CIRMA

Solar and wind energy sources bring some new risks along with the savings

Risk Management Techniques for Renewable Energy:

Keeping "Green Energy" Safe and Cost Effective

CIRMA
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With the increased availability of funding from the American Recovery and Investment Act of 2009 and various state grants, "green" energy has become an attractive option for Connecticut Municipalities and Boards of Education.

As a result, the number of green energy installations is growing.

"Green energy," the environmentally friendly and non-polluting technologies such as geothermal, wind, and solar power are quickly moving from their status as an alternative energy source into mainstream usage. Heightened awareness of our need to reduce carbon dioxide emissions, plus the new Connecticut building code requirements (PA 07-240) and attractive cost savings have fueled interest in renewable energy sources by municipalities. Ensuring the safe installation and ongoing operation of these energy sources through a risk management program will protect those savings for years to come.

Because most green energy sources are relatively new and specialized technologies, they bring with them some new and unfamiliar risks that must be controlled before their tremendous benefits can be fully realized. Traditional boiler equipment and heating plants have long posed their own risks, which CIRMA and its strategic partners have helped members manage effectively for many years. CIRMA is now at the forefront of developing risk management strategies and best practices to manage the emerging risks associated with renewable energy generation, thereby helping members achieve a safe and cost-effective installation and ongoing operation.

CIRMA has researched the risk management concerns of solar panels and wind turbines, the two most commonly used renewable energy sources installed by municipalities and schools today. A summary of the risks and ways to control and mitigate them are described below:

Solar Technologies

Solar technologies are broadly characterized as either passive solar or active, depending on the way they capture, convert, and distribute solar energy. Passive solar technologies maximize the building's solar gain, heating the building by conduction. Containing no moving parts and no electrical components, they carry few, if any, risks. Active solar techniques, including photovoltaic panels and solar thermal collectors, use electrical and/or mechanical components to convert sunlight into useful energy. Their moving parts, electrical components, or high heat require more active risk management strategies.

Solar panels are generally used to provide power directly to the building or, if connected to the grid, provide savings through energy credits from the local power company. Similar in composition to glass, solar cells are brittle and prone to breakage. Solar photovoltaic panels are heavy, electrified, and aerodynamically vulnerable. Thus, they can present multiple risks during installation and operation. These risks can lead to various types of property damage, injuries, and costly claims.

Installation

Solar panels require specific skills and should only be installed by qualified licensed professionals. Their expertise will reduce electrical hazards and help maintain the structural integrity of the building. (Note: Connecticut statutes stipulate that an E-1 Electrical Contractor license or an E-2 Journey person license is required for work performed on photovoltaic or wind generation systems. Although not specifically mentioned, the technologies fall under the definition of electrical work. Solar licenses are required for work performed on an active, passive or hybrid solar hot-water heating system: they include a solar contractor's license, a solar journeyman's license, and a solar apprentice's permit.)

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Safe Installation

- During installation, the areas around the location should be treated as construction zones with limited access to reduce the risk of injury to staff, students and visitors. Students should not participate in the installation process.
- It is important to note that as soon as the panels are exposed to sunlight they begin to generate and store electric energy. Therefore, make sure that the panel modules remain in the package until they are ready to be installed. During installation sparks may occur. Ensure that there will be no flammable gases or vapors present where the panels are to be located.
- Ensure that the panels are properly supported and that the contractor/vendor understands the structural integrity of the building on which they will be installed. Discuss installation methods with contractors and determine if special techniques will be needed to prevent property damage, such as damage to the structural fire-proofing materials.
- Regulations and code requirements are many and new, so budget time to ensure that all federal, state, and local electrical, building, and planning and zoning codes are addressed and adhered to before and during panel installation.
- Ensure that an appropriate contract is in place with third- party vendors/ contractors before the installation. Have your legal counsel review the contracts to ensure that your entity is provided the appropriate legal protections. Ensure that the contract does not waive your right to subrogation and names the municipality and/or the Board of Education as an additional insured during the installation process. **CIRMA will review construction contracts for its members to ensure that you retain your recovery rights. Note: Do not sign a waiver of subrogation with the contractor.**

Safe Operation

In addition to meeting applicable electric codes to ensure safe operation, a solar power system that connects to the grid may have to meet additional safety criteria established by the local power company.

- An individual panel typically generates a low voltage that, by itself, is not sufficient to cause serious injury. But when panels are wired together, the power generated by the array increases proportionally and can cause a serious or fatal shock injury. Broken panels should be repaired or replaced as soon as possible because they leak current, endangering staff, students, workers and other equipment in the building. Photovoltaic panels are fragile and are not designed to hold weight, so they must not be leaned against or stepped on. Staff and vendors who are authorized to go onto the roof should be made aware that the panels are in place and should be instructed to avoid the panels. Consider placing warning signs describing the hazards in the immediate area.
- In general, the solar panel area should be considered off limits to all persons not specifically authorized. This will help prevent injuries and damage to the panels. Before allowing access to the roof by workers to inspect or repair the panels, ensure that OSHA fall protection training and equipment are in place and used.

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Claim Example - Lessons Learned
Solar Panel Roofing Project – Net Loss Incurred $2,760,000.

During the recent installation of solar panels on a school roof, 50,000 square feet of building interior ceiling and fire proofing was damaged. The loss occurred when the solar panel roofing contractor and his crew used shovels and brooms along with a stripping machine to prepare the roof for installation. The machine's heavy vibrations loosened the sprayed-on fire proofing causing it to delaminate from the steel roofing and fall, which in turn damaged the ceiling components. All ceiling tiles, metal framing of ceiling tile, wires, and ductwork had to be taken down in order to install new fireproofing materials. Most of the school was affected, including the library-media center, classrooms and offices. A review of the construction contract revealed that the member had signed a waiver of subrogation. This waiver prohibited the Board of Education and CIRMA from recovering expenses associated with the damage to the building that occurred during the course of the work.

Wind Turbines

While wind turbines are more-environmentally friendly than a coal or oil fired plant, there are still environmental concerns that may provoke some NIMBY opposition. Thus, long before a shovel is lifted, there exists the possibility of legal actions and claims regarding the siting of the turbine: this is a significant liability exposure for the municipality or public school.

There are many different groups and individuals that may be involved or have a voice in siting a wind power project. Understanding the differing roles, interests and priorities of various stakeholders is essential to implementing wind power successfully.

Location, location, location

- **Zoning and Planning** During the planning stage, your entity should coordinate with the local planning and zoning commission to obtain the appropriate permits for construction and installation of the wind turbine. A public hearing may also be required, especially if the site is located in a residential area. Wind turbines may be subject to local- and state-level planning, zoning, and inland-wetlands agency regulations. Some zoning rules may limit turbines or their heights based on the location property size. Your local zoning board may also require an engineering analysis of the tower and the foundations' structural integrity.
- **Community groups** Be prepared to inform local community groups, including land trusts and environmental groups. At this time, make sure an analysis of the soil's composition and stability is performed to determine if the site is suitable to support the structure. The Connecticut Siting Council, the state final permitting authority, regulates siting renewable sources greater than 1 MW.
  NOTE: In Connecticut, there is a loophole that allows zoning boards to approve "test" towers for wind turbine without a public hearing or notifying neighbors

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The capture and concentration of energy—in any form—is inherently dangerous. Wind energy exposes those who work with it to hazards similar to those in other industries... But there are the hazards which are unique to wind energy: high winds, heights, rotating machinery and the large spinning mass of the wind turbine rotor.

Windworks.org

and residents. As a result there may be, in fact, limited ability for the residents and community to challenge the development of an energy project.

Additionally, the State of Connecticut, through its clean energy grants and the Connecticut Siting Council, inadvertently supports the bypassing of local zoning during the wind energy development. The state gave the Connecticut Siting Council authority to override local zoning for sites larger than 1MW because electrical generating facilities are often unpopular and typically create local opposition.

- **Setback distances and height** The closer wind turbine towers are to buildings or other structures, the taller they need to be to ensure that the wind supply is consistent and not obstructed. When siting the tower and determining the tower height, the appropriate setback distance must also be determined. Appropriate distances should reflect the concerns of the abutting property owners and the municipality or school. This distance is typically the height of the tower plus the length of one blade from the property line, inhabited neighboring structures, utility lines, or roads. These distances are outlined by the American Wind Energy Association and are considered appropriate as long as they meet local zoning codes.

Wind and weather warnings

Wind turbines present other liability and property damage exposures that local public entities should consider before installing wind equipment. These are—

- **Icing** Like trees, power lines, and aircraft wings, wind turbines in cold climates can become covered in ice, a serious hazard. If the blades are moving, the ice may become detached and thrown for distances up to 1300 feet, depending on the length and speed of the turbine blades. If the blades are still, the ice may melt and fall directly onto anyone or anything positioned beneath the blades, resulting in serious injury, death, or property damage. Therefore, a restricted-access zone should be set aside at the base of the wind turbine to contain the falling ice. Post signs warning of the danger to the public and employees. Instruct staff to monitor the turbine for icing during cold weather.

  When the blades are moving, it may be difficult to see whether or not ice has formed on them. Warning signs of dangerous icing include a visible accumulation of ice on the blades, change in operating sound, and unbalanced rotation. Maintenance staff should be provided training from the turbine vendor on how to monitor ice development on the tower and blades. Ice can also damage the gear boxes and mechanical systems of the turbine. Having risk management systems in place such as icing alarms, ice detections monitors or anti-adhesive coating, and cold and inclement weather shut-down procedures will help minimize ice damage to the equipment, and surrounding properties.

- **Lightning** Wind turbines are tall structures typically located in open areas and on top of hills, exposing them to direct lightning strikes. According to the National Renewable Energy Laboratory Program on Lightning Risks and Wind Turbine Generator Protection, most turbines are controlled by sophisticated

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For additional information on this topic, please contact George Tammaro, Risk Management Supervisor, CIRMA at 203-498-3076, or at gtammaro@ccm-ct.org.

low-voltage controller systems that are at risk of damage from lightning strikes, causing a loss of hardware and/or operations. During the planning and engineering of the wind turbine and tower, make sure that your equipment vendor and contractor provides the proper grounding procedures and systems.

- **Bird strikes** Damage to the wind turbine and destruction of wildlife is a major risk management concern surrounding wind turbines. The later is of particular concern if the wildlife involved is an endangered species, such as the bald eagle, which has recently returned to the Connecticut river valley area. Depending on the location, some bird species are more likely to stray into the turbine than others. When wildlife or other environmental issues arise, an environmental protection agency may become involved. Although it is not possible to prevent all bird strikes, the possibility and probability of bird strikes should be addressed at the planning stage, when siting changes can mitigate the impact.
- **Contracts** Contractual agreements can be used to provide additional protection to the entity. Officials should require a certificate of insurance and a copy of the vendor's insurance policy, including the endorsements and exclusions. The entity should be named as an additional insured on the vendor's policy during the installation and construction of the wind turbine and tower. Do not sign a waiver of subrogation rights.

Other Resources

The Institute for Sustainable Energy at Eastern Connecticut State University provides a host of resources on wind energy resources and other electricity issues in Connecticut: www.easternct.edu/depts/sustainenergy/publication/reports.

The Connecticut Clean Energy Fund (CCEF) works regionally to support renewable sources and has information about wind siting in the region at www.ctcleanenergy.com.

For more information about establishing a risk management program for renewable energy sources, please contact your CIRMA Risk Management Consultant at 203-946-3700.

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The Connecticut Interlocal Risk Management Agency, CIRMA, is Connecticut’s leading provider of municipal risk financing and risk management services. A member-owned and governed agency, CIRMA provides high quality insurance for municipalities, school districts, and local public agencies. CIRMA operates two risk pools, the Workers’ Compensation and the Liability-Auto-Property pool. It also provides Heart & Hypertension claims services and claims administration and risk management services to self-insured municipalities. CIRMA’s financial strength enables it to provide assured rate stability, open availability, and expert risk control and claims services.

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