/resources/companies_manufacturers.htm) (both sites last visited June 15, 2007).

<sup>2</sup> U.S. Department of Energy, *Small Wind Electric Systems: A U.S. Consumer's Guide* 8 (Mar. 2005), available at [http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small\\_wind/small\\_wind\\_guide.pdf](http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small_wind/small_wind_guide.pdf) (last visited June 15, 2007); see also Mick Sagrillo and Ian Woofenden, "Wind Turbine Buyer's Guide" 38 from *Home Power Magazine* No. 119 (June/July 2007), available at <http://www.homepower.com/files/featured/TurbineBuyersGuide.pdf> (last visited June 15, 2007).

<sup>3</sup> See generally, Alan R. Merkle, "Engineering, Construction, and Turbine Purchase Agreements" from *The Law of Wind* (Stoel Rives, LLP, 3d ed. 2006), available at [http://www.stoel.com/webfiles/LawOfWind\\_WEB\\_02\\_07.pdf](http://www.stoel.com/webfiles/LawOfWind_WEB_02_07.pdf) (last visited June 19, 2007).

sources of parts available, which companies are qualified to perform maintenance and repairs, and whether a used turbine seller offers a warranty or right to pre-purchase inspection. A used turbine might have a shorter lifespan than a new turbine, which could have implications for the economics of a project. Quality used wind energy equipment is available, but farmers should use caution in any purchases.<sup>4</sup>

### A. Possible Supply Limitations

Among the many challenges of developing a commercial-scale wind project is actually procuring wind turbines. Not only are they frequently the most expensive part of the project, but in recent years, commercial-scale wind turbines have been in short supply.<sup>5</sup> The U.S. wind industry has been reluctant to expand its manufacturing capacity in the face of unreliable government incentives for wind energy, discussed in the chapters on project financing (Chapter 8) and government incentives (Chapter 12) of this guide.

Combined with the booming global wind market of recent years, the shortage of turbines produced in America has resulted in long lead times for obtaining turbines—waits of well over a year in some cases. Commercial-scale projects that are relatively small, meaning they need no more than a few turbines, fare poorly in such market conditions, because manufacturers typically prefer the efficiency of working with a few large customers to working with many smaller ones. As a result, in many cases turbine availability within a suitable timeframe becomes one of the most influential factors in determining which turbine to purchase.

In some cases, large businesses that are interested in investing in commercial-scale wind projects may have guarantees for future availability of turbines from a particular manufacturer. The fact that a potential investor can bring turbines to the negotiating table may be part of the selection process for farmers looking to partner with large investors to build a project. Investment models are discussed

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<sup>4</sup> See Mick Sagrillo, *Advice from an Expert: Buying Used Wind Equipment* (Am. Wind Energy Ass'n 2002), available at [http://www.awea.org/faq/sagrillo/ms\\_used\\_0211.html](http://www.awea.org/faq/sagrillo/ms_used_0211.html) (last visited June 15, 2007).

<sup>5</sup> See, e.g., Energy Trust of Oregon, *Community Wind: An Oregon Guidebook* 77 (2005), available at [http://www.energytrust.org/RR/wind/community/oregon\\_wind\\_guidebook.pdf](http://www.energytrust.org/RR/wind/community/oregon_wind_guidebook.pdf) (last visited June 15, 2007) (providing expense examples for a 3 MW and a 10 MW wind project).

in more detail in the chapters on project financing (Chapter 8) and wind business structures (Chapter 10). Farmers should work with an attorney before entering into any investment agreement as there are many details, contingencies, and obligations that must be addressed.

## **B. Negotiating a Turbine Purchase Agreement**

Wind equipment purchase agreements might be limited to procurement of the turbine and associated hardware or be part of a package of related agreements for other services like construction and maintenance. Any purchase agreement should detail the scope of work provided and the exact specifications of the product promised.

Because of the expense and demand involved, commercial-scale wind turbine manufacturers usually require farmers to put down a substantial deposit in order to reserve a turbine and often require a schedule of additional payments leading up to the actual delivery of the turbine. Farmers should carefully examine whether these deposits are refundable and, if so, under what circumstances. The long wait that can be involved in getting a commercial-scale wind turbine often requires farmers to put a deposit down before they are absolutely certain of all of the details of the wind project, or even before they are certain that they will be able to interconnect the project and secure a contract with a willing purchaser of the electricity. The risk that a project will ultimately prove not feasible should be carefully considered when entering into turbine purchase agreements and making pre-payment arrangements.

Farmers should also examine whether their turbine is guaranteed to be delivered in a particular timeframe. Delays can be costly, especially if the project is relying on a government incentive that will expire or requires the project to be operational by a particular date. Any promises made by the manufacturer should be had in writing.

## **C. Product Warranties**

Reputable wind equipment manufacturers will offer a warranty for their products. Farmers should carefully review any warranties provided for a turbine and other wind equipment.

More information about product warranties and warranty disputes in general should be available from the consumer protection division of each state Attorney General's office.<sup>6</sup>

### 1. Factors to Consider

Having a turbine of any size, but particularly commercial-scale turbines, out of operation due to a defect or failure can be very costly, making it essential to understand exactly what is covered by a turbine warranty, and what the procedure and timeline are for repairs and obtaining replacement parts. Thus, important factors to consider when reviewing a written warranty include:<sup>7</sup>

- What specific types of defect or damage are covered?
- Are any parts of the equipment or types of problems excluded from coverage?
- What actions by the farmer or another party might void the warranty?
- What remedy does the warranty provide if there is a problem—that is, will the company repair or replace the equipment, or refund the purchase price? Does the warranty cover labor costs for repair? Is repair or replacement guaranteed within a certain period of time after a warranty claim is made?
- Who will provide warranted service and maintenance, and who will pay the costs of shipping the equipment to the service location, if needed?
- How long will the warranty last? Is an extended warranty available?

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<sup>6</sup> General contact information for each state's Attorney General can be found at [http://www.naag.org/attorneys\\_general.php](http://www.naag.org/attorneys_general.php) (last visited June 21, 2007).

<sup>7</sup> Federal Trade Commission, *Consumer Alert: Warranties* (Oct. 2001), available at <http://www.ftc.gov/bcp/online/pubs/products/warrant.shtm>; see also Mick Sagrillo and Ian Woofenden, "Wind Turbine Buyer's Guide" 38 from *Home Power Magazine* No. 119 (June/July 2007), available at <http://www.homepower.com/files/featured/TurbineBuyersGuide.pdf> (discussing warranties and indicators of quality in small wind turbines) (both sites last visited June 15, 2007).

Typically, manufacturer warranties cover defects in materials or workmanship but do not cover improper installation or use. As discussed below, however, in many cases the supplier of wind energy equipment will also install the equipment. In such cases, any damage occurring during installation and testing is more likely to be covered by the product warranty or installation agreement with the supplier.

## 2. Consequential Damages

A very important issue for warranties on turbines and other wind energy equipment is whether the warranty covers the farmer's *consequential damages* from an equipment failure. Most consumer warranties and many commercial warranties cover only the product itself; that is, the purchaser will only be entitled to a refund of the purchase price or a repaired or replacement product. Any "consequential" damage to other property caused by the defective product, and any financial losses resulting from down time while the product is repaired or replaced, are generally excluded from coverage.

However, if defective equipment or delayed delivery prevents a wind project owner from satisfying its obligations to a power purchaser or making payments on scheduled debt, the viability of the entire project can be threatened. Therefore, coverage for consequential damages from equipment failure can be a necessity for wind projects, particularly coverage for the inability to generate electricity while the equipment is repaired or replaced.

Coverage for some consequential damages may also be referred to as an *availability guarantee*—that is, a guarantee that the turbine will be operational at least a specified percentage of the time—or a *performance guarantee*—that is, a guarantee that the turbine will produce at least a specified amount of electricity under certain conditions. These kinds of guarantees are most likely to be offered for commercial-scale wind turbines. If this coverage cannot be negotiated as part of the equipment warranty, farmers should seek separate insurance coverage for this risk.

## 3. Implied Warranties

If a particular problem with wind energy equipment is not covered by the written warranty from the supplier or manufacturer, called an *express warranty*, protection may be provided by an implied warranty. An *implied warranty* is a warranty that is created by state law rather than by an agreement between the buyer and the seller. Every state has enacted some

form of implied warranties for consumer and commercial sales transactions, though some states limit how long the implied warranties will be in effect.<sup>8</sup>

The most common type of implied warranty is the *warranty of merchantability*. Among other things, this means the seller promises that the product is “fit for the ordinary purposes for which such goods are used.”<sup>9</sup> For wind energy equipment, this would mean that the equipment is fit to be used in a wind project.

Another common type of implied warranty is the *warranty of fitness for a particular purpose*. This type of warranty arises when a buyer is relying on the advice of the seller in selecting a product for a particular use, and the seller is aware of the product’s intended use. This warranty means the seller promises that the product will be fit for the particular use intended by the buyer.<sup>10</sup> If a farmer explains the particular characteristics of a wind project (for example, scale of the project, top wind speeds, or extreme weather conditions), and the equipment supplier recommends a particular type of turbine for those characteristics, the implied warranty of fitness for a particular purpose would ensure that the recommended turbine could in fact handle the described conditions.

Although implied warranties are created by law in every state, it is usually possible for the seller to exclude a particular product or sale from an implied warranty by using notice language set out in state law. For example, Minnesota law allows sellers to avoid implied warranties by, among other things, labeling the transaction “as is” or stating, “There are no warranties which extend beyond the description on the face hereof.”<sup>11</sup>

#### 4. Warranty Disputes

In general, problems with wind energy equipment should first be brought to the attention of the equipment supplier. If the supplier’s response is unsatisfactory, the farmer may want to contact the manufacturer directly.

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<sup>8</sup> Federal Trade Commission, *Consumer Alert: Warranties* (Oct. 2001), available at <http://www.ftc.gov/bcp/online/pubs/products/warrant.shtm> (last visited June 20, 2007).

<sup>9</sup> See, e.g., Minn. Stat. § 336.2-314 (2006).

<sup>10</sup> See, e.g., Minn. Stat. § 336.2-315 (2006).

<sup>11</sup> Minn. Stat. § 336.2-316 (2006).

The warranty might itself set out dispute resolution procedures that the parties must use if the situation cannot be satisfactorily resolved. Possible dispute resolution procedures include mediation and arbitration. Depending on the terms of the particular warranty, these procedures might be required before going to court over a dispute, or they might be available *instead of* review by a court.

#### **D. Identifying and Obtaining Other Necessary Equipment**

In addition to the turbines themselves, farmers will need a variety of equipment to generate electricity from wind and allow for the use or transmission of that electricity. Much of this equipment is closely related to the turbine and will likely be purchased as part of the generator package. Other equipment, however, will likely be purchased or at least considered separately, and compatibility can be an important factor.

For a small off-grid project, intended only to provide electricity for farm and home requirements, a battery and charge controller will be needed to store for later use any electricity that is not used as it is generated. An off-grid project will also require an inverter to convert the direct current from the turbine or battery to alternating current for farm and home use.<sup>12</sup>

If a wind project will be connecting to the electric grid, there is no need for battery storage of any excess electricity generated, but an inverter (also called a power conditioning unit) will be required to make the direct current from the generator compatible with the grid's alternating current.<sup>13</sup> Wind projects that will be connected with the electric grid will also need the equipment necessary for the interconnection. Which components the wind project owner is responsible for will be identified during the interconnection process, described in the chapter on small on-farm wind projects (Chapter 7), and, especially for larger projects, the chapter on interconnection and transmission (Chapter 11) in this guide. The interconnecting utility will have requirements and possibly recommendations for

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<sup>12</sup> U.S. Department of Energy, *Small Wind Electric Systems: A U.S. Consumer's Guide* 6-7 (Mar. 2005), available at [http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small\\_wind/small\\_wind\\_guide.pdf](http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small_wind/small_wind_guide.pdf) (last visited June 15, 2007).

<sup>13</sup> U.S. Department of Energy, *Small Wind Electric Systems: A U.S. Consumer's Guide* 7 (Mar. 2005), available at [http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small\\_wind/small\\_wind\\_guide.pdf](http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small_wind/small_wind_guide.pdf) (last visited June 15, 2007).

these components. The electrical equipment needed for a commercial-scale turbine will be much more extensive and expensive than for a small-scale turbine.

## II. Installation

Most wind system manufacturers and dealers offer installation packages, which might provide more customer support from the company and should include additional warranties against defects in installation. The installation package offered by a manufacturer may differ from the package offered by a dealer, who may operate in the vicinity of the particular wind project and provide additional local services. Small turbine manufacturers generally have prepared information about the different installation options that are available, and can quote prices for their various packages. Commercial-scale turbine manufacturers might not offer this information unless they are responding to a formal request for a quote or bid.

It is important to understand what services are included in any installation package, as well as what is *not* included.<sup>14</sup> Installation by the dealer or manufacturer typically will not include necessary steps such as construction of concrete foundations and access roads and preparation of the facility site.<sup>15</sup> These activities must be performed by a separate contractor. Commercial-scale wind projects are particularly likely to deal with multiple contractors for project design, engineering, and site preparation as the process is significantly more involved.

The manufacturer, dealer, local utility, or a state agency such as the Department of Commerce or Department of Energy may be able to provide a list of

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<sup>14</sup> See Minnesota Department of Commerce, *Hiring a Renewable Energy Dealer*, [http://www.state.mn.us/mn/externalDocs/Commerce/Hiring\\_a\\_Renewable\\_Energy\\_Dealer\\_121302010223\\_How2Hire.pdf](http://www.state.mn.us/mn/externalDocs/Commerce/Hiring_a_Renewable_Energy_Dealer_121302010223_How2Hire.pdf) (last visited June 15, 2007) (listing questions to ask before hiring renewable energy dealers and describing what to expect from dealers and installers).

<sup>15</sup> Alan R. Merkle, “Engineering, Construction, and Turbine Purchase Agreements” from *The Law of Wind* (Stoel Rives, LLP, 3d ed. 2006), available at [http://www.stoel.com/webfiles/LawOfWind\\_WEB\\_02\\_07.pdf](http://www.stoel.com/webfiles/LawOfWind_WEB_02_07.pdf) (last visited June 19, 2007).

contractors qualified to install a wind system.<sup>16</sup> A small wind installer, who should be a licensed electrician, may also provide related services, such as obtaining the necessary building or electrical permits. These installers often provide bids that include erecting the tower, assembling and installing the wind generator, connecting all electrical components, and bringing the facility into operation.<sup>17</sup> It will generally still be necessary to hire a separate contractor to construct the facility foundations and roads and do any desired land preparation.

For small on-farm projects, farmers might choose to buy the components and install the facility themselves. This offers both significant savings and hands-on experience with the turbine.<sup>18</sup> Manufacturers of small wind systems typically provide installation manuals, so farmers can review the steps involved before deciding whether they want to install the system themselves. The farmer could also contract out certain portions of the installation, such as constructing the foundation, taking delivery of the turbine, trenching for underground wires, and assembling and wiring the generator.<sup>19</sup>

In contrast, installing a commercial-scale wind turbine is a complex construction project that must be overseen and carried out by professionals. In the planning stages, farmers should keep logistical issues in mind, such as the need to reserve

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<sup>16</sup> See Minnesota Department of Commerce, *Hiring a Renewable Energy Dealer*, [http://www.state.mn.us/mn/externalDocs/Commerce/Hiring\\_a\\_Renewable\\_Energy\\_Dealer\\_121302010223\\_How2Hire.pdf](http://www.state.mn.us/mn/externalDocs/Commerce/Hiring_a_Renewable_Energy_Dealer_121302010223_How2Hire.pdf) (last visited June 15, 2007).

<sup>17</sup> Mick Sagrillo, *Harvesting Your Own Wind-Generated Electricity* 3 (Wisc. Focus on Energy 2004), available at [http://www.focusonenergy.com/data/common/dmsFiles/W\\_RI\\_MKFS\\_Wind%20for%20Farms%20.pdf](http://www.focusonenergy.com/data/common/dmsFiles/W_RI_MKFS_Wind%20for%20Farms%20.pdf) (last visited June 15, 2007).

<sup>18</sup> U.S. Department of Energy, *Small Wind Electric Systems: A U.S. Consumer's Guide* 8 (Mar. 2005), available at [http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small\\_wind\\_guide.pdf](http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small_wind_guide.pdf) (last visited June 15, 2007).

<sup>19</sup> Mick Sagrillo, *Harvesting Your Own Wind-Generated Electricity* 3 (Wisc. Focus on Energy 2004), available at [http://www.focusonenergy.com/data/common/dmsFiles/W\\_RI\\_MKFS\\_Wind%20for%20Farms%20.pdf](http://www.focusonenergy.com/data/common/dmsFiles/W_RI_MKFS_Wind%20for%20Farms%20.pdf) (last visited June 15, 2007).

a crane and possibly build access roads to provide it and other heavy construction equipment access to the project site.<sup>20</sup>

### A. Safety Requirements and Code Compliance

For small-scale wind turbines, the city, county, or state electrical code that applies to the particular wind project will undoubtedly require proper wiring and components that are certified by an approved testing lab, such as Underwriters Laboratories (UL). Most local electrical codes are based on the National Electrical Code (NEC).<sup>21</sup>

Any inverter purchased with a wind project should include all of the required safety features and certifications. These include the protective relays and circuit breakers needed to synchronize safely and reliably with the electric grid, and to automatically shut down the facility when there is a utility power outage.<sup>22</sup> Most new inverters comply with all recognized safety codes and standards, including the NEC, UL, and the Institute of Electrical and Electronic Engineers (IEEE).<sup>23</sup>

Electrical safety and code compliance issues are much more complex for commercial-scale wind turbines, but also follow many of these standards. Farmers installing a project of this size should get technical assistance to navigate these issues.

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<sup>20</sup> To provide some perspective, Windustry has posted photographs of its efforts to install a single turbine *blade* at the Minnesota State Fair at <http://www.windustry.org/statefair/bladephotos.htm> (last visited June 20, 2007).

<sup>21</sup> U.S. Department of Energy, *Small Wind Electric Systems: A U.S. Consumer's Guide* 16 (Mar. 2005), available at [http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small\\_wind\\_guide.pdf](http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small_wind_guide.pdf) (last visited June 15, 2007).

<sup>22</sup> NorthWestern Energy, *Montana Wind Power: A Consumer's Guide to Harvesting the Wind* 20 (Dec. 2004), available at <http://www.montanagreenpower.com/pdf/montanawindpowerpub.pdf> (last visited June 15, 2007).

<sup>23</sup> NorthWestern Energy, *Montana Wind Power: A Consumer's Guide to Harvesting the Wind* 20 (Dec. 2004), available at <http://www.montanagreenpower.com/pdf/montanawindpowerpub.pdf> (last visited June 15, 2007).

## B. Insurance

As soon as a wind facility is installed, it will be important to have it covered by appropriate insurance. This includes: (1) insurance for harm that may be caused *by* the wind facility, and (2) insurance for harm that may occur *to* the wind facility.

In many cases, a home or farm liability insurance policy that covers the structures on the farm can be extended to cover any damage caused by a small on-farm wind facility as an *appurtenant structure*. Larger wind projects that are intended to be operated for profit will likely have to be insured separately from the farm. In either case, farmers can reduce their liability insurance costs by adopting safety precautions, such as a setback from other structures equal to the height of the tower, and building a safety fence around the turbine.<sup>24</sup> Liability issues are discussed in more detail in Chapter 5 of this guide.

Similarly, coverage for damage caused to a small on-farm wind facility can probably be included in the farmer's existing property insurance policy, though the premium may be increased, while property insurance for larger wind projects will probably need to be purchased separately. The insurance should cover all likely sources of damage to the wind facility, including fire, lightning, ice, vandalism, and theft.<sup>25</sup> In order to get this coverage, it will be important that the project complies with electrical and other safety codes, discussed above. If a project is not in compliance, the insurance company may refuse a claim related to electrical safety.<sup>26</sup>

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<sup>24</sup> Iowa Energy Center, *Wind Energy Manual: Legal Issues in Wind Energy* (2006), available at [http://www.energy.iastate.edu/renewable/wind/wem/wem-01\\_print.html](http://www.energy.iastate.edu/renewable/wind/wem/wem-01_print.html) (last visited June 15, 2007).

<sup>25</sup> Mick Sagrillo, *Advice from an Expert: Insuring Your Wind System: Potential Insurance Needs/Costs* (Am. Wind Energy Ass'n 2000), available at [http://www.awea.org/faq/sagrillo/ms\\_insur2.html](http://www.awea.org/faq/sagrillo/ms_insur2.html) (last visited June 15, 2007).

<sup>26</sup> Mick Sagrillo, *Advice from an Expert: Residential Wind Turbines and "Code Compliance"* (Am. Wind Energy Ass'n 2004), available at [http://www.awea.org/faq/sagrillo/ms\\_codesnov04.html](http://www.awea.org/faq/sagrillo/ms_codesnov04.html); Mick Sagrillo, *Advice from an Expert: Insuring Your Wind System: Potential Insurance Needs/Costs* (Am. Wind Energy Ass'n 2000), available at [http://www.awea.org/faq/sagrillo/ms\\_insur2.html](http://www.awea.org/faq/sagrillo/ms_insur2.html) (both sites last visited June 15, 2007).

As mentioned in the warranty section of this chapter, farmers might also want to obtain separate insurance coverage for economic losses that would result if the wind facility were unable to operate for an extended period due to equipment failure or damage.

Well in advance of installation, farmers should contact their current insurance agent and other potential insurance providers about the availability and cost of these various types of insurance in order to be prepared for the insurance requirements of their wind project.<sup>27</sup>

### III. Operations and Maintenance

On the whole, most wind systems have a lifespan of about 20 years or longer if properly installed and maintained.<sup>28</sup> Nonetheless, even small wind facilities require some basic annual maintenance, such as monitoring the condition of bolts and electrical connections, checking for corrosion, greasing and oiling bearings and parts, and checking for correct guy wire tension (if applicable). Eventually, blades or bearings may also need to be replaced. Commercial-scale wind projects require more regular monitoring and routine maintenance.

The manufacturer or dealer of the wind energy equipment may offer a service and maintenance program, either alone or as part of an installation package.<sup>29</sup> Maintenance contracts will make sense for some wind projects, while some farmers will opt to do this work themselves or hire it to be done by a third party.

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<sup>27</sup> Iowa Energy Center, *Wind Energy Manual: Legal Issues in Wind Energy* (2006), available at [http://www.energy.iastate.edu/renewable/wind/wem/wem-01\\_print.html](http://www.energy.iastate.edu/renewable/wind/wem/wem-01_print.html) (last visited June 15, 2007). There are several large insurance companies with significant experience working with commercial-scale wind projects, and they can be found within the American Wind Energy Association's member directory, a service available on-line at <http://web.memberclicks.com/mc/page.do?orgId=awea> (last visited June 21, 2007).

<sup>28</sup> Mick Sagrillo and Ian Woofenden, "Wind Turbine Buyer's Guide" 38 from *Home Power Magazine No. 119* (June/July 2007), available at <http://www.homepower.com/files/featured/TurbineBuyersGuide.pdf> (last visited June 15, 2007).

<sup>29</sup> U.S. Department of Energy, *Small Wind Electric Systems: A U.S. Consumer's Guide* 9 (Mar. 2005), available at [http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small\\_wind\\_guide.pdf](http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small_wind_guide.pdf) (last visited June 15, 2007).

Factors that farmers should take into account when considering a maintenance contract for a wind project include:<sup>30</sup>

- What services are specifically offered under the contract? Routine maintenance only? Repairs of incidental damage?
- Which specific components of the wind facility are covered by the contract?
- How often will maintenance services be performed under the contract? If not on a regular schedule, what events will trigger maintenance activities?
- What is the relationship between the services offered under the maintenance contract and the protections of any equipment warranty? Does the warranty require that maintenance or other servicing be performed only by the dealer, manufacturer, or other approved party?
- Does the maintenance agreement satisfy conditions imposed by the project's equity investors, lenders, or power purchaser?
- How does the cost of an ongoing maintenance contract compare to the cost of hiring occasional service providers? Are these costs likely to increase during the term of the maintenance contract?
- How long will the maintenance contract last? Can it be extended? At what cost?
- How is the cost of the maintenance contract determined? An upfront fee? Scheduled payments? Are there surcharges or additional fees of any type?
- What are the farmer's options if he or she is dissatisfied with the service? Are there mechanisms for the farmer to complain, and get needed relief, if the maintenance is not performed satisfactorily?
- May the maintenance contract be terminated early by either party? If so, what circumstances permit termination? Is there a fee for terminating early?
- If a maintenance contract is not entered into when the equipment is purchased, may one be purchased at a later time?

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<sup>30</sup> Federal Trade Commission, *Consumer Alert: Service Contracts* (Oct. 2001), available at <http://www.ftc.gov/bcp/online/pubs/products/servcon.shtml> (last visited June 21, 2007).

Commercial-scale wind projects require a person or team of people with expertise and training to oversee operations and maintenance. Farmers might be able to acquire some of this knowledge for themselves, but almost certainly will need to contract for some portion of the work. As a result, the availability of qualified operations and maintenance teams becomes an especially important consideration when choosing a commercial-scale turbine model. With this in mind, farmers should take note during the project planning stages of which turbine manufacturers have installations in their region. Some manufacturers will not agree to supply a turbine for a location that is too far away from qualified operations and maintenance services.

