

Teaching by Example

How a Pennsylvania state park overcame challenges to install a 10-kilowatt wind system that educates as it generates.

School groups often visit Presque Isle State Park's wind turbine, according to Environmental Education Supervisor Ann Desarra and Superintendent Harry Leslie, above.

By **MICK SAGRILLO** and **LISA DIFRANCISCO** Photos by Lisa DiFrancisco, North Coast Energy Systems

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Pennsylvania's Presque Isle State Park (PISP), located just minutes from downtown Erie, is a tourist attraction specializing in environmental education for all ages. With more than 4 million visitors a year, the 3,200-acre park, which sits on a 7-mile sandspit peninsula on Lake Erie, is not only a recreational facility, but also a highly visible forum for teaching by example.

Since 2004, PISP has been home to a 10-kilowatt (kW) wind turbine, which powers an interpretive center in the park. The turbine also serves as a teaching tool for park-goers, school groups, bird and bat enthusiasts and even wind installers. A powerful demonstration of the viability of renewable energy, the project encountered a few initial setbacks that taught their own lessons along the way.

How to Demonstrate a Wind System at a Public Facility

Hire a qualified wind-site assessor to evaluate your site, wind resource and energy-generation potential. This information can later be used for educational purposes: How were the tower height and location determined? How were the wind speed and energy production estimates calculated? Were there any zoning, permitting or utility-interconnection challenges? What are the correlations between wind speed, tower height and production?

There's no such thing as a "maintenance-free" wind generator. All turbines need annual inspections and eventual maintenance and repairs. Question your site assessor and/or installer about the real cost of installing and maintaining a high-quality wind turbine. Then budget accordingly and realistically.

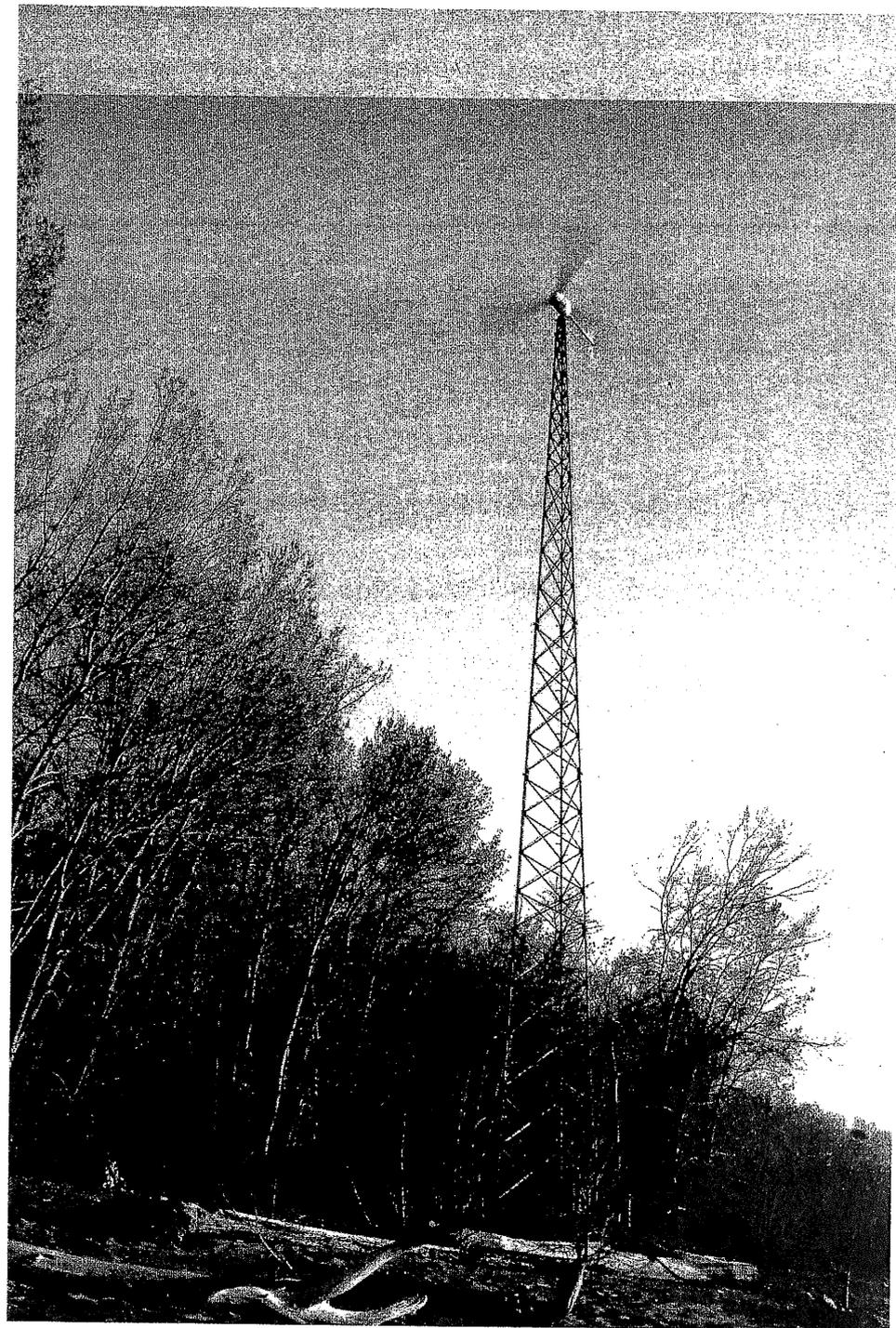
Don't cheap out. What you are after is a well-sited wind system that will operate for decades. Such systems are not inexpensive. But then neither is a poorly sited bargain turbine that only runs for a few years.

Don't expect a free wind system. If the owner has "no skin in the game," the first time the system needs attention or repairs, the fixes are not likely to be authorized. If this happens, ask yourself what you are really teaching future generations of consumers and voters.

Overcoming a Turbulent Start

Presque Isle's first wind system was a 4- kW wind turbine installed in September 1982. The turbine was ill-sited, installed on a tower too short for the location and plagued with problems from the start. Within four months, the turbine developed a growling noise. Other mechanical issues continued for the next three years, resulting in significant time and cost for trouble-shooting and repair.

In 1986, the turbine was moved from its original location on Lake Erie's Beach 6 to Barracks Beach, near the Stull Interpretive Center, in hopes that the more favorable site condition would improve production and functionality. Unfortunately, problems continued. By 1995,

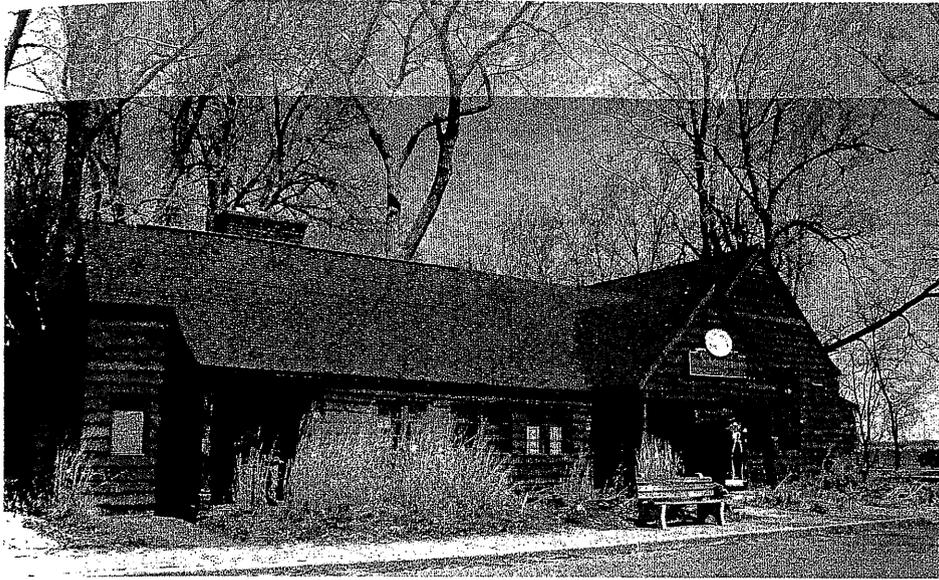


PISP Superintendent Harry Leslie firmly believes that installing a wind turbine is the right thing for a natural resources agency to do. One of Leslie's dreams for the park is a 50-kW wind system.

technicians had recoated the blades, rebuilt the generator, overhauled the control box and repaired or replaced other components, including the anemometers. The turbine continued to function erratically and required excessive attention. The final attempt to repair the turbine was made in 2000. When that failed, the system remained non-functional until it was finally dismantled in 2004, abandoned as a lost cause.

In 2003, a local installer of small-wind sys-

tems, realizing the negative perceptions a non-functioning turbine might be creating, met with park managers to discuss options for replacing the wind turbine. Undaunted by the previous wind system experience, park officials agreed that if the funding could be raised, the turbine should be replaced. With that, Lisa and Joe DiFrancisco of North Coast Energy Systems (ncenergy systems.com), under the auspices of the Presque Isle Partnership, applied for and received an



Above, the Stull Interpretative Center in Presque Isle State Park is powered by the 10-kilowatt wind turbine on nearby Barracks Beach. Below, Julie Maries reads the informational kiosk about the wind turbine at Pennsylvania's Presque Isle State Park. The turbine generates energy for the park and serves as an educational tool.



Energy Harvest Grant from the Pennsylvania Department of Environmental Protection (DEP) for installation of a new wind turbine. In addition to replacing the non-functioning wind turbine, the project had several other goals:

- to negate pollution caused by other energy sources,
- to reduce the demand on the local utility grid,
- to promote education and awareness of renewable energy and

- to demonstrate the ability of man and nature to function together.

The Presque Isle Partnership has a track record of successfully delivering on its stated goals, and the proposed project met with an enormous amount of community support and pledged participation. As a result, the Pennsylvania DEP awarded the Presque Isle Partnership a grant of \$42,106.

The turbine selected for the project was a Bergey Windpower Co. Excel (bergey.com),

Performance Highlights: The Presque Isle State Park Wind System

While the 10-kW Bergey Excel turbine was projected to generate between 15,000 and 17,000 kilowatt-hours (kWh) annually, actual production has ranged from 11,620 to 15,090 kWh per year. In the first three months of 2010, the system has already generated 4,063 kWh. Other than routine inspections, the turbine has had only six weeks of downtime in the 66.5 months since it was commissioned.

Commissioned: Sept. 15, 2005.

Electricity Generated

Lifetime: 74,722 kWh

Annual Average: 13,484 kWh per year

Pollution Offset

Lifetime:

Coal: 37.4 tons (33.9 metric tons)

CO₂ = 173,773 lb (78,822 kg)

NO_x = 448 lb (203 kg)

SO₂ = 1,479 lb (671 kg)

Annual:

Coal: 3.75 tons (3.4 metric tons)/yr

CO₂ = 31,595 lb (14,331 kg)/yr

NO_x = 82 lb (37 kg)/yr

SO₂ = 269 lb (122 kg)/yr

Project Costs and Funding

Expenses

• Bergey 10-kW Excel turbine, with Grid-Tec inverter	\$22,900
• 120-foot freestanding SSV tower	\$13,200
• Wiring, energy meter and safety equipment	\$1,490
• Inspection and application fees	\$1,950
• Labor, materials and equipment rental	\$17,494
• Administrative oversight and travel	\$2,349
Total	\$59,383

Funding

• Energy Harvest Grant	\$42,106
• Donations (North Coast Energy Systems, local contractors and individuals)	\$17,277
Total	\$59,383



manufactured in Norman, Okla., and rated at 10 kW of peak power at 32 miles per hour (14.3 meters per second, or m/s). With a life expectancy of at least 25–30 years, this turbine has a reputation for being the most reliable in its size category, an important criterion when demonstrating any technology in a frequently visited location. Mounted on a 120-foot (37-meter) freestanding tower (40 feet, or 12 meters, taller than the previous tower), the Bergey Excel would provide electricity to the Stull Interpretive Center on Barracks Beach.

The initial site survey by North Coast Energy Systems indicated a very good wind resource for the park, averaging 12 miles per hour at 30 feet (5.36 m/s), and extrapolated to 15.5 miles

The wind turbine at Presque Isle State Park sits on Barracks Beach. The highly visible location brings thousands of visitors to learn about the turbine each year.

per hour (6.92 m/s) atop the 120-foot tower. System designers estimated the Bergey would generate from 15,000 to 17,000 kilowatt-hours (kWh) per year.

In July 2004, North Coast Energy Systems, park employees, local contractors and volunteers dismantled the old wind turbine and its 80-foot tower. They immediately began working on the foundation for the new 10-kW wind turbine and its 120-foot tower. The grant covered the cost of the major components, such as the wind turbine, tower, inverter, down-tower wiring and concrete; much of the remaining labor and materials were

provided in-kind or at cost by local contractors and individuals.

By September, installers had completed the wiring and mounted the inverter, and the local utility had approved the interconnection application. The system was fully interconnected and commissioned on Sept. 15, 2004, immediately generating energy and drawing crowds.

Creating Understanding, Experience

The Bergey Excel is a valuable teaching tool, noted Ann Desarro, the environmental education supervisor for PISP. It's installed on a public beach, so the area around and under the turbine gets heavy usage. School groups visit often, and environmental education lessons take place under the turbine. More than 10,000 students attend formal programs with staff every year, with thousands of others visiting as well. "The wind turbine is a no-brainer for young people, a piece of the puzzle for a sustainable future," Desarro said.

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— Ann Desarro, environmental education supervisor
for Presque Isle State Park

An outdoor interpretive panel explains the workings of the system to beach-goers. Public reaction has been overwhelmingly positive, and many visitors are mesmerized by what they characterize as an “awesome piece of equipment.”

In addition to being featured in the park’s educational programs, the wind turbine is used each year in the Earthforce Youth Summit (earthforce.org). It has also been used as a backdrop for public education, including an event sponsored by the Presque Isle Chapter of the Audubon Society on wind turbines, birds and bats. The event’s participants gained a better understanding of small wind and its benefits.

Assessing Avian Effects

The wind turbine is a mere mile from an ecological preserve, so naturally some expressed concerns about bird and bat mortality. Since these issues are typically at the foreground with wind farms and utility-scale turbines, no

wind turbine area for birds or bats and keeping a log of findings. Audubon members accepted the invitation, and the co-monitoring ran from 2005 to 2007. The result: After more than two years with no notable findings (only one seagull with no physical injuries to indicate a strike), the Presque Isle Chapter of the Audubon Society made a preliminary determination that small wind turbines, even when placed close to migratory flyways, pose no significant threat to birds or bats. A more formal study confirming these findings would soon follow.

From fall 2006 to spring 2008, an independent study was conducted for the Pennsylvania Department of Conservation and Natural Resources. Scientists, professors and students from nearby Gannon University conducted the study with oversight by the Regional Science Consortium, a nonprofit that coordinates educational and research projects for Lake Erie and the upper Ohio River Basin. The study proved

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— Harry Leslie, Presque Isle State Park superintendent

Building on Success

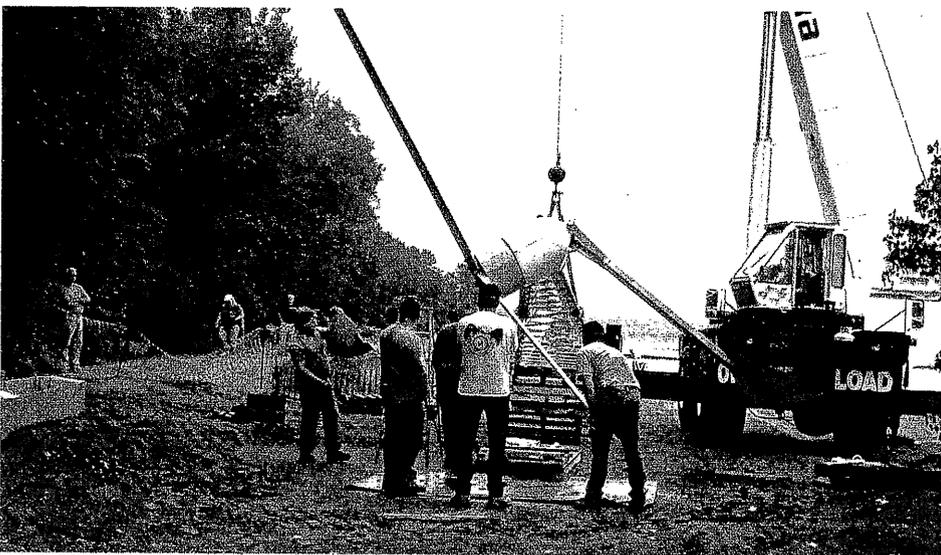
Since the 10-kW wind turbine was installed in 2004, electricity generated has been recorded using a simple, utility grade, cumulative kilowatt-hour meter. Periodic meter readings not only track production, but also provide early indication of problems with the system — before they become irreparable, expensive or cause excessive downtime.

Metering data can be used by organizations, grantors, incentive programs and others to verify the projects they fund are performing as expected. Additionally, small-wind professionals can use this production data to improve the accuracy of site assessments. By tracking production over a number of years, they can identify production variances and patterns from year to year, even at the same site. They can also correlate changes in production to changing site conditions, such as tree growth. This information is valuable for everyone from turbine manufacturers to end-users.

Harry Leslie has been the superintendent of PISP since 1989, back to the days of the first wind system. Asked why, given the bleak experience with that turbine, the park took a gamble on another wind system, Leslie said the time was right. He had seen the technology mature over the years, becoming much more reliable.

Leslie firmly believes that installing a wind turbine is the right thing for a natural resources agency to do for public education. “It symbolizes a better way to generate electricity, sets a positive example and is a wise use of park dollars,” he said. One of Leslie’s dreams for the park is a 50-kW wind system.

In part due to the success of this project, a second Bergey Excel has since been installed at the Tom Ridge Environmental Center at PISP, and there are now turbines at five other state parks in Pennsylvania. 57



Volunteers help assemble and install Presque Isle State Park’s 10-kilowatt Bergey Excel wind turbine. The project was entirely paid for through a grant and donations of time, materials and money from local wind installers and individuals.

resource offered conclusive information as to whether smaller wind turbines were responsible for killing birds and bats.

Following installation of the new turbine, North Coast Energy Systems invited members of the Presque Isle Chapter of the Audubon Society to participate in some informal co-monitoring. Each week, representatives from both North Coast Energy Systems and the Audubon Society would be responsible for searching the

invaluable, recording which species of birds and bats are active in the area. According to the findings, more than 3,000 bird species either inhabit the area or migrate through it. Of those species, 130 are “threatened, endangered, or rare.” Only one common grackle was found dead in the area, and the cause of death was undetermined. These findings reinforced the conclusion that small wind turbines are not decimating bird and bat populations, as is sometimes postulated.