Focus On: Small Wind Turbines

Property and equipment breakdown risks are closely related, while casualty risks are evolving.

Electricity derived from small wind turbines is one of the fastest growing alternative energy markets, with the United States being the world’s largest market. The American Wind Energy Association (AWEA) reports that installation capacity for small wind turbines in the U.S.—those with rated capacities of 100 kilowatts (kW) and less—grew 26 percent in 2010 with 25.6 megawatts (MW) of new capacity. Growth has been driven by fossil fuel price instability and insecurity, plus federal and state incentives, and this trend is expected to continue.

Topography dependent
Wind turbines use wind to turn blades, which rotates a generator to produce electricity. Consistent usable wind velocity (neither too high nor too low) and direction vary across the U.S., and it is the consistency and direction of usable wind that is most important. The National Renewable Energy Laboratory has published wind power density maps or wind resource maps, which give the wind power across the country at specific heights. Key states for turbine installation include Texas, Iowa and California. The Southeast has lower wind opportunity and less legislative support.

Multiple configurations
Small wind turbines can be located at almost any location, including homes, farms, office buildings, manufacturing sites, schools, and municipalities, but are better suited to rural areas where there is expansive open space. They are generally owned by the business, facility, or landowner and are typically used to supplement electrical needs and reduce the amount of energy purchased from the utility. On a farm, for example, a wind turbine might be used to power a barn, outbuilding or remote irrigation pumps.

There are two popular small wind turbine designs; the traditional horizontal axis (HAWT) design and the vertical axis wind turbine (VAWT) design. Small wind turbines may be installed as off grid (stand-alone) or grid connected (connected to the utility grid), and can be integrated with batteries to store electricity. Technical and insurance requirements vary by state, as do metering arrangements.
Evolving design and technology
Simpler small wind turbine components make maintenance and risks more easily understood and quantifiable compared to larger wind turbines. The popularity of small wind turbines has encouraged many new wind turbine manufacturers to enter the marketplace with numerous prototype designs prematurely, before undergoing any long term durability testing.

Certification
The Small Wind Turbine Certification Council certifies small wind turbines that meet or exceed AWEA Small Wind Turbine Performance and Safety Standard.

Property Exposures
Wind turbines are unique in their high exposure to both property and equipment breakdown losses. Losses can impact either of these coverages within Business Owner’s, Homeowner’s, Farm Owner’s and Commercial Package policies.

Property
Weather has a major impact on wind turbines. Exposure to the elements can cause erosion of the blade’s leading edge and can negatively impact its aerodynamic characteristics. In addition, weather events can cause the tower to collapse, and would likely result in damage to the turbine’s blades and equipment upon impact.

Ice/hail – Hail, sand, insects and other airborne particles can cause erosion, dent, or break through a turbine’s blades. Ice adds weight that can cause imbalance and lead to significant equipment failure. Also, ice shedding and throwing should be considered when determining the location of the turbine, particularly around schools.

High winds – Damage from impact or from blades spinning too fast during high wind events can lead to blade failure or cause the tower to collapse or buckle. Therefore, a stationary turbine should be designed to protect itself from high winds by moving to face downwind, or braking and stopping rotation of the blades. Many smaller turbines have no mechanical means for shut down. Instead, they rely on dynamic braking or electrical shorting of the windings.

A tilt-down tower can be a defense against high winds but may not be practical. For a farmer facing threat of tornado, for example, tilting the wind turbine tower may be a lower priority than securing the safety of livestock.

Lightning – Wind turbines, by design, are the highest point in an area and are frequently struck by lightning. Current must be safely conducted to the ground to avoid electrical damage to turbine components. Heat at the point of impact also can have destructive effects on a blade, leading to delamination and possible blade failure. Power surges resulting from lightning often damage sensitive electronic controls.

Flood and earth movement – A sound foundation and footings are important in areas prone to geological events.

Fire – Small wind turbines rarely have hydraulically controlled yaw or blade pitch systems. Nevertheless, they can be equipped with oil or grease lubricated gear boxes and bearings in the unit’s nacelle, or equipment housing, which can be ignited by lightning or as a result of equipment failure. Small wind turbines typically are not equipped with fire suppression systems in the nacelle, so fire often results in a complete loss of the unit.

Vandalism & theft – Turbines located in remote areas have a greater exposure to vandalism and theft than those sited in populated areas where monitoring is more convenient. Vandalism and theft of certain materials like copper is a serious concern, and the owner should put measures in place to monitor and limit site access. Where practical, a security fence and motion-activated camera monitoring can be an effective deterrent.

Tower collapse – Many small wind turbines use an array of wires to assist in supporting the tower. The footings and foundation should be adequate to prevent collapse. However, insurers should be aware of additional equipment and nearby property that could be damaged, should the foundation, footings and wire supports prove inadequate to prevent collapse.

Equipment Breakdown
Turbulence and frequent changes in wind direction can result in continuous cyclic pounding that strains the wind turbine components and reduces the equipment reliability and overall life. An end-of-warranty inspection should be scheduled 4 to 6 months before the end of the warranty period to identify issues which can be addressed under warranty.

Blade damage – Can be caused by sand, insects, dust, ice, hail, lightning strikes, and fatigue cracks. Blades can be visually inspected, with a 50x field scope periodically when the unit is not operating.

Overspeed damage – Brake failure could lead to equipment damage within the nacelle.

Rotor/generator/gearbox bearing failure – Lack of or improper selection of lubricants (oil or grease) in cold climates can result in vibration and damage to bearings.

Gearbox issues – Most small wind turbines use permanent magnet direct drive generators and do not have gear boxes, but those with gear boxes must be cleaned, inspected, lubricated and realigned periodically.

Electrical exposures – Damage from lightning strikes, surge, grid voltage swings, and overheating can lead to damaged inverters and control systems.
Casualty Considerations

Liability issues related to wind turbines are just starting to emerge. They involve a complex set of legal and contractual exposures that exist throughout all phases of a wind turbine project, from development, through site preparation and construction, connection to the power grid, testing and, ultimately, performance.

Issues involving allocation of liability and coverage questions depend upon the legal climate of the state in which the wind turbine operates and suits are ultimately pursued. These issues in connection with wind turbines are fairly new and have yet to play out in courts. Therefore, a great deal of uncertainty exists around wind turbine liability exposures.

Casualty Coverages

Policy forms that may be involved in wind energy litigation include Comprehensive General Liability, Umbrella, Directors and Officers, Auto, Directors Liability, Products and Completed Operations and specialized Non-performance covers.

Insured Classes

Overlap and interaction among the parties engaged in a wind turbine project and the variety of activities involved add to the complexity of the exposure. In general, the following classes of business have exposures related to wind turbines:

Developers/investors of commercial wind farm operations – Owners have a Directors & Officers liability exposure plus other risks related to the finance, construction, and operation of the turbine.

Equipment manufacturers – Parts and component manufacturers have a straightforward products liability exposure. Non-performance is also an issue, since wind turbine technology is a new and evolving technology. New insurance products are starting to be developed to respond to the non-performance exposure.

Construction – Site preparation, footings, transportation of the turbine or its parts from the manufacturer to the site, plus erection of the turbine are all exposures for the construction classes. Manufacturers often assume part or all of the responsibility for construction. Typical landowners, even if they plan on operating the turbine themselves, should generally not take on responsibility for construction.

Testing and/or maintenance – This is typically done by the manufacturer or the installation contractor, but commercial operators and local users may also be involved with testing and maintenance responsibilities.

Land owner – The land owner may be the owner/operator or may simply lease the land to a commercial wind energy operator. The former has all the exposures of a typical commercial wind energy operator, while the latter will be exposed largely to vicarious liability (involving mostly defense) and/or contractual exposure.

Potential Exposures/Claim Scenarios

Traditional Commercial General Liability (CGL) policies cover Bodily Injury (BI), Property Damage (PD), Personal Injury (PI), and Advertising Injury (AI) and contain language excluding certain types of contracts. Because there are many contracts associated with the typical wind turbine installation, it’s critical that all parties understand the obligations set forth in those contracts and whether they are covered in the standard CGL policy, including through coverage for “additional insureds.” The following comments apply to the CGL policy.

Pure injunctive relief – Suits brought about solely to have objectionable behavior ceased that does not involve BI or PD are not usually covered under CGL policies. However, non-standard policies containing “all sums” language (rather than the traditional “those sums” language) have been construed to include injunctive relief by some courts.

Pure economic loss – Similarly, pure economic loss without tangible property damage is not likely to be covered under traditional policies although “loss of use” property damage may complicate the issue.

Nuisance claims – an attractive nuisance that results in BI would typically be covered under a CGL policy. Allegations by neighboring property owners that a turbine constitutes a public nuisance are more common and, while there is no BI, some courts may determine that coverage may exist under PI if “wrongful entry/eviction” or “right of private occupancy” is a named peril.

Misrepresentation – suits claiming failure to deliver on performance related to noise, output, energy savings, etc. are not likely to be covered under traditional CGL policies. As insurers further develop specialized products to cover the non-performance risk, risk of lawsuits claiming misrepresentation under CGL policies diminishes.

Bodily injury and property damage – Claims including blade or ice throws, tower falling, attractive nuisance, and noise would likely be included unless specifically excluded.

Health/emotional distress – “Wind Turbine Syndrome” is a reported health ailment caused by the low frequency sound from wind turbines. While ISO’s CGL policy does not include emotional distress, courts have been divided on the question of coverage in such cases. As such, it may emerge as a latent, systemic loss scenario for the industry.

Design defect – Claims that the turbine design is defective without accompanying BI or PD are generally excluded in the CGL policy but only for property damage. Coverage for bodily injury claims under certain circumstances (including those for noise-related health effects) is less clear.
Additional Considerations

Operational risks - Wind turbines are a relatively new and unproven technology, making performance difficult to predict. Typical issues around new market entrants include lack of experience, unreliable products, and a focus on manufacturing rather than service. Market exits lead to repair, parts, and supply issues. Insureds should use established installers and manufacturers that offer a warranty of at least 5 years.

Towers, turbulence durability - Towers should be high enough above surrounding objects to access consistent wind speeds and avoid turbulence. Towers that are too short generate less wind speed and electricity, and experience more wear and tear with compromised reliability. Experienced installers generally ensure turbines are properly designed for wind speeds and wind events typical of the location, and ensure protections against damage from hail and lightning are in place.

Maintenance - Maintenance requirements increase as a wind turbine increases in age. Small wind turbines are designed to be low-maintenance, requiring only periodic visual inspection by the owners but more involved inspections by the original equipment manufacturer (OEM). It is important to follow guidelines and have repairs done by certified OEM contractors. Also, maintenance and repair may be difficult for wind turbines located in rural or mountainous areas.

Exposure Checklist

**Construction and Installation**
- Which contracts apply to the turbine owner? How is liability transferred to or from the turbine owner?
- Was the installation done by the dealer or manufacturer?
- What are the qualifications of those involved in construction, including subcontractors?
- Has a commissioning test run been adequately executed with reaching name plate capacity?
- Is there a service and maintenance agreement in place with the OEM or authorized contractor? Does it include a manufacturer’s availability guaranty for installation? Does it include a minimum of two annual service inspections?
- What monitoring and inspection procedures or agreements are in place?
- What is the experience level of the turbine manufacturer fleet size and fleet leader reliability? The contractor/installer?
- Are the turbine and its parts covered under a manufacturer’s warranty?

**Location**
- What is the tower’s proximity to other properties or persons? Is the tower protected by fencing and are there adequate warning signs posted?
- Is the tower readily accessible for routine and emergency maintenance?
- What type of technology or features does the turbine use, i.e. vertical or horizontal axis, tilt-down or fixed?
- Are the guide wires visibly marked from ground to eye level?
- After the occurrence of a loss, can restrictive measures be expected from local authorities?

**Equipment**
- Does the manufacturer have a proven track record?
- How many units of this model turbine are currently in operation, and when did the fleet leader enter service?
- What is the nature and scope of the warranty and products liability coverage?
- What safety features are incorporated? Does the operator have the ability to monitor and shut off the turbine?
- What is the amount of power generated?
- What is the rated capacity of the turbine?
- Has the wind turbine been fitted with a
  - lightning protection system?
  - fire detection system and/or automatic fire suppression extinguishing system?
  - Condition Monitoring System (CMS) that has been certified by an acknowledged testing organization?

**Grid Arrangements**
- Does the owner generate power for private use or to sell to others?
- Does the turbine generate business income and would the owner incur extra expense in the event of a loss?
- Is power transferred to the grid? If so, how is it connected and maintained?
- What are the contractual or additional insured arrangements with the utility or power company?