

## Managing safety during wind farm construction

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Wind power has been in use for centuries and is becoming one of the leading mechanically based sources for renewable energy. Since the 1970s large interconnected wind-driven turbines and generators have been constructed in “farms” to generate electricity. Recently, these farms have grown to enormous size, using large wind turbines, blades and towers. Many of the design, construction and management issues associated with other types of construction projects are also present in wind farms, but can be magnified. When a loss occurs, it has the potential to be a high-severity loss. For these reasons, managing the exposures of this work is essential.

### Falls

The most likely exposure associated with wind farm construction is falls. Because of the extreme height and size of wind turbines, there is nearly a 100 percent mortality rate when a fall does occur when a person is not using fall protection. Fall management is an essential component during this construction.

Today, the issue with fall protection starts with the lack of specifics associated with fall management. The issue is not only a lack of providing anchorage points or anchorage requirements, but also not using the right equipment for the exposure. For example, how is an employee going to be rescued in a timely manner if a fall arrest occurs and leaves the employee hanging? During the construction phase, if wrong equipment is used, self rescue likely will not be an option. Using a six-foot lanyard with a shock absorber can result in a total fall distance of more than 10 feet minimizing the potential for self rescue. Retractable-type fall equipment, such as self-retracting lifelines, will likely minimize fall distances and improve opportunities for self rescue when incorporated properly.

During construction, the use of improper fall equipment will require equipment such as cranes to remain at the tower site. One solution for a site where a crane is not present is to have trained “up tower” rescue teams with rescue equipment readily available. Because of the remote locations of many wind farms, emergency response times can be drastically increased and should not be depended upon for fall rescue. The natural height of towers severely limits the use of emergency responder equipment such as ladder trucks. This further elevates the need for up tower rescue teams and equipment at each tower site. This brings the primary issue back to the selection and use of fall equipment for the exposure and the need for dedicated “up tower” rescue teams.

Industry trade groups, trade schools and fall protection equipment manufacturers have developed programs to begin addressing the key exposures. Fall management training programs have been established to educate employees on the fall exposures associated with wind farm construction. Fall equipment manufacturers have, and continue to develop, a litany of solutions for performing aerial rescue with such equipment as controlled descent devices.

The wind industry has played a major role with trying to reduce fall exposures to minimize injuries with employees as described above. Additionally, the manufacturers have taken data from their studies to design and engineer out exposures. There are platforms built in the tower sections between 40 to 50 inches below the connector plate, which then provide one level of fall protection to the workers as they guide the next tower section into place. These platforms also provide an additional benefit in helping reduce the occurrence of musculoskeletal injuries, such as back and shoulder strains. The platforms place the connector plates around waist height, thereby eliminating the need for workers to kneel or be in an awkward position while installing, tightening and tensioning the connector bolts.

Additional considerations by manufacturers have included permanently attached anchorage devices and systems. These devices are strategically engineered and affixed — not just for construction purposes, but remain for maintenance employees once the turbine is commissioned.

### Cranes

Cranes can present an array of potential loss exposures, some of which can have high severity. A single crane loss may impact several different insurance coverages, such as workers’ compensation, general liability, contractor’s equipment and builders’ risk.

A natural enemy for crane operations during the construction phase is wind. The effects of wind on the lifted load and crane boom must be assessed to ensure that the crane is not overloaded or side loaded. The manufacturer’s instructions

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pertaining to wind should be understood by management and crane operators. Monitoring wind conditions and speeds should occur at each tower site and be no lower than the tip of the crane's boom. Wind monitoring should be more specific than what the general weather forecast states.

Another factor affecting crane operations is that wind farms are typically built in farming regions where the ground has been turned year after year creating soft unstable soil conditions. Wind farms also can be located in mountainous and hilly regions of the country. Although these areas may be ideal for wind farms, they can create problems for crane operations due to ground instability, uneven ground, and difficult access to the site. Despite the common belief that contractors have little control on the type or quality of soil present at the project, every contractor does have full control of how they address the issue regardless of the soil type, condition or quality. Solutions may include the incorporation of properly sized crane mats, soil stabilization and compaction of soil.

Even with management techniques, such as soil stabilization and the use of quality crane mats, cranes still remain prone to overturning on wind farms. Surprisingly, these losses are not always directly related to hoisting and setting activities, but are attributed to moving and relocating from tower site to tower site. Access roads between tower sites should be built to withstand the loads imposed during moving operations.

### Electrical

Electrical exposures during construction of wind farms are more prevalent than most people realize. With miles of cable both underground and overhead, they can pose difficult problems logistically. Issues such as arc flash and fires are prevalent. Fires can trap an employee in the nacelle leading to a tower rescue situation. Workers also need to be isolated from induced electrical currents that may be present in the electrical transmission cable that has been installed. Effective grounding and bonding is necessary to control this exposure.

### Emergency response

As with fall protection, a rescue situation from fire cannot always depend upon local emergency response units due to extended response times. During the construction phase, it is important that plans are in place and practiced to deal with these issues before they occur. Personnel need to be trained in up tower rescue, self rescue, and the use of proper equipment at the tower site to perform such rescues as needed.

### Transportation

Most wind farms, at best, are surrounded by county roads and makeshift access roads. Transportation can be difficult and continues to be an area of scrutiny within the industry. For contractors, this exposure is often limited due to the project owners having responsibility for the site. The manufacturers are typically responsible for getting the components from their facilities to the tower site. Contractors pick up responsibility from the staging area to each individual tower site when haul roads are at their worst.

Access roads are commonly in poor condition — narrow roads and gravel type (at best) with deep soft shoulders. These are major factors that must be addressed to minimize loss potential. It is imperative heavy-assist equipment such as dozers and loaders are present or readily available to help push and pull the transporters through when moving from the staging area to the tower site.

### Public exposure

Because of their rural locations, public exposure to wind farms is unique. The rural locations with the acreage that farms occupy make it difficult to create a secured construction site. Temporary fencing is not a common practice for these types of projects due to the natural area encompassed. It is not uncommon for a tower site to be located on a cattle ranch and have the presence of the landowners fencing allowing for a level of security. This provides another challenge where contractors must ensure gates are being closed immediately when passing through.

Private security guards are another option during construction. A common practice is to have a guard located in the trailer area with another roaming from tower site to tower site reporting back any issues. Cellular-based systems can be used to enhance the security and theft protection of the equipment, staged material, and general vandalism when used in conjunction with the on-site security guards.

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As wind farms move from farm lands into mountain and hilly regions, issues that can be faced include off-road vehicle activity such as 4x4 trucks, ATVs and dirt bikes. There is also the potential for accidental shooting due to nearby hunting, or attacks by large game such as moose, bear or mountain lions, or even poisonous snakes that may be inhabiting a particular region. Prior to a project starting, becoming familiar with these regional issues will allow for effective management practices to minimize exposures.

### Summary

As is common with most construction projects, a number of challenges are present with safety, logistics, transportation, scheduling, public exposures, etc. The success of the project and the contractor is dependent on management's commitment to properly address and manage these risks. The approach and attitude of the wind energy associations, utility owners and manufacturers provides for a solid springboard for contractors to elevate their risk management programs allowing every opportunity to minimize exposures.

Travelers has developed numerous resource materials available to our customers to further support and assist contractors with maximizing the effectiveness of their risk management programs.

For more information, log in to the Risk Control Customer Portal at [travelers.com/riskcontrol](http://travelers.com/riskcontrol). (Need help? Read our [Registration Quick Guide](#).) You also can contact your Risk Control consultant or email [Ask-Risk-Control@travelers.com](mailto:Ask-Risk-Control@travelers.com).



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