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FEBRUARY 2017

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*Computer program summarizes test results from periodic turbine inspections.*

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# EDITOR'S DESK

FEBRUARY 2017

## Services Keep Turbines Turning

**F**ebruary can sometimes be an odd month. It can never make up its mind how many days it wants to have in it. It's usually cold.

And if you're single, Valentine's Day can be a real bummer.

But for the February issue of *Wind Systems*, you'll find some stories that will hopefully make the second month of 2017 feel as short as it is.

With a focus on operations and turbine maintenance, we've rounded up some articles that are both informative and interesting.

Starting with our company profile, we shine a spotlight on Shermco Industries.

The company, which has been around for more than 40 years, has made strides in helping wind-project owners reduce their overall costs, and in the article, officials discuss their philosophy in how they make that a part of their everyday routine.

Making sure turbines are always working properly is an ongoing concern with wind projects. With all those moving parts, there are a lot of components that have to be kept in check.

That's why turbine inspections are important.

In this month's Conversation, we talk with Steven Elrod, general manager with BS Rotor Technic USA. Elrod fills us in on how BS Rotor uses its technical knowledge and expertise to service and repair wind-turbine blades. Part of that expertise deals with inspections.

Also as part of inFocus, Thomas Arnold, with TÜV SÜD Industrie Service GmbH, shares his insights into the advantages of standardizing how data is processed and distributed.

Outside of this month's inFocus topics, Crosswinds offers up a fascinating article on research being done on using material derived from plant fibers that will help make wind turbines not only lighter, but more ecologically sound.

With the Department of Energy recently announcing that American wind jobs have hit the 100,000 mark, it's exciting to see advances and research in the wind industry continue to soar.

There's still no sign of the wind industry slowing down in the coming months and years, and the strides that continue to be made are a solid indicator of that constant growth.

So, bundle up this February and reflect on the good fortunes of a burgeoning wind industry. And if you didn't get any Valentine's candy, just remember it's half price on the 15th.

Thanks for reading!



**Kenneth Carter, managing editor**  
*Wind Systems* magazine  
editor@windssystemsmag.com  
(800) 366-2185, ext. 204

A stylized, handwritten signature in black ink that reads "Kenneth Carter". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.



## More States Taking Advantage of Wind

Courtesy of AWEA

- Over the last 12 months, both Iowa and Kansas have generated more than 30 percent of their electricity using wind.
- North Dakota, South Dakota, and Oklahoma all created at least 20 percent of their electricity with wind over the past 12 months.
- Overall, 13 states used wind to generate at least 10 percent of their electricity.
- There's enough installed wind capacity in the U.S. to power 20 million homes.
- Wind is on track to provide 10 percent of U.S. electricity by 2020 and 20 percent by 2030.

The American Wind Energy Association (AWEA) is the premier national trade association that represents the

interests of America's wind energy industry. For more information, go to [www.awea.org](http://www.awea.org)



*Giving Wind Direction*

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# DIRECTION

Policy • Advocacy • Business • Finance • Legal • Environment • International

## DOE: American Wind Jobs Crack 100,000

Wind power employs just more than 100,000 Americans according to recent data released by the U.S. Department of Energy (DOE). That's more than work at nuclear, natural gas, coal, or hydroelectric power plants.

"Wind means opportunity and job security for over 100,000 Americans," said Tom Kiernan, CEO of the American Wind Energy Association. "The Department of Energy's new jobs data underscore the incredible impact of wind power in creating American jobs. Wind workers directly contribute to our nation's energy independence and economic success story. We're especially proud of helping America's veterans find well-paying jobs after their service, employing them at a rate that is 50 percent higher than the national average."

These wind jobs can be found across the nation. According to DOE, Texas is home to nearly 25 percent of American wind workers. Substantially more growth is possible. According to DOE's earlier Wind Vision report, 380,000 American wind jobs could be created by 2030.

DOE's new data validates the jobs growth reported in AWEA's own annual report. At the end of 2015, AWEA estimated 88,000 Americans were employed in the U.S. wind industry, a 20 percent increase from 2014 levels. Given near-record amounts of wind power under construction and recent wind manufacturing facility expansions in states such as Colorado, Florida, Texas, and Wisconsin, AWEA expects wind industry employment grew significantly in 2016.

AWEA's detailed jobs analysis, including state-by-state breakdowns, will be released this spring as part of the U.S. Wind Industry's Annual Market Report 2016. ↵



At the end of 2015, AWEA estimated 88,000 Americans were employed in the U.S. wind industry. (Courtesy: AWEA)

Source: American Wind Energy Association

For more information, go to [www.awea.org](http://www.awea.org)

## New York State Plans 2,400 MW of Offshore Wind by 2030

New York Gov. Andrew M. Cuomo called on the Long Island Power Authority to approve a 90 MW offshore wind project 30 miles southeast of Montauk. The project will be the nation's largest offshore wind farm and will not be visible from Long Island's beaches.

He also proposed an unprecedented commitment to develop up to 2.4 GW of offshore wind power by 2030, enough power generation for 1.25 million homes and the largest commitment in U.S. history. The projects will be developed out of view from the coast and in close collaboration with local communities and stakeholders. The Offshore Wind Master Plan will outline the path forward for

this commitment to offshore wind and will be completed by the end of 2017.

"New York's unparalleled commitment to offshore wind power will create new, high-paying jobs, reduce our carbon footprint, establish a new, reliable source of energy for millions of New Yorkers, and solidify New York's status as a national clean energy leader," Cuomo said. "The Offshore Wind Master Plan will establish a bold strategy to harness this untapped resource in New York and provide a new source of energy to power a brighter, greener future for all."

Offshore wind is critical to meeting the goal outlined

in the governor's Clean Energy Standard to meet 50 percent of New York's electricity needs with renewable sources by 2030. As part of this proposal, the governor also calls on state agencies to ensure a 79,000-acre lease area capable of siting about 800 MW of offshore wind off of the Rockaway Peninsula is developed cost-effectively and responsibly to customers.

In addition, Cuomo directed the Department of Environmental Conservation and the New York State Energy Research and Development Authority to undertake a comprehensive study to determine the most rapid, cost-effective, and responsible pathway to reach 100 percent renewable energy statewide. New York will engage academic partners to draw upon existing clean-energy research and seek input from other key stakeholders.

### LONG ISLAND PROJECTS

The Long Island project is the first step toward developing an area that can host up to 1,000 MW of offshore wind power.

In an indication of offshore wind's growing attractiveness as a power source, the proposed project is the most innovative and least cost way to meet the growing power needs of the South Fork and to provide cleaner energy for Long Island.

In December, the international energy company Statoil Wind US LLC won an auction from the federal government to lease the area for the second project south of the Rockaway Peninsula for wind-energy development.

Cuomo is calling on the New York State Energy Research and Development Authority (NYSERDA) to work with Statoil to ensure the project delivers power cost-effectively and responsibly to customers. NYSERDA



At his recent State of the State address, New York Gov. Andrew M. Cuomo announced several offshore wind projects. (Courtesy: New York Governor's office)

also will help ensure needs are met for affected stakeholders such as fishermen, maritime industries, coastal communities, and labor. The compa-

ny won the lease for \$42.5 million, demonstrating the commercial interest in developing offshore wind for New York state.



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**OFFSHORE WIND MASTER PLAN**

With some of the most favorable conditions for offshore wind in the United States, the coast of Long Island has the potential to bring an enormous amount of renewable energy and substantial job creation and economic development benefits to all New Yorkers.

The state's Offshore Wind Master Plan will establish a commitment for the responsible development of New York's offshore wind resources in ways that benefit electricity customers and protect the environment. Offshore wind will protect the environment by reducing emissions and spur new investments in infrastruc-

ture and manufacturing, creating high-quality jobs across the state.

New York will ensure that the visual impact of offshore wind turbines will be minimized through appropriate siting. New offshore wind-turbine foundation technologies will allow construction in deeper water, farther offshore and out of sightlines from the coast.

**REFORMING THE ENERGY VISION**

Reforming the Energy Vision is Cuomo's strategy to lead on climate change and grow New York's economy. Reforming the Energy Vision is building a cleaner, more resilient and affordable energy system for all New

Yorkers by stimulating investment in clean technologies such as solar, wind, and energy efficiency and generating 50 percent of the state's electricity needs from renewable energy by 2030. Already, Reforming the Energy Vision has created thousands of jobs in manufacturing, engineering, and other clean-tech sectors. Reforming the Energy Vision is ensuring New York State reduces statewide greenhouse gas emissions 40 percent by 2030 and achieves the internationally recognized target of reducing emissions 80 percent by 2050. ↘

*Source: New York Governor's office*  
For more information, go to [www.governor.ny.gov](http://www.governor.ny.gov)

**Mita-Teknik Chooses Windsourcing.com as Sales Partner for IP-Box**

In 2015, Windsourcing.com welcomed Mita-Teknik on board and became an official distribution partner for the Danish company's wind-energy products. Mita-Teknik is an international company specializing in complete control concepts for wind turbines including control systems, Retrofit Control systems, SCADA systems, grid connection systems, condition monitoring, load and control optimizing, and sensors.

Starting in 2018, the German operator Telekom will switch all their networks to All-IP, and many operators in European countries will follow. This means the disappearance for ISDN-telephony and traditional telecommunications system.

As a consequence, many older wind turbines will not be able to be controlled or monitored by analog or ISDN-modems any longer. To solve this, Mita-Teknik developed a cost effective and easy-to-install solution to replace the obsolete communication equipment in any turbine and reconnect it with existing SCADA solutions running Windows 32 or 64bit.

"We are already working successfully together with Windsourcing.com as our distribution partner for the after-sales wind-energy market," said Thomas Liratsch, sales director at Mita-Teknik. "Therefore, it was a logical step to also promote and supply our new product development, the MiComm IP-Box via Stefan Weber and his team."

With the new MiComm IP-Box, Mita-Teknik offers a complete remote communication solution designed to replace obsolete PSTN/ISDN modems and enable modern, reliable and secure remote IP communication to existing wind turbines with existing SCADA systems.

"We are very pleased to further strengthen our cooperation with Mita-Teknik and be selected as their official distribution partner to supply the new MiComm IP-Box," said Weber, founder and managing director of Windsourcing.com GmbH.



The MiComm IP-Box is designed to replace obsolete PSTN/ISDN modems. (Courtesy: Windsourcing.com)

**STRATEGIC SUPPLY PARTNERSHIP**

"That is a great endorsement for us," said Seher Kaygusuz, responsible for Business Development and Marketing at Windsourcing.com. "We consider ourselves not only as distribution partners, but also as business partners helping to promote new product developments within the wind market."

Kaygusuz invites manufacturers and suppliers to come to her and the

entire team directly to join Windsourcing.com's team of suppliers.

"Windsourcing.com calls upon hundreds of suppliers to obtain the materials and services our customers need in fulfilling their everyday maintenance and repair works," she said. "If you are interested in joining us, simply contact us." ↵

Source: [Windsourcing.com](http://Windsourcing.com)

For more information,  
go to [windsourcing.com](http://windsourcing.com)



Windsourcing.com is partnering with Mita-Teknik. (Courtesy: Windsourcing.com)

## Report: New Transmission Can Help Wind Supply a Third of U.S. Power

The Energy Department released a report that confirms that adding even limited electricity transmission can significantly reduce the costs of expanding wind energy to supply 35 percent of U.S. electricity by 2050.

The report, Reducing Wind Curtailment through Transmission Expansion in a Wind Vision Future authored by the National Renewable Energy Laboratory (NREL), affirms the findings of the Energy Department's 2015 Wind Vision, which showed that a future in which wind provides 20 percent of U.S. electricity in 2030 and 35 percent in 2050 is achievable and would provide significant economic, energy security, and health benefits to the nation.

### MODELING TOOL

For the study, NREL simulated operation of the electric power grid under a scenario where 35 percent of electricity comes from wind in the year 2050 using PLEXOS, an integrated modeling tool commonly used by utilities and transmission organizations.

The study focuses on the Western Interconnection grid, which includes 11 states, two Canadian provinces, and parts of northern Mexico where the U.S. grid crosses the border.

The study includes a baseline scenario assuming no significant transmission expansion across the western grid, as well as three scenarios with varying levels of transmission build out.

In the baseline scenario with no transmission expansion, substantial renewable energy curtailment — times in which wind farm operators are told not to produce energy due to limited capacity on the grid — could become a major issue.

In this scenario, about 15.5 percent of wind-energy capacity goes unused with consequent increases in system costs as a result of idled wind generation.

The study also finds that if just four currently pro-

posed transmission projects are built, wind curtailment can be reduced by about half, cutting lost generating potential to 7.8 percent.

If the nation deploys additional transmission beyond those four proposed projects, wind curtailment can be reduced even further — allowing full use of wind energy, reducing generation costs, and unleashing additional economic and societal benefits.

### LOOKING AT TEXAS

This report quantifies on a regional scale what's been seen in Texas in recent years: Wind curtailment on Texas's grid ranged from 8 percent to 17 percent between 2009 and 2011, but fell to only 1 percent after new transmission lines and other upgrades were completed under Texas's Competitive Renewable Energy Zone initiative.

Wind power is one of the fastest growing sources of new electricity generation in the United States and already is providing substantial economic, energy security, and health benefits.

This study affirms that even limited additions to transmission capacity would allow more wind energy from the Mountain States to power load centers on the West Coast. On the other hand, a lack of new transmission capacity could limit the growth of wind energy and its potential benefits.

Overall, the results of the study underline that utility grids can reliably operate with more than 35 percent wind energy and 12 percent solar energy, and they emphasize even limited transmission expansion can significantly ease the path to a renewable energy future. ↵

Source: *Energy Department's Office of Energy Efficiency and Renewable Energy*

For more information,  
go to [energy.gov](http://energy.gov)

## IEA: France’s Energy Transition Is Vital for Energy Security

In its latest country review of energy policies, the International Energy Agency (IEA) praised France for setting in motion significant reforms toward more secure, affordable and sustainable energy supplies, and the green growth of its economy.

Over the past 10 years, the French economy has reduced its carbon intensity and benefited from greater energy efficiency, notably in the residential sector, according to the IEA report, *Energy Policies of IEA Countries: France 2016 Review*. The IEA praised France’s leadership role in climate-change mitigation and green finance around the world and at home, particularly thanks to the adoption of the ambitious set of measures under the Energy Transition for Green Growth Act in 2015.

### SIGNIFICANT INVESTMENTS

But the IEA found the government’s plan to cut the share of nuclear power from 78 percent of electricity produced today to 50 percent by 2025, while also reducing greenhouse gas emissions by 40 percent in 2030, will require significant investments in energy efficiency and new low-carbon generation.

“France has to implement nothing less than a transformation of its energy system and power market,” said Paul Simons, the IEA deputy executive director, speaking at the launch of the report in Paris.

France’s ambitious goal of reducing its share of nuclear power over the next decade amid an aging fleet is going to transform its energy sector. Reaching the target will require careful policy guidance, effective markets, and strong measures for renewables and energy efficiency, according to the IEA’s latest review of France’s energy policies.

### NUCLEAR SECTOR

The report outlines the outlook for France’s nuclear sector in the next 10 years will be decisive for the country’s capacity to meet its climate and energy goals, and — at the same time — maintain electricity security. France’s nuclear fleet is the world’s second-largest, and it has reached a 30-year average lifetime. For now, no decision has been taken in favor of long-term operation pending safety reviews.

The IEA report highlights five avenues to accelerate the energy transition and guide energy investment: It encourages the government to track progress along ro-



France’s ambitious goal of reducing its share of nuclear power over the next decade amid an aging fleet is going to transform its energy sector. (Courtesy: IEA)

bust scenarios, to continue with clear and long-term carbon pricing instruments, to take timely decisions on the safe and long-term operation of the nuclear reactors, to further reduce barriers to renewable deployment and to strengthen efforts toward market opening, competition, and consumer choice.

### RENEWABLE ENERGY

The IEA shows that deployment of renewable energy in France is still below the IEA average. While solar and biomass are developing well, further government action

could help improve siting, permitting, acceptance, and grid connection of wind power. Despite recent reforms, price signals from the electricity and carbon markets are weak, and technical and market barriers

remain for further renewable deployment.

The IEA acknowledges France’s progress in gas market reforms, with higher trade and regional integration. But despite reforms of the electricity market, including dropping regulated tariffs for large and mid-sized consumers, and ensuring competitive regulated access to the nuclear fleet, France’s electricity sector has only a few large players.

Commendably, the government has decided to encourage demand response, to launch capacity mechanism, and set investment targets under the multi-annual energy planning (PPE). ↴

Source: International Energy Agency

For more information, go to [www.iea.org](http://www.iea.org)

“ France’s nuclear fleet is the world’s second-largest, and it has reached a 30-year average lifetime. ”



Bachmann's SCT202 M1 automation module. (Courtesy: Bachmann electronic GmbH)

## New PLC-Integrated Module Helps with Safety Speed Measurement

Bachmann electronic has extended its portfolio of safety modules with the SCT202 M1 automation module, a highly versatile speed and position measurement module for safety-related applications, particularly in the wind sector. Bachmann consistently embeds its fully compatible safety solutions directly in the plant controls. Tasks such as operational control and safety technology are fully integrated.

### SAFETY SPEED MONITORING

The SCT202 module eliminates the need for external solutions for safety speed monitoring. The shared use of the acquired measured values for safety-related and non-safety-related automation tasks reduces system costs for procurement as well as for integration, mounting, and operation. The SCT202 also comes with two inputs for incremental encoders (HTL, TTL), together with encoder

power supply for both voltage signals, two counter inputs as well as two safety-related inputs and outputs each.

The provision of measured values for non-safety-related applications is not bound to the safety cycle. Instead, the Bachmann concept allows the integrated use of the SCT202 in the operational control of a wind turbine.

The safety-related digital outputs provided in the module enable a safety-related response in less than 1 ms. This guarantees safety even in highly dynamic applications.

### VERSATILE HOMING METHODS

The module also stands out on account of the wide range of homing methods it offers for incremental encoders. This not only includes homing with the zero track, but also via digital input, counter input, and the linking in the application of input

signals not acquired by the SCT202.

As homing on the SCT202 is implemented with safety signals, it is also possible to measure positions and rotation angles reliably.

### CERTIFIED ALL-ROUNDER

The safe, application-related processing of the acquired values in Bachmann's SLC284 safety controller makes it possible to implement complex scenarios. Possible applications include the detection of overspeed situations, gearbox failure as well as cable twist. With these features, the SCT202 module is ideally equipped to implement the complex task of safety speed monitoring in wind turbines. ↗

Source: Bachmann  
Electronic GmbH

For more information,  
go to [bachmann.info](http://bachmann.info)

# inFOCUS

## New Database for Hundreds of Test Reports

*Computer program summarizes test results from periodic turbine inspections.*

By Thomas Arnold

Throughout the service life of a wind-energy turbine, managers of large wind-farm portfolios have to cope with a veritable deluge of information. In addition to electronically transmitted operational data, there are various documents — such as licenses, invoices, and maintenance and repair reports — that contain important information for optimizing operation. And last but not least, reports from periodic inspections also regularly deliver valuable information about the state of repair of wind turbines and their equipment.

However, with this abundance of information, stakeholders may find it difficult to draw the right conclusions and make good investment decisions. Do the turbines have any faults that require immediate action? What about repairs, servicing and maintenance, and their intervals and deadlines? Operational processes and documentation processes may ensure the relevant data and information are available, but their processing generally proves quite challenging. For example, there are no interfaces or functions for exporting letters and PDF files.

To analyze data and information, prioritize activities, and initiate work to be undertaken at the turbines, experts frequently copy data and information to other IT systems and file formats (e.g. Excel workbooks).

### ADVANTAGES FROM DIGITIZATION

Given the above, standardized and digitized processing of information promises a plethora of advantages. Evaluation of the data included in the reports of periodic turbine inspection is one example. To date, faults mostly have been recorded in a paper checklist, from which the experts later enter the results in their own IT systems and file formats.

This approach quickly produces hundreds of test reports. To complicate matters further, the data recorded during the on-site inspection of the turbine is not standardized, and it may include different spellings or various synonyms or abbreviations for the same component. Specific faults are recorded in an unspecific manner and insufficiently described, which causes another problem.

The sector has now taken first steps toward removing excessive leeway for interpretation and improving the situation by introducing standardization. For example, the European Technical Association for Power and Heat Generation (VBG) published an international list of nomenclature for wind turbines, the Reference Designation System for Power Plants (RDS-PP®). The method and nomenclature of the RDS-PP® are based on the proven German identification system for power plants (KKS). Each component is assigned

a unique and specific code depending on its location of installation and its functions. The code “MDL10,” for example, refers to an azimuth drive.

### DATABASE SOLUTION

This innovation lays the foundation for a new database solution developed by TÜV SÜD’s experts. With this solution, faults are now recorded in a digitized and standardized manner on the expert’s smartphone or tablet PC



Germany has 25,000 onshore wind turbines that must be inspected every two years. During inspection, a remote-controlled drone equipped with a camera delivers high-resolution photos, thus permitting full documentation of the inspection. (Courtesy: TÜV SÜD)

directly on site during the periodic inspection of a wind-energy turbine. With a single click, the experts can access an extensive list that includes precise fault descriptions and clearly assigns and specifies the components and their locations of installation.

In addition to the inspection reports, which they can manage con-

veniently in netDocX, the virtual logbook, turbine managers now can access the database.

All information and data are stored there in a centralized manner and processed to allow stakeholders a quick overview of the wind turbines' state of repair. The functions implemented by the system

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support data analysis and evaluation and help users prepare statistics, derive forecasts, prioritize activities, and manage dates and tasks.

### DETAILED EVALUATIONS

For the first time, the database also allows the production of more detailed evaluations that involved considerable efforts in the past using conventional tools — if they were even possible at all.

As documented defects can now be mapped across all wind turbines, the quickly available information reveals which faults are the most frequent, whether components of a certain manufacturer have particularly high failure rates, or whether specific faults occur more often in certain turbines or regions (e.g. faults caused by lightning). Series faults, too, can be identified faster.

Data analysis thus highlights areas that offer the potential to improve availability and save costs. Managers can improve their planning of servicing and maintenance measures and quantify the costs of fault types, thereby reducing downtime, improving efficiency, and facilitating budgeting. ✎



TÜV SÜD is continuously expanding its services in the field of renewable sources of energy. The international service provider considers wind power and photovoltaics to offer the largest growth opportunities. (Courtesy: TÜV SÜD)



**Thomas Arnold** heads the Measurements and Technical Inspections team within the department Wind Cert Services of TÜV SÜD Industrie Service GmbH with focus on measurements of wind-turbine behavior as well as wind-turbine inspections. In the latter, the department offers all necessary inspections for WTG as an independent body recognized by all authorities.

# ENGINEERED DROP PREVENTION SOLUTIONS



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GE Hub Hatch Tool



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# PROFILE

## Shermco Industries

*Shermco Industries provides comprehensive wind generator maintenance and repair.*

By Kenneth Carter  
Managing Editor | Wind Systems

At Shermco Industries, they have a simple goal: Help wind-energy project owners and operators reduce their overall cost of energy.

But achieving that goal takes a lot of effort and a lot of planning.

Part of that planning involves expanding the equipment reliability culture that exists in other industries into wind generation, said Kevin Alewine, director of marketing with Shermco Industries.

“We help this endeavor by developing as many solutions for uptower preventative projects as possible, supplying the most reliable and cost-effective remanufactured generators and by providing the highest level of testing, repairs, and service recommendations for the balance-of-plant equipment,” Alewine said.

### FOUR DECADES OF EXPERIENCE

Shermco Industries was founded in 1974 to service, repair, and remanufacture electric motors and generators for general industry in the Dallas-Fort Worth area. The Engineering Services Division was added in 1981 to provide electrical engineering services and to test and repair the power systems, transformers, switchgear, and related components that deliver power to



Field service generator replacement. (Photos courtesy: Shermco Industries)

### Shermco Industries

**Founded:**  
1974

**Headquarters:**  
Irving, Texas

**Website:**  
[www.shermco.com](http://www.shermco.com)

factory machinery and power generation facilities.

And Shermco has only continued to grow, adding services and products to improve reliability and safe operations for a gamut of industrial and utility customers.



Generator being installed in turbine.

“We now have over 900 employees and 23 locations in the U.S. and Canada focused on engineering and field services, concentrating our motor and generator remanufacturing in Irving, Texas, and St. Paul, Minnesota,” Alewine said.

## ENTERING WIND

Shermco’s first foray into the wind industry involved troubleshooting and failure analysis on a wind turbine’s electrical components for European-based OEMs, according to Alewine. Those OEMs had little-to-no specialized service capabilities in North America.

“As more turbines were installed, we developed great working relationships with both the OEMs and the generator manufacturers and have repaired or remanufactured hundreds of these units in our Irving facility,” Alewine said.

With many wind turbines starting to come out of warranty, Alewine said most of Shermco’s customers are the project owners — utilities in particular — who are interested in long-term reliability solutions.

“Since we have seen so many of these machines and understand their varied failure modes, we have developed upgraded engineered solutions for many of the designs, both mechanically and for the electrical insulation systems,” he said. “These solutions provide reliability and worry-free performance well beyond the original designs.”

Over the years, Shermco has worked with OEMs and owners on multiple upgrade projects, and the company has developed many of the processes used for uptower generator repairs, according to Alewine.

Those projects include rotor and stator lead replacement, mechanical upgrades, fleet change-out of failed bearings, and slip rings replacements ... to name a few.



Remanufactured wind generator being set up for testing.



Stator during winding process.

“Recently, we have been able to identify rotor winding damage on some popular wind generators that can be repaired before a catastrophic failure, and we are performing quite a few surveys and life extension projects all over the U.S.,” Alewine said. “In total, we have repaired or remanufactured more than 5 GW of generators. That’s well over 3,000 units representing virtually every manufacturer, so we know what to expect and what is needed to make them more reliable.”

### CONTINUING EDUCATION

Adding to that, Shermco has a stand-alone training department that provides classroom and field-learning opportunities for hundreds of wind-energy technicians and managers.

“Our electrical safety classes are among the most sought-after in the country, and our technical classes on BOP (balance of plant) and substation maintenance have been adopted by many major OEMs and operating companies,” Alewine said.

Shermco had been in the generator remanufacturing business for 25 years before wind became a factor. Because of those decades of expertise, the company has developed many solutions dealing with harsh-environment applications, and it understands what’s involved to make those machines last until the end of their 15- to 20-year lifespan, according to Alewine.

“Working with key material suppliers and processing experts, we have been able to provide leading-edge solutions for generator remanufacturing,” he said. “Our electrical insulation system has proven extremely reliable, and our redesigns for rotor leads, magnetic wedge retention, and both rotor- and stator-coil designs provide the long term life expectancy required by owners.”

Shermco is also an early adopter of



Shermco Industries' corporate office and flagship remanufacturing center in Irving, Texas.

ISO 9001 quality standards.

"We have always been ahead of the curve for product quality," Alewine said. "The Irving, Texas, repair facility was among the first to be accredited by EASA, the industry associa-

tion for electrical machinery repair, and we have hundreds of technicians certified by the InterNational Electrical Testing Association (NETA), and all of our field-service projects comply with the NETA standards."

## SAFETY FIRST

But all that training and expertise are hard to justify without, according to Alewine, the most important statistic: safety.

Shermco regularly provides speakers and subject-matter experts for presentations, training events, and standards development committees for wind operations as well as the electrical industry in general.

"We have employees on multiple electrical safety and industry committees including NFPA 70E, NFPA 70 (the National Electrical Code), and NFPA 70B as well as the IEEE, ASTM, NETA, and AWEA," Alewine said. "Additionally, we are avid supporters of the wind industry and have provided strong leadership in the Operations and Maintenance Committee, the Safety Steering Committee, and during multiple visits to Congress in Washington, D.C., on behalf of the industry."

With all that in its arsenal, Shermco's employees have worked diligently for more than three years to make the company the first and — so far — only motor and generator remanufacturer to achieve the OSHA VPP Star status in its Irving facility.

"These high standards of safety are adopted throughout our other offices and the field service team, which has led to awards and recognition for our efforts and achievement," Alewine said.

So, Shermco's goal of helping project owners lower their costs may sound simple; however, the execution of that focused goal is anything but.

"Shermco employees and managers, through human performance education and practice, are embracing a culture of principled ownership, responsibility, and mentoring to achieve the highest level of safety, quality, and job satisfaction," Alewine said. ↴

# CONVERSATION

## Steven Elrod

General Manager  
BS Rotor Technic USA, LLC

+1 (888) 44-ROTOR  
www.bs-rotorusa.com  
/bsrotor  
@bsrotortechinc



### Tell us about Blade Service Rotor Technic USA and its core philosophy.

BS Rotor Technic USA, LLC has been servicing the wind industry in the U.S. since 2009 and is committed in providing prompt technical and professional services to wind-farm owners and operators.

With several years of experience with one of the world's largest rotor blade manufacturers, we can utilize our technical knowledge and expertise in the service and repair of wind-turbine rotor blades.

### What are your duties with BS Rotor?

As the general manager of BS Rotor Technic USA, it is my duty first and foremost to be dedicated to our customers, to be a leader in interacting with our team of professionals,

and ensuring that we provide professional services in a safe and workman-like manner.

### What are some of the areas BS Rotor specializes in?

We specialize in wind-turbine rotor blade inspections, repairs, tower cleaning, and spare parts. We are able to utilize many different options for our customers to achieve cost savings such as: ground-based rotor-blade inspections; tower cleaning; unmanned UAV inspections of rotor blades, towers and nacelles; rope access inspections; and platform access rotor blade repairs.

### What goes into inspecting turbines?

Inspections start either with a customer request for inspection or because a technician has identified and reported an issue to the customer. A proposal is then submitted for approval of a purchase order that is provided by the customer.

Once the schedule is accepted, we provide a Job Safety Analysis (JSA), submit certifications for the technicians performing the inspections, participate in site-specific safety orientation, and follow the customer's and BS Rotor Technic USA's safety protocols at all times during the inspections. We provide detailed, photographic reports of damage, including location and severity, for each of

the inspected wind turbines. Upon completion, depending on the severity of damage, the customer is advised if the wind turbine can be left in service or if it is recommended that the wind turbine be taken out of service until repairs are performed.

### After an inspection, a blade needs to be repaired. What happens next?

Once approved access for the repair is agreed upon with safety and cost savings for the customer in mind, a proposal for repair is submitted for approval. A JSA and certifications are provided to the customer with a schedule that is based on weather conditions and other variables.

Without disclosing proprietary repair procedures, we access the repair location and complete the repair as required. We provide a detailed report to the customer with photographs showing conditions before, during, and after the repair.

### Your company stresses environmental health and safety, how do you keep that goal in check?

BS Rotor Technic USA continually stresses the importance of safety with training to achieve our certifications and re-certifications prior to expiration dates.

BS Rotor Technic USA Health and Safety and JSA documentation

is provided to our customers prior to the start of our projects, with changes to the JSA, as needed, to describe the hazards and the best practices to mitigate those hazards.

BS Rotor Technic USA employee tailboard meetings are held daily, as well as customer-based tailboard meetings, to be aware of the hazards and conditions that exist on each site. We gather signatures of all meeting participants.

**You have an exclusive affiliation with several big industry companies. Could you name a few and how you interact with them?**

We are the preferred vendor for blade inspections and repairs for several leading O&M companies, and we have exclusive affiliations with Nu tech Wind parts for supplies of components of aftermarket spares for many legacy turbines such as V-27, V-47, Meg Micon 750, Gamesa G 5X, etc. and current turbines such as GE 1.5, Gamesa G-80, Vestas V-80, V-90, etc.

We also represent Carlson Energy and Multi Gear AG for wind-turbine gearboxes and generators.

**Where do you see the wind industry headed in 2017?**

The wind industry will continue to grow as costs of operations and maintenance are coming down and reliability is improving. The leveled cost of electricity for wind is getting very competitive.

The challenge is the low power purchase agreement pricing. It needs to improve for the owners to continue investing in wind energy. ✎



BS Rotor Technic USA has several years of experience and uses its technical knowledge and expertise in the service and repair of wind-turbine rotor blades. (Courtesy: BS Rotor Technic USA)

# MAINTENANCE

Operations • Service & Repair • Inspection • Safety • Equipment • Condition Monitoring • Lubrication

## Altitec Launches Rope Ascender Rental Service



Powered rope ascender systems such as the ActSafe Ascender are able to considerably reduce climbing times for rope access technicians. (Courtesy: Altitec)

Altitec, the distributor and service partner for ActSafe Ascenders for the UK, Ireland, and Baltic countries, has launched a rental service for the powered rope ascender system that will transform the speed and efficiency of rope access across multiple sectors.

It will provide a cost-effective solution for reducing inspection and maintenance times in the energy, telecoms, and construction industries, enabling independent contractors and in-house rope access technical teams to maximize performance in limited operational windows. It also will provide a number of potentially life-saving options for fire departments and emergency rescue services.

### REDUCING COSTS

Repair and inspection on operational infrastructure is invariably a time-sensitive process. In the energy and construction sectors, operators and asset owners are under increasing pressure to reduce costs by increasing the performance and profitability of their assets; while in the telecoms space, planned outages and service interruption must be kept to a minimum.

Moreover, conducting scheduled and unscheduled maintenance at heights creates additional time pressure for technical teams, since work must be carried out in favorable weather conditions, further narrowing the window of opportunity.



On average, technicians using an ActSafe Ascender system can achieve 35 percent more work in one day. (Courtesy: Altitec)

When it comes to complex on-site inspection and maintenance on tall assets — from wind turbines to telecoms masts and offshore infrastructure — rope access technicians continue to offer the most comprehensive and effective solution. Yet there are still clear gains to be made when it comes to efficiency and speed of access.

Powered rope ascender systems such as the ActSafe Ascender are able to considerably reduce climbing times for rope access technicians, boosting access efficiency, combating fatigue, and allowing a greater focus on conducting essential repairs. On average, technicians equipped with an ActSafe Ascender system can achieve 35 percent more work in one day, contributing to substantial long-term time and cost savings for asset owners.

### **INCLUDES TRAINING**

Altitec has already confirmed a number of early rental agreements with leading rope access and inspection firms operating in the onshore and offshore sectors, all of whom will benefit from a full maintenance and service offering. This includes one full day of hands-on training to ensure the safe and practical operation of the equipment, regular equipment assessment and service intervals every six months, and an exclusive up-time guarantee, ensuring that technicians and inspection teams are fully equipped at all times with ready-to-use cutting edge rope access equipment.



“No matter how sophisticated remote inspection systems become, there’s ultimately no substitute for a team of highly trained rope access technicians when it comes to conducting inspection and repairs at height,” said Tom Dyffort, managing director of Altitec. “While some might view rope access as a more ‘traditional’ option, the fact is that the discipline is becoming increasingly advanced — due, in part,

to specialist training, and in part to time-saving technological innovations like the ActSafe Ascender.”

“As a provider of blade repair and inspection services to the global wind energy industry, we’re acutely aware of the cumulative performance impact of incremental efficiency gains and have experienced first-hand the advantages of ActSafe, which we deploy as standard in our day-to-day operations,” Dyffort said.

ActSafe Power Ascenders are available in four different models, including battery, remote controlled, mobile power supply, and gas-powered units, with a range of applications for the energy, telecoms, and search-and-rescue industries. ↴

Source: Altitec

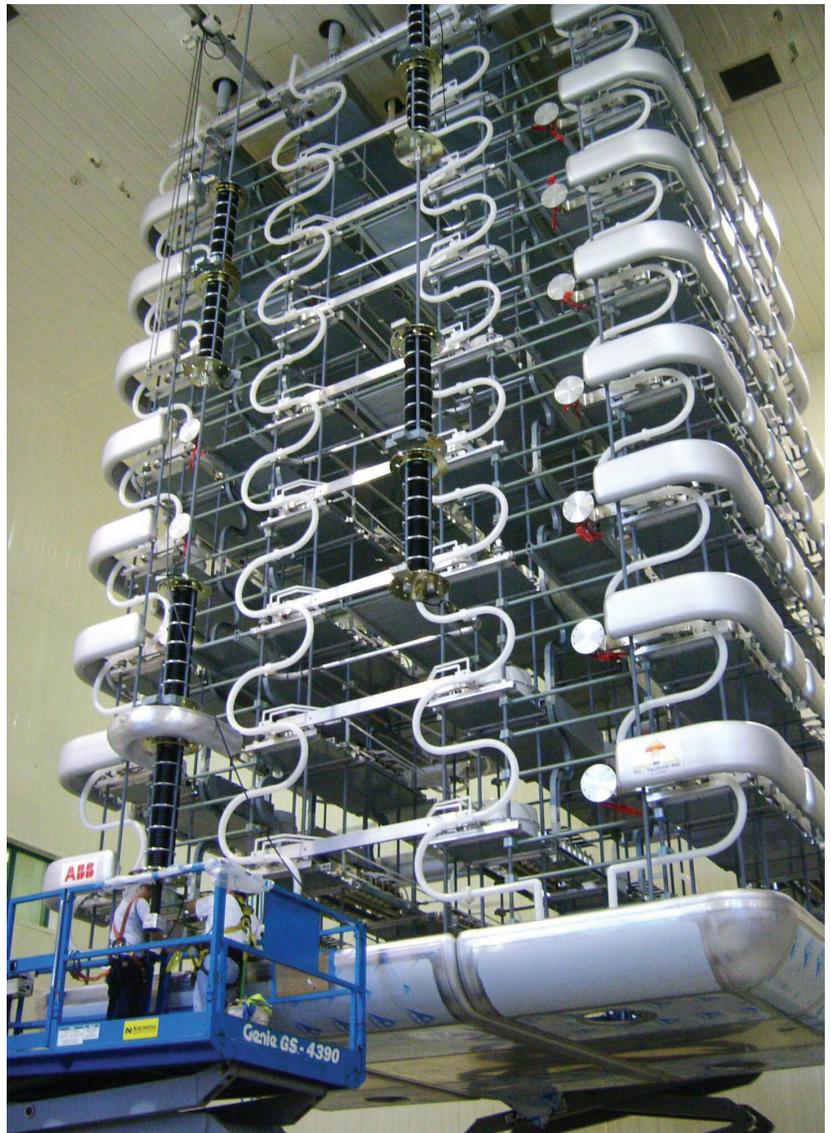
For more information, go to [www.altitec.co.uk/actsafe/](http://www.altitec.co.uk/actsafe/)

## ABB Wins \$100 Million Order to Upgrade California HVDC Link

ABB has won an order worth more than \$100 million from the U.S. utility Los Angeles Department of Water and Power (LADWP), to modernize the existing Sylmar HVDC (high-voltage direct current) converter station in California. This station is an important part of the electricity link between the Pacific Northwest and southern California commissioned in 1970.

The Sylmar converter station, north of Los Angeles, is the southern station of the Pacific Intertie, a 1,360-kilometer HVDC link that connects to the Celilo converter station near the Columbia River, Oregon. The Pacific Intertie transmits electricity from the Pacific Northwest to as many as 3 million households in the greater Los Angeles area. Normally, the power flow is from north to south, but during the winter, the north consumes significant quantities of power for heating while the south requires less, and the power flow is reversed. The Pacific Intertie allows power to flow between the Northwest and Southern California, helping to balance supply with demand.

“The Pacific Intertie was the first major HVDC link to be installed in the U.S. and has been providing power to millions in the U.S. for nearly five decades,” said Claudio Facchin, president of ABB’s Power



An HVDC converter station. (Courtesy: ABB)

Grids division. “We are delighted to return to this pioneering project. After the success of Celilo, the Sylmar upgrade will help to secure power supplies while providing greater efficiency and reliability with an exceptional level of control. ABB is a global leader in HVDC, and this project reiterates our commitment to service and lifetime support, a key element of our Next Level Strategy.”

### KEY FEATURES

Digitalization will be a key feature in the upgrade, as the latest version of ABB’s most advanced digital MACH control and protection system will be installed. As announced previously, Celilo, the northern converter station of the link, was the first installation in the world to benefit from an upgrade to this latest control system. Other key components of the Sylmar station upgrade are AC and DC filters, shunt reactors, as well as measurement and auxiliary equipment.

The digital MACH system monitors, controls, and protects the sophisticated hardware in the station, managing thousands of operations to ensure the highest possible reliability. It also helps to protect the transmission link from unexpected disruptions, such as lightning strikes.

MACH acts like the brain of the HVDC link, designed to run around the clock for decades. Incorporating



ABB is upgrading the Sylmar HVDC converter station — an important part of the electricity link between the Pacific Northwest and southern California. (Courtesy: ABB)

advanced fault registration and remote-control functions, ABB’s MACH system is the world’s most extensively deployed control solution for HVDC and FACTS (Flexible Alternating Current Transmission Systems) installations, with more than 1,100 such systems in operation throughout the world.

Since being awarded the contract to help build the

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Pacific Intertie in 1965, ABB has had a long lasting relationship with the link, delivering multiple performance and life extending upgrades over the 46 years the link has been in operation. This is ABB's sixth order

to work on the Pacific Intertie.

ABB pioneered HVDC technology more than 60 years ago and has been awarded more than 110 HVDC projects, representing a total installed capacity of more

than 120,000 MW, accounting for around half the global installed base. ↙

Source: ABB Group

For more information, go to [www.abb.com](http://www.abb.com)

## Cyberhawk Is a Finalist at Offshore Achievement Awards



Cyberhawk team operates a drone offshore. (Courtesy: Cyberhawk Innovations)

Cyberhawk Innovations has been recognized as a finalist at the 2017 Offshore Achievement Awards in the Safety Innovation and Export Achievement categories.

The world leader in aerial inspection and survey using Unmanned Aerial Vehicles (UAV), or drones, continues to pioneer the use of this technology to conduct close up inspections of live and difficult-to-reach structures.

The company has been named as a finalist for the Safety Innovation award as a result of its UAV inspection solution for the internal inspection of tanks and confined spaces in the offshore oil and gas industry.

### NEW SERVICE LAUNCHED

In 2015, Cyberhawk carried out the world's first inspection of an internal storage tank on board a Maersk FPSO in the UKCS, successfully launching a new service to the global oil and gas and shipping industry.

The company's track record proves that this technique dramatically reduces safety risks, can incur savings into seven figures and is at least two- to four-times faster than traditional inspection methods.

Similarly, the shortlisting for the Export Achievement award draws upon Cyberhawk's original approach to successfully deliver its inspection solution to international markets, proving that UAV technology is a vi-

able option for inspection in the oil and gas and renewables sector. These markets include mainland Europe, the Middle East, Africa, Asia, and North America.

### GLOBAL POTENTIAL

"The whole team is honored to have been shortlisted for both prestigious industry awards, which is testament to our engineering pedigree and determination to take an idea and develop an entirely new market," said Chris Fleming, CEO at Cyberhawk. "We created this industry almost 10 years ago and since undertaking the world's first inspections of assets such as flares and wind turbines, we realized that this untapped market had huge global potential."

“Since then we have worked in more than 25 countries, the majority of which have been the country’s very first UAV oil and gas inspection,” he said. “We are proud to have our technology recognized by the industry on a global scale and look forward to the ceremony in March.”

Hosted by the Society of Petroleum Engineers (SPE) Aberdeen Section, the annual awards celebrate pioneer-

ing technology and safety innovation, and exceptional individual and company performance in the oil and gas and renewables sector. Winners will be announced at an awards ceremony March 23 in Aberdeen. ↵

Source: *Cyberhawk Innovations*

For more information, go to [www.thecyberhawk.com](http://www.thecyberhawk.com)

## Klüber Offers Ultra-Fine Filtered Synthetic Spindle and Hydraulic Oil

Klüber Lubrication, a worldwide manufacturer of specialty lubricants, offers Klübersynth FB 4 Series, an ultra-fine filtered synthetic spindle and hydraulic oil that extends component life and reduces operating costs.

Oils in the Klübersynth FB 4 Series are designed to lubricate rolling bearings of highspeed machine tool spindles. They can also be used in hydraulic systems and components, including dirt-sensitive servo valves where cleanliness standards and/or classes are predetermined by the manufacturer.

“The three oils in the Klübersynth FB 4 Series, ISO VG grades 32, 46, and 68, help reduce wear caused by fine dirt particles in the lubricant, and can lengthen component life due to a higher purity of the oil,” said Bill Watson, regional

director of marketing and engineering for Klüber Lubrication NA LP. “A fully synthetic base oil also helps extend oil change intervals and improve total cost of ownership in a hydraulic system.”

Klübersynth FB 4 Series are PAO oils of purity class 15/13/10 in accordance with ISO 4406.

Klüber Lubrication is one of the world’s leading manufacturers of specialty lubricants, offering high-end tribological solutions to virtually all industries and markets worldwide. ↵

Source: *Klüber Lubrication*

For more information, go to [www.klubersolutions.com](http://www.klubersolutions.com)

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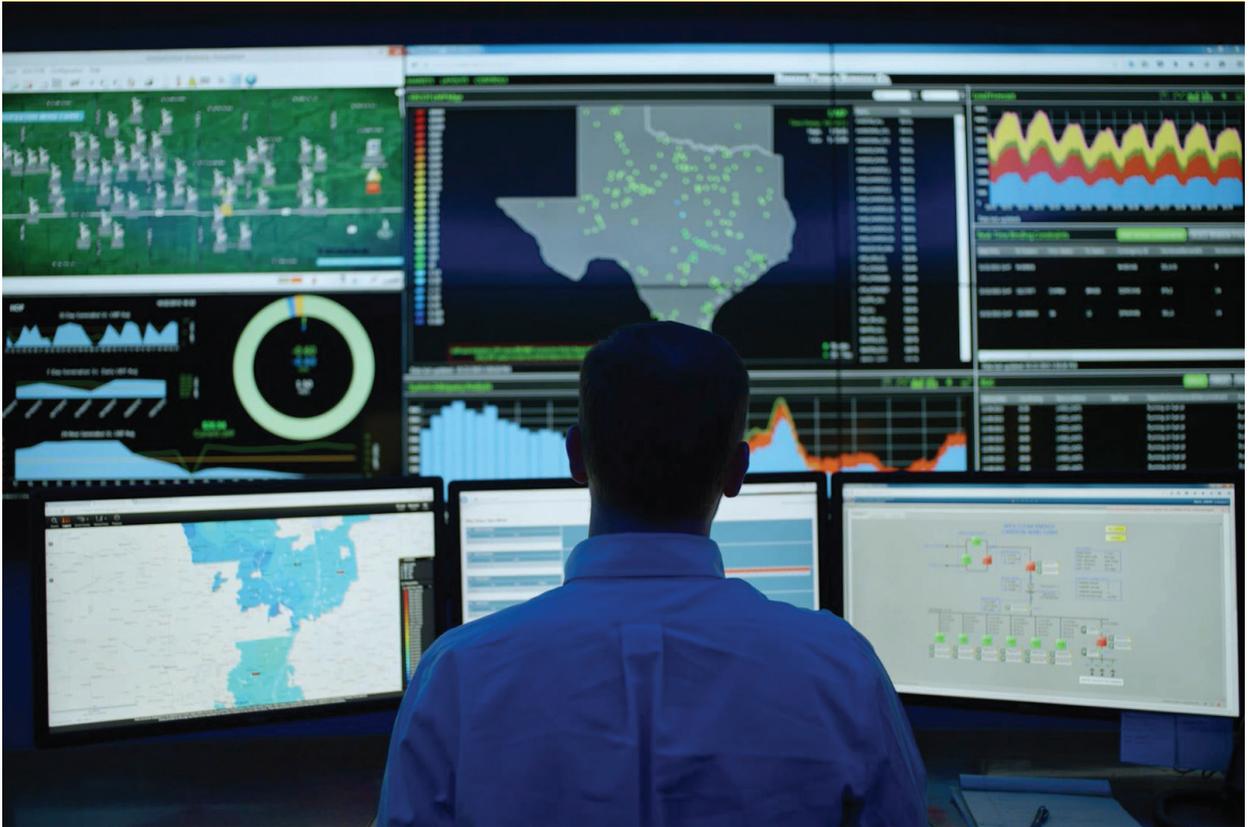




# INNOVATION

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## Remote Operations Control Center Monitors Apex's Wind Facilities



The team uses the video wall to monitor wind-farm performance data, energy market prices, forecasting models, weather patterns, and live camera feeds from the wind farms. (Courtesy: CineMassive)

In 2014, the leadership at Apex Clean energy decided to implement a Remote Operations Team to provide additional monitoring and control for Apex's managed wind-power facilities. The Remote Operations Team would perform a number of critical, 24/7 operations — including wind-farm performance monitoring, SCADA system monitoring, downtime categorization reporting, generation forecasting, and more. A new, high-tech facility called the Remote Operations Control Center (ROCC) would be built at Apex's Charlottesville, Virginia, headquarters to house the new team.

Apex leadership recognized that to monitor the data produced by their many informational systems, the Remote Operations Team would need a user-friendly visualization solution. The company decided to equip the Remote Operations Control Center with a video wall:

a high-resolution display system where the team could monitor real-time video and data from various platforms.

Apex Clean Energy is an independent renewable energy company that builds, owns, and operates utility-scale wind and solar power facilities. With a team of more than 200 professionals and the nation's largest wind-energy project pipeline, Apex is a leader in the transition to a clean energy future.

### SELECTING A SOLUTION

David Grant, director of Remote Operations and SCADA Technology at Apex, led the effort to select a video wall solution for the new ROCC. Having successfully implemented a video wall system in a previous leadership role, Grant had valuable insights into the features

that would be most important for the Remote Operations Team.

“I knew that the functionality and ease-of-use of the video wall controller would be critical,” he said.

After evaluating offerings from a number of providers, Grant and his colleagues chose CineMassive to deliver a turn-key video wall system for the ROCC. The solution would include an LCD display system, a video wall controller, and software. Grant cited the capabilities of CineMassive’s Alpha video wall controller as a major factor in the decision.

“Other companies’ controllers just didn’t offer the content flexibility and control that the Alpha provided,” he said.

## INTEGRAL ROLE

Apex’s new Remote Operations Control Center and CineMassive video wall system were completed in August 2014. Since its installation, the CineMassive system has played an integral role in the Remote Operations Team’s 24/7 workflow, providing operators with real-time situational awareness of Apex’s management portfolio.

Inside the ROCC, operators sit at workstations facing their CineView LCD video wall. The bright, 5x2 array of ultra-narrow-bezel screens displays an assortment of live video, maps, television news, and active data feeds.

The team uses the video wall to monitor wind-farm performance data, energy-market prices, forecasting models, weather patterns, and live camera feeds from the wind farms. An Alpha video wall controller enables all of these applications to be displayed simultaneously, allowing the team to create a real-time operating dashboard on the displays.

“The Alpha lets us display whatever we want, whenever we want, however we want, so we’re able to visualize multiple data systems on the video wall simultaneously,” Grant said.

## SOFTWARE INTERFACE

Operators interact with the system through the Alpha’s CineNet software interface — a multi-user platform accessible from their workstations. With CineNet, they can arrange content sources anywhere on the displays and freely scale, crop, and zoom into content sources in real-time. This functionality lets them adjust their view on the fly and investigate areas of interest in live data and camera feeds.

“One of our responsibilities is to monitor the safety of the employees working at our substation control yards,”

Grant said. “With CineNet, we can display live video feeds from those locations and actually zoom in on individuals to ensure their safety remotely.”

The team also leverages CineNet’s Layouts feature, which allows it to build and save arrangements of content sources to be displayed on the video wall during specific situations. Operators can create layouts on the live video wall or use CineNet’s Preview Canvas to build them “offline.” Once saved, their purpose-built layouts can be pushed instantly to the displays when needed.

“When executive management and asset managers walk into the operations center, we can give them an immediate overview of their portfolios on the video wall,” Grant said. “Or, if we have a customer coming in and we want to show them data and video that pertains to their assets, then we can pull up a layout that shows those specific content sources.”

The video wall system also plays an important role in alerting operators to critical alarms. If an event triggers Apex’s centralized alarming program, an alert not only displays on the alarm application itself, but also pops up on the video wall, ensuring that it cannot be missed.

When an alarm is received, operators can quickly push relevant video and data feeds to the video wall, where they can continue monitoring the situation in real-time as they coordinate their response.

## THE BENEFITS

By using their CineMassive video wall system to visualize and manage their critical data, the Remote Operations Team is able to work efficiently and effectively to support Apex’s clean-energy assets.

Pleased with the outcome of the project, Grant said the video wall system is not just visually impressive, but also genuinely useful to the team.

“The data you see on the screens is a truly functional view,” he said. “Every single thing on the video wall adds value.”

Looking to the future, Grant said he is also happy to have implemented a visualization system that can scale and develop along with the organization itself.

“As Apex continues to acquire new assets and grow as an organization, the CineMassive system gives us the flexibility to evolve and expand the information we’re visualizing,” he said. ↵

*Source: CineMassive*

For more information, go to [www.cinemassive.com](http://www.cinemassive.com)

## Altenex Revolutionizes Renewable Energy Purchasing with PowerBlok

Altenex, an Edison Energy company, announced the availability of PowerBlok™ — a first-of-its-kind renewable energy power purchase agreement (PPA) structure for commercial, industrial, and institutional electricity users.

PowerBlok is specifically designed to meet the needs of large and mid-size energy users by providing smaller and shorter duration renewable capacity offtake. The result is a fundamental shift in the way renewable energy is purchased and a potentially dramatic expansion of the United States' renewable energy market.

“Many organizations are attracted to wind and solar energy to decrease energy costs, reduce risk, and meet organizational sustainability goals, but until now, options for renewable energy purchasing have been limited to only the very largest energy users given the size and duration of the power purchase agreements,” said Allan Schurr, president of Edison Energy. “Through PowerBlok, Edison Energy is taking the next step in helping organizations with smaller energy demands benefit from purchasing off-site renewables. It’s a key product in our Energy-as-a-Service model, where we offer tailored solutions to meet each client’s unique needs.”

PowerBlok enables organizations of all sizes to purchase smaller blocks of power that are matched more closely to localized demand and have the flexibility to contract for power on the customer’s timeline,



PowerBlok is specifically designed to meet the needs of large and mid-size energy users by providing smaller and shorter duration renewable capacity offtake.

as opposed to being dependent on the renewable project’s construction and commercial operation schedule. Whereas a traditional corporate PPA might require a purchasing commitment of 100 MW and a 15-20 year contract term, PowerBlok are available in 5-10 MW increments and 10 year terms.

“We believe PowerBlok is an appealing solution for a much wider range of commercial and industrial companies and institutions such as universities, local governments, and healthcare systems, many of which have smaller energy loads than would readily align with a traditional PPA,” said Duncan McIntyre, president of Altenex. “Many of these organizations have

been unable to participate in the renewable energy market because they can’t meet the requirements of a traditional PPA. And the current site aggregation strategies have been challenging. PowerBlok changes that.”

“We’ve also seen interest from larger corporate customers that are attracted to the flexible offtake sizing and 10-year terms,” McIntyre said. “We think that this structure will bring new participants to the renewables market and give current participants another strategic option for this cost effective supply.”

Source: Edison Energy

For more information, go to [www.edisonenergy.com/c/blog](http://www.edisonenergy.com/c/blog)

## Fraunhofer IWES Develops Test Field for Offshore Wind Turbines

In early 2017, Fraunhofer IWES is set to receive its own test field right in front of its doors in Bremerhaven thanks to funding from the Federal Ministry for Economic Affairs and Energy (BMWi).

The centerpiece will be Adwen’s prototype of the AD 8-180, currently the largest wind turbine in the world with a rotor diameter of 180 meters. Construction work is already underway, and the first measurements and

tests will begin in spring. Comparison of field survey results with the data obtained on the large-scale test rigs will significantly expand the opportunities for further optimization of measuring and testing

methods as well as risk mitigation for new turbine designs.

Fraunhofer IWES's research project has a total budget of about 18.5 million euros and will make a considerable contribution to both quality assurance and cost savings in the wind-energy industry.

## NEAR TEST RIG

The first prototype of Adwen's AD 8-180 offshore turbine won't be getting its feet wet at its new home on the quay following the industry's practices. The research wind turbine at the former airfield in Bremerhaven is just a stone's throw away from the Fraunhofer nacelle test rig — a stroke of luck for the Fraunhofer scientists, as Adwen's 8 MW turbine can be connected to the existing IWES infrastructure without any major complications.

"Research and development are key for further reducing the costs involved in expanding offshore wind energy," said Uwe Beckmeyer, Parliamentary State Secretary at the Federal Ministry for Economic Affairs and Energy. "The Federal Ministry for Economic Affairs and Energy is therefore providing funding worth 18.5 million euros for the testing ground for offshore installations in Bremerhaven. The aim is to test the operation of the

installations under real-life conditions and gather important data that can be used to set up the installations on an industrial scale. We are thus making a contribution to strengthening the role of offshore wind energy as an important pillar of the energy transition by handing over the official grant notification."

## INFRASTRUCTURE SCHEME

Following the successful operation of the test rigs for rotor blades and nacelles, the turbine serving as a test platform represents a further important piece of the puzzle in the research institute's infrastructure scheme. The results of the test benches can now be compared systematically with the measurements taken in the field and the test methods optimized accordingly.

In particular, this makes it possible to develop and validate new methods for the performance of fault ride through (FRT) tests via coupling of the 44 MVA medium-voltage grid emulator already integrated in the nacelle test rig as well as to conduct high-resolution 3D wind field measurements for optimization of future offshore wind-farm layouts.

"The test field with the research turbine is the highly valuable completion of our unique testing infrastructure," said



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Andreas Reuter, managing director of Fraunhofer IWES. “It empowers us to find solutions for fundamental aspects concerning reliability and grid integration and contributes essentially to the future improvement of very large turbines.”

Certification tests in the field require the operation of the wind turbine at the whole spectrum of wind conditions. The conditions can, however, be reproduced exactly in the lab, making it possible to conduct certification measurements with a high degree of accuracy and reducing the time needed for the field-test campaign. The development risks for new turbine generations are minimized, and ultimately the energy production costs for wind energy are reduced by means of optimized and absolutely reliable design.

### ADWEN COOPERATION

Fraunhofer IWES will develop its research on testing procedures in close cooperation with Adwen GmbH.

“We are very pleased to collaborate with the Fraunhofer IWES in our field tests of our prototype of the AD 8-180,” said Luis Álvarez, general manager of Adwen GmbH. “Already, the Fraunhofer IWES DyNaLab has allowed us to exhaustively validate our technology, resulting in great confidence about the optimal performance and reliability of the turbine. In this way, we can develop cutting edge technology with minimum risk. That is crucial to continue reducing the cost of offshore wind energy.”

*Source: Fraunhofer IWES*

For more information, go to [www.windenergie.iwes.fraunhofer.de](http://www.windenergie.iwes.fraunhofer.de)



Adwen's AD 8-180 is currently the largest wind turbine in the world with a rotor diameter of 180 meters. (Courtesy: Adwen GmbH)

## New Thermal Imaging Camera Has Better Resolution, Expanded Lens Options

LumaSense Technologies Inc. introduces the MCL640 thermal imaging camera, the next generation in LumaSense's long line of infrared

thermal imagers designed specifically for industrial process control and monitoring. The MCL640 camera offers 640 x 480 resolution imaging

for long-wave infrared applications, producing superior images and temperature measurement ( $\pm 2$  degrees C). The MCL640 thermal imager

resolution is four times greater than the camera it replaces, and it offers expanded lens options. These new features combine to provide users with better and more accurate temperature measurement accuracy to improve process control.

“With the improvements to the new camera, users can detect problems sooner and, when paired with the telephoto lens, at greater distances,” said Lenny Shaver, senior director of Product Management.

In addition to the new lenses, the MCL640 camera can be ordered with a number of environmental enclosures enabling accurate and safe operation in the harshest environments.

The new Vortex Cooled (VC) enclosure is a heavy-duty housing that can be used in a wide range of industrial applications including steel and paper mills, refineries, and automo-



The MCL640 thermal imaging camera. (Courtesy: LumaSense Technologies)

otive parts production. The enclosure accommodates an air purge for use in classified hazardous areas in petrochemical applications.

The MCL640 camera is also the imager used in the latest generation of ThermalSpection 724 cameras.

The ThermalSpection 724 system includes an IP66 enclosure with integrated cooling and heating for

operation outdoors, providing on-line monitoring of electric utility equipment and critical industrial infrastructure.

With an array of protective accessories, the MCL640 demonstrates LumaSense’s commitment to long-term trouble-free process monitoring in harsh, industrial applications.

The next generation MCL640 thermal imager is compatible with process control solutions offered by LumaSense, including systems for precisely controlling the temperature of metals during processing, remote petrochemical equipment monitoring, and on-line high-voltage electrical equipment monitoring. ✎

Source: LumaSense Technologies Inc.

For more information, go to [www.lumasense.com](http://www.lumasense.com)

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## Vestas Gets Orders for Hundreds of Megawatts at Year's End

Vestas was extremely busy at the end of 2016, acquiring orders from businesses all over the United States and other parts of the world.

Those orders included:

**Australia:** 270 MW for the Sapphire Wind Farm project. It consists of 75 V126-3.45 MW turbines with Power Optimized Mode to 3.6 MW. Installation and commissioning of the turbines should be completed in the second half of 2018.

**Brazil:** 117 MW for the Ventos da Bahia — Phase 2 wind park. The order includes supply and installation of 53 units of V110-2.0 MW turbines manufactured in Brazil. Wind turbine delivery is planned to begin in the first quarter of 2018, with commissioning expected for the third quarter of 2018.

**Brazil:** 42 MW that includes 21 V110-2.0 MW wind turbines for the Cabeço Vermelho I and Cabeço Vermelho II wind park in Rio Grande do Norte. The turbines will be produced in Brazil with delivery planned to begin in the fourth quarter of 2017, with commissioning expected for the second quarter of 2018.

**China:** 50 MW for the V110-2.0 MW turbine with Power Optimized Mode to 2.2 MW. Turbine delivery is expected to begin in the third quarter of 2017.

**China:** Huadian orders seven V117-3.45 MW turbines for a project in China's Fujian Province. Delivery of turbines is expected in the second quarter of 2017, with commissioning scheduled for the second half of the year.

**China:** 40 V110-2.0 MW turbines from Titan Wind Energy for a project in eastern China's Shandong



Vestas December was packed with orders for hundreds of megawatts from all over the world, but particularly in the United States. (Courtesy: Vestas)

Province. Delivery of turbines is expected in the second quarter of 2017, with commissioning scheduled for the second half of the year.

**Germany:** 30 MW for a repowering project consisting of nine V117-3.45 MW turbines from Bürger-Windpark Lübke-Koog Nord GmbH & Co.KG. The project is a repowering project and replaces 13 V80-2.0 MW turbines. Wind turbine delivery and commissioning is planned for the third quarter of 2017.

**Honduras:** 59 MW. The order includes V117-3.45 MW turbines and is Vestas' first in Honduras. Honduras is the second new market for Vestas in 2016. Turbine delivery is planned for the first quarter of 2017, while commissioning is expected for the fourth quarter of 2017.

**Sweden:** Eolus Vind AB placed their largest wind power order to date, comprising 23 V126-3.45 MW turbines for the Jenåsen wind power plant. Delivery of the wind turbines is expected to begin in the first quarter of 2018.

**Ukraine:** 21 MW for Karpatenwind LLC for 6 V126-3.45 MW. The wind turbines will be installed in the Lviv region in western Ukraine. Wind turbine delivery and commissioning is planned for the second quarter of 2017.

**United States:** 101 MW. The order includes V126-3.45 MW and V117-3.45 MW turbines with Power Optimized Mode to 3.6 MW. Turbine delivery is expected in 2017.

**United States:** 101 MW. The order includes V126-3.45 MW and V117-3.45 MW turbines with Power Optimized Mode to 3.6 MW. Turbine delivery is expected in 2017. Customer and project names were not disclosed at the customer's request.

**United States:** 153 MW from the largest utility owner of wind energy

in the U.S., MidAmerican Energy. The order includes 153 MW of V110-2.0 MW turbines as part of the 2,000 MW Wind XI project in Iowa. The turbines will be manufactured at Vestas' Colorado factories with expected delivery in 2017.

**United States:** 42 MW. The order comprises V110-2.0 MW turbine components that enable future project pipeline. Customer name was not disclosed at the customer's request.

**United States:** 200 MW. Customer and project name were not disclosed at the customer's request

**United States:** 29 MW for a repowering project in the United States. The order includes 29 MW of V110-2.0 MW turbine components that enable future repowering efforts within the customer's operating wind-project portfolio. The turbine components will be manufactured at Vestas' Colorado factories and will be delivered beginning in 2017. Customer name not disclosed at the customer's request.

**United States:** 154 MW. MidAmerican Energy ordered 77 V110-2.0 MW turbines as part of the 2,000 MW Wind XI project in Iowa. The turbines will be manufactured at Vestas' Colorado factories with expected delivery in 2017. Potential future order intake under the 2,000 MW Wind XI project is expected to occur.

**United States:** 48 MW comprising 3 MW compatible turbine components that enable future project pipeline. Customer name not disclosed at the customer's request.

**United States:** 200 MW of V110-2.0 MW turbine components that enable future project pipeline. Turbine components will be manufactured at Vestas' Colorado factories. Customer name not disclosed at the customer's request.

**United States:** 43 MW of turbine

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components that enable future project pipeline. The order includes components compatible with a variety of turbines across the 2 MW and 3 MW platforms that enable future project pipeline, with multiple components produced at Vestas' Colorado factories.

**United States:** 131 MW comprising V112-3.45 MW turbine components that enable future project pipeline. Customer name not disclosed at the customer's request.

**United States:** 30 MW from Avangrid Renewables for 3.0 MW turbine components, growing the 3 MW platform's presence in the U.S. The order enables future project pipeline and includes supply and commissioning of the wind turbines.

**United States:** 131 MW that includes 100 MW of V110-2.0 MW turbines and 31 MW of 2.0 MW compatible turbine components from EDF Renewable Energy. The order includes 50 V110-2.0 MW turbines for an undisclosed project and an additional 31 MW of 2.0 MW compatible turbine components to enable fu-

ture project pipeline. Nacelles, blades, and towers will be produced at Vestas' Colorado factories.

**United States:** 67 MW for an order of V110-2.0 MW turbine components that both enable future project pipeline and repowering of existing operating assets. The order includes supply and commissioning of the wind turbines. Multiple components will be produced at Vestas' Colorado factories. Customer name not disclosed at the customer's request.

**United States:** 29 MW of V110-2.0 MW turbine components that enable future repowering efforts within the customer's operating wind-project portfolio. The turbine components will be manufactured at Vestas' Colorado factories with delivery expected in the beginning of 2017. Customer name not disclosed at the customer's request. ↵

*Source: Vestas*

For more information, go to [www.vestas.com](http://www.vestas.com)

## Senvion Concludes 33 MW Contract with Innogy Renewables

Senvion, a leading global manufacturer of wind turbines, has signed a contract with Innogy Renewables UK Ltd. to supply 16 wind turbines from its 2 MW series for the Mynydd y Gwair wind farm in South Wales.

Located 15 kilometers north of Swansea, Mynydd y Gwair wind farm will consist of 16 Senvion MM92 turbines. Once operational, the project will have an installed capacity of 32.8 MW and will generate enough renewable electricity to power more than 22,000 average U.K. households annually.

The average annual generation expected at the site could be equivalent to the approximate domestic needs of up to 22,600 average U.K. households. Energy predicted to be generated by the proposal is derived using wind speeds monitored in the local area and correlating to historical reanalysis weather data providing longer-term data. The calculations are based on an installed capacity of 32.8 MW. The energy capture predicted and hence derived homes equivalent figure may change as further data are gathered.

Equivalent homes supplied is based on an annual electricity consumption per home of 4,400 kWh. This figure is supported by recent domestic electricity consumption data available from The Digest of U.K. Energy Statistics and household figures from the U.K. Statistics Authority. Turbine components delivery starts in April 2018, and installation and commissioning is due to be completed in October 2018.

This is the 11th contract to be signed between Senvion and Innogy Renewables UK Ltd. and the conclu-

sion of this contract marks the fifth consecutive turbine supply agreement between both parties. In 2016, Senvion concluded agreements to supply turbines for Innogy Renewable UK's Brechfa Forest West wind farm and Bad á Cheò wind farm. Brechfa Forest West wind farm is in Carmarthenshire in South Wales. The wind farm will consist of 28 MM92 turbines providing an overall capacity of 57.4 MW. Grid consent for the project was confirmed in October 2016.

Once fully operational, the wind farm will generate enough renewable electricity to meet the calculative needs of approximately 38,800 average U.K. households annually. Bad á Cheò wind farm is near Caithness in Scotland and will feature 13 MM92 turbines. Construction will start in early 2017 and once constructed, the wind farm will provide an installed capacity of up to 26.7 MW.

Senvion also concluded five-year maintenance contracts with Innogy Renewables UK Ltd. for all three projects, with options to extend these up to 10 and then 15 years.

"We are delighted to be working with Innogy Renewables UK once more," said Guy Madgwick, managing director of Senvion Northern Europe. "Since we signed our first contract together for the Ffynnon Oer wind farm in 2005, we have partnered on a number of successful projects, and these additional contracts demonstrate the strength of the established and reliable relationship we have maintained for more than a decade."

“It was great to have all contracts signed before the financial year end,” said Tanya Davies, head of On-shore Development at Innogy Renewables UK Ltd. “We are delighted to see Mynydd y Gwair Wind Farm join Brechfa Forest West and Bad á Cheò and enter into construction. This is great news for the industry and the investment opportunities in South Wales.”

“We look forward to the construction of Mynydd y

Gwair Wind Farm and the Senvion turbines being erected and generating clean renewable energy in the near future,” said Gwenllian Elias, Mynydd y Gwair development manager at Innogy Renewables UK Ltd. ↴

Source: Senvion

For more information, go to [www.senvion.com](http://www.senvion.com)

## LM Wind Power Pledges To Become Carbon Neutral by 2018

LM Wind Power, the world’s largest, independent manufacturer of wind-turbine blades recently announced it plans to be carbon neutral by 2018, making it one of the first in the wind industry to take such a step. It will begin by sourcing 100 percent of its electricity from renewable energy sources during 2017.

With the ambition to eliminate and offset the CO2 emissions from its own operations by 2018, LM Wind Power joins an exclusive group of corporate leaders committed to demonstrating the leadership and action required to keep global warming below 2 degrees C, and setting new standards to accelerate the de-carbonization of the wind industry’s own supply chain.

LM Wind Power has produced more than 185,000 blades since the company began blade operations in 1978. This corresponds to approximately 77 GW of installed wind-power capacity, which each year effectively replaces about 147 million metric tons of CO2. This corresponds to the annual CO2 emissions from electricity used in 20 million (U.S.) homes.

“When we signed the UN Global Compact in 2010, we argued that LM Wind Power might be the greenest company in the world with more than 20 percent of all turbines worldwide flying LM blades,” said LM Wind Power CEO Marc de Jong. “But we also asked some tough questions — are we really green enough? It’s a paradox that the industry has not addressed this more coherently before. Could we not reduce our own carbon footprint further and do even more to nurture the growth of wind energy globally? Our carbon neutrality ambition by 2018 is the clear response to that challenge. Our customers, our host governments, the communities where we operate, and above all, our employees, are all behind us in this ambitious plan. In so doing, we will truly live our company vision that “Together, we capture the wind to power a cleaner world.”

The three main components of LM Wind Power’s carbon neutral program, which will be named “CleanLM” are:



LM Wind Power has produced more than 185,000 blades since beginning blade operations in 1978. (Courtesy: LM Wind Power)

- Reductions in the company’s carbon emissions through operational efficiencies, for example, an internal drive to reduce energy consumption and waste.
- Using 100 percent renewable electricity, particularly from wind, in conjunction with partners and customers and effective from 2017.
- Offsetting our remaining emissions through carbon credits and building low carbon sustainable development through the delivery of clean and renewable energy for communities in developing countries.

The company has implemented several sustainability initiatives in recent years with the aim of driving innovation and ensuring the long-term viability of the business. The bold ambition to become carbon neutral in 2018 is a core component of a wider program that includes implementing life-cycle thinking in the design of future generations of wind-turbine blades, an active focus on chemical substitution in manufacturing and end of life disposal. ↴

Source: LM Wind Power

For more information, go to [www.lmwindpower.com](http://www.lmwindpower.com)

# CONSTRUCTION

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## CEE Group Acquires a 19.8 MW Wind Farm



CEE Group is acquiring the Gollenberg wind farm under construction in Rheinland-Pfalz. (Courtesy: Jens Christian Berger)

The Hamburg-based CEE Group continues to expand its wind portfolio and is acquiring the Gollenberg wind farm under construction in Rheinland-Pfalz. The seller is Juwi Energieprojekte GmbH, which is also responsible for the construction stage as general contractor. The wind farm comprises six Vesta V126 turbines. The hub height is 137 meters, the rotor diameter is 126 meters, and the wind farm's total capacity amounts to 19.8 MW.

After commissioning, the turbines will supply environmentally friendly power to about 15,000 households each year. The wind farm was expected to be fully connected to the grid at the end of January.

CEE Operations, which manages the CEE Group's power plant portfolio, will be responsible for commercial operations. Juwi Operations and Maintenance GmbH will assume responsibility for technical operations. This is the fifth

project the CEE Group and Juwi have implemented jointly.

"By acquiring Gollenberg, CEE has also managed to continue the growth strategy in the wind segment in Germany in an extremely challenging market environment," said Detlef Schreiber, CEE Group's CEO. "Together with our reliable partners, we also intend to continue to grow outside our core markets."

"The Gollenberg wind farm clearly demonstrates that turbines can be operated profitably in the long term even at so-called low-wind sites thanks to modern inland technology," said Michael Class, Juwi Group's CEO. "We are very pleased to have implemented this project with the CEE Group."

The Gollenberg wind farm increases the CEE Group's renewables portfolio to about 556 MW. In 2017, CEE's energy plants are expected to produce about 880,000 MWh of power from renewable sources.

The Juwi Group is one of the world's leading companies in the area of renewable energy.

The renewable energy pioneer with a strong regional presence offers project development and EPC services as well as products and solutions for the energy turnaround. Company activities are mainly projects with solar and wind.

So far, Juwi has realized more than 900 wind turbines with a total capacity of more than 2,000 MW at more than 150 sites globally. ↪

*Source: CEE Group*

For more information, go to [cee-group.de](http://cee-group.de)

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## Lagerwey Building the First L136 4.5 MW Turbines for Growind

Wind-turbine manufacturer Lagerwey has received an order from Growind to build two L136 4.5 MW wind turbines in the Eemshaven in the northern part of the Netherlands. The L136 is the largest onshore IECII platform on the market.

Lagerwey's latest turbine has greater onshore capacity than any other. While other platforms are only capable of withstanding average wind speeds of up to 7.5 meters per second, Lagerwey's turbines can handle up to 8.5 m/s. This reduces the cost per kWh generated.

The Lagerwey turbines will replace two old wind turbines in the port of Eemshaven, which already have been dismantled. In January, the new foundations for the L136s were constructed in the same locations.

Construction work on the first new turbine will be-

gin in March. This turbine will be completed by the end of April, creating enough energy for more than 5,000 households.

The second turbine will be constructed at the end of 2017 using the Lagerwey Climbing Crane. It will be the first time the Climbing Crane will be used following its presentation in June 2016.

The turbines have a hub height of 132 meters and a rotor diameter of 136 meters, resulting in a tip height of just more than 200 meters, making them the tallest onshore wind turbines in the Netherlands. ↪

*Source: Lagerwey*

For more information, go to [www.lagerwey.com](http://www.lagerwey.com)

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## Allete Clean Energy Plans Expansion of North Dakota Wind Farm

Allete Clean Energy, a wholly-owned subsidiary of Allete, Inc. will work with Montana-Dakota Utilities (MDU) to expand the Thunder Spirit wind farm in North Dakota, reaching the 150-MW permitted capacity of the facility Allete Clean Energy developed in 2014 and 2015.

Allete Clean Energy secured a 25-year power purchase agreement with MDU to purchase energy from the expansion near Hettinger, North Dakota, about 100 miles southwest of Bismarck.

Under the agreement, MDU, a division of MDU Resources Group also has the option to purchase the expansion when it is complete as it did with the first phase of Thunder Spirit.

In 2014, Allete Clean Energy acquired the rights to build the 107.5-MW first phase of Thunder Spirit, which comprises 43 turbines and generates enough electricity to power about 30,000 homes. After the project was completed in 2015, MDU bought Thunder Spirit from Allete Clean Energy for \$200 million and operates the wind farm for its customers.

MDU granted Allete Clean Energy the right to devel-

op the 13- to 16-turbine Thunder Spirit expansion, with major construction on the \$85 million project expected to start in May 2018. Allete Clean Energy has qualified the Thunder Spirit expansion site for federal renewable energy production tax credits.

"We are pleased MDU has selected us to expand the Thunder Spirit Wind project and look forward to partnering with them, area landowners, and Adams County officials as well as North Dakota regulators on this exciting project that will deliver additional carbon-free energy to serve its customers," said Allan S. Rudeck Jr., president of Allete Clean Energy. "This transaction strengthens Allete Clean Energy's renewable energy repertoire and is consistent with ACE's multipronged growth strategy to expand its clean energy project portfolio by pursuing acquisitions and new builds with long-term power sales agreements, build-transfers, and renewal investments of existing facilities."

The Thunder Spirit expansion helps MDU meet its energy needs.

"Our relationship with Allete Clean Energy on the first phase of Thunder Spirit Wind proved to be a winning formula," said MDU President and CEO Nicole Kivisto.

“We are in need of additional energy to meet our growing demands, and with the easements, interconnection to the grid, and permits already in place from the first phase of Thunder Spirit Wind, it makes this a great project for Montana-Dakota.”

In addition to developing this expansion for MDU, Allete Clean Energy owns and operates wind generation facilities in Minnesota, Iowa, Oregon, and Pennsylvania. ↵

*Source: Allete Clean Energy*

For more information, go to [www.allete.com](http://www.allete.com)



Allete Clean Energy will help expand the Thunder Spirit wind farm in North Dakota. (Courtesy: Allete Clean Energy)

## Pattern Development Completes Financing for Wind Project in Japan

Pattern Energy Group LP (Pattern Development) and Green Power Investment Corporation (GPI) have completed financing of the 33 MW Green Power Otsuki GK (Ohorayama Wind) power project. Pattern Development and GPI are joint venture partners on the Ohorayama Wind project in Kochi Prefecture, Japan.

“We are making steady progress on our commitment to develop 1,000 MW of new renewable energy sources in Japan, demonstrating the value of our partnership with GPI,” said Mike Garland, president and CEO of Pattern Development. “Together with GPI we have completed two solar facilities in Japan and are moving forward on Ohorayama Wind. We also have a broad and deep pipeline

of new wind and solar projects, including several in the advanced stages of development.”

“Ohorayama is our first wind project to reach financial close and start construction since we joined hands with Pattern in early 2014,” said Toshio Hori, CEO and founder of GPI. “This achievement is a reflection of the effectiveness of our partnership, and we are excited about further executing on our portfolio of mature development assets. We expect our next project, a 126 MW wind farm in Aomori prefecture, to reach financial close and commence construction by mid-2017. It is anticipated to be the largest wind project in Japan.”

Ohorayama Wind has a 20-year power purchase agreement with Shi-

koku Electric Power Company for 100 percent of the output from the facility. The project is under construction and expected to reach completion in March of 2018.

In 2016, Pattern Development and GPI announced the completion of two solar power projects in Japan — the 14 MW Kanagi Solar PV facility in Shimane prefecture of Japan, and the 42 MW Futtsu Solar PV facility in Japan’s prefecture of Chiba.

Affiliate company Pattern Energy Group Inc. has previously added the Ohorayama Wind facility to its list of identified Right of First Offer (ROFO) projects. ↵

*Source: Pattern Development*

For more information, go to [www.patterndev.com](http://www.patterndev.com)

## 122,000 Acres of Offshore North Carolina up for Auction

Furthering President Barack Obama’s comprehensive Climate Action Plan to create American jobs, develop domestic clean energy resources, and cut carbon pollution, U.S. Secretary of the Interior Sally Jewell and the Bureau of Ocean Energy Management (BOEM) Acting Director Walter Cruickshank recently announced that

122,405 acres offshore Kitty Hawk, North Carolina, will be offered in a commercial wind lease sale March 16.

“(The) announcement demonstrates how our collaborative efforts with Federal, state, and local partners over the past eight years have built a foundation to harness the enormous potential of offshore wind

energy,” Jewell said. “The lease sale underscores the growing market demand for renewable energy and strong industry interest in meeting that demand.”

The Kitty Hawk lease sale is the latest effort in the Obama Administration’s renewable energy program at the U.S. Department of the Inte-

rior, which recently marked the operational launch of the nation’s first offshore wind farm off the coast of Rhode Island, and the lease sale for more than 79,000 acres offshore New York. To date, BOEM has held six competitive lease sales, which have generated more than \$58 million in high bids for more than 1 million acres in federal waters.

The Kitty Hawk lease area begins about 24 nautical miles from shore and extends 25.7 nautical miles in a general southeast direction. Its seaward extent ranges from 13.5 nautical miles in the north to 0.6 of a nautical mile in the south.

“This is a significant milestone for North Carolina and our country as we continue to make progress on diversifying our nation’s energy portfolio,” Cruickshank said. “BOEM looks forward to overseeing a successful lease sale in March, to contribute to the region’s energy supply and assist local governments in achieving their goals for energy independence and job creation.”

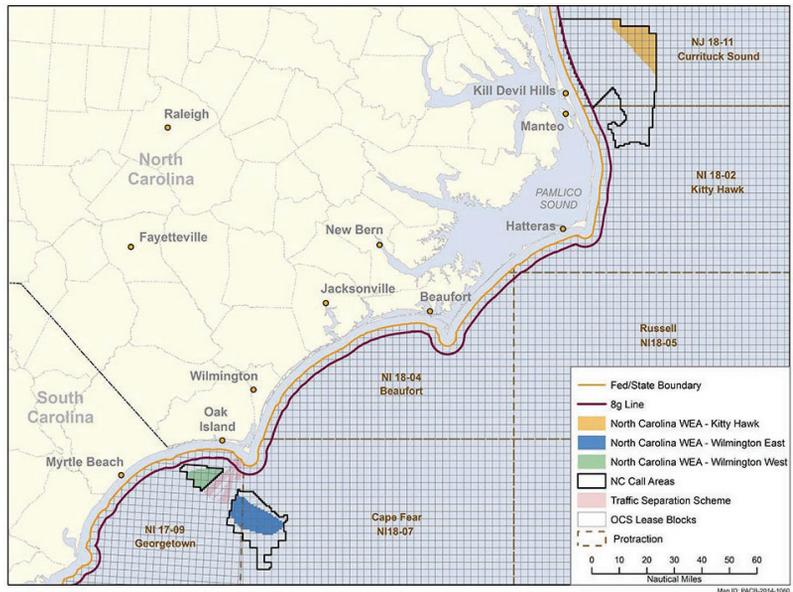
The announcement also identified nine companies BOEM has deemed legally, technically, and financially qualified to participate in the upcoming lease sale:

- Avangrid Renewables, LLC
- Enbridge Holdings (Green Energy) LLC
- Shell WindEnergy Inc.
- Northland Power America Inc.
- Wind Future LLC
- Outer Banks Ocean Energy, LLC
- PNE Wind USA, Inc.
- Statoil Wind US LLC
- wpd offshore Alpha LLC

The Final Sale Notice contains relevant information, such as deadlines and milestones for bidders, the area available for leasing, lease provisions and conditions, auction details, criteria for evaluating bids, award procedures, and lease execution.

Under the terms of the Final Sale Notice, which was published in the Federal Register on January 19, the lease area will be auctioned as Lease OCS-A 0508.

In September 2015, BOEM published a revised environmental assessment (EA) for commercial wind-lease issuance and related activities within the three North Caro-



Wind Energy Areas (WEAs) in North Carolina. (Courtesy: BOEM)

“ This is a significant milestone for North Carolina and our country as we continue to make progress on diversifying our nation’s energy portfolio. ”

lina Wind Energy Areas (WEA) (i.e., Kitty Hawk WEA, Wilmington East WEA, and Wilmington West WEA) offshore North Carolina. The EA considers reasonably foreseeable environmental and socioeconomic impacts from issuing a renewable energy lease and conducting site characterization (e.g., surveys) and assessment (e.g., installation and operation of meteorological towers and buoys) activities in the designated offshore area.

As a result of the analysis in the revised EA, BOEM issued a Finding of No Significant Impact, which concluded that reasonably foreseeable environmental effects associated with the issuance of commercial wind leases and related activities would not significantly affect the environment.

The Wilmington East and Wilmington West WEAs, due to their proximity and shared attributes, have been coupled with the planning and leasing process for the South Carolina Call Areas. ↵

Source: Bureau of Ocean Energy Management

For more information, go to [www.boem.gov/North-Carolina](http://www.boem.gov/North-Carolina)

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## Big Help in a Small Package

*Research with plant fibers could make future turbines lighter and greener.*

By **Kenneth Carter**  
Managing Editor | Wind Systems

**W**ind turbines continue to get bigger. The downside is that as they get bigger, they also get heavier.

But promising research being done at American University in Washington, D.C., is finding the world of plants may hold the answer in not only making turbine pieces lighter, but also using a renewable resource to accomplish that goal.

It's called nanocellulose.

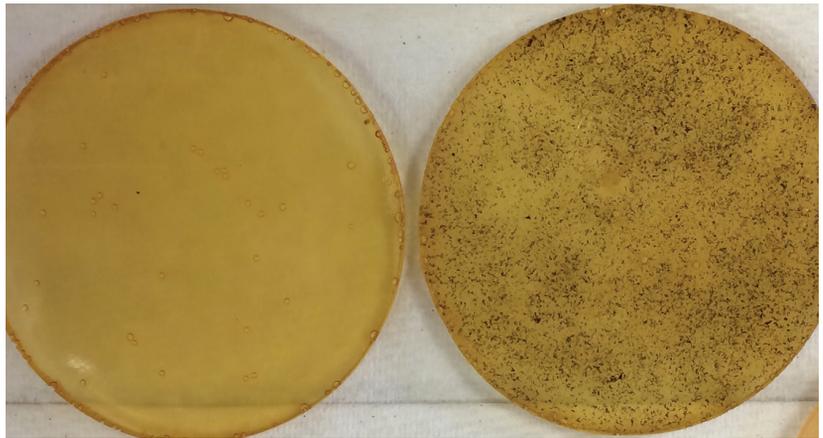
"Nanocellulose is simply cellulose fibers that have a width scale that's typically 20 nanometers or smaller," said Douglas Fox, associate professor of the Department of Chemistry at American University.

Nanocellulose is typically divided into two types: nanofiber and a nanocrystal.

"The nanofiber can be very long," Fox said. "It can be upwards of several microns and perhaps even longer than that, whereas the nanocrystals are typically no longer than 100 to 200 nanometers. The difference between the two is that the crystal tends to have slightly higher crystallinity because if you hydrolyze the nanofiber, then you can get these slightly more crystalline types of entities. So you either have longer, which are better to bridge crack propagation, or you have shorter ones that are stiffer. Depending on what your application is, you choose one or the other."

### WIND APPLICATION

For the wind industry, that application would mean replacing the filler used in



Epoxy containing cellulose nanocrystals (left) and modified cellulose nanocrystals (right) shows less aggregation and less degradation during heating. (Courtesy: Douglas Fox)

turbine blades, making them lighter.

"In wind, the wind-turbine blades right now are made from epoxy composites," Fox said. "And they are primarily glass filled. And the problem is, as you start to get to longer and longer blades, it gets more difficult to use glass. You're starting to find a limit simply because of the weight of the glass. There has been some experimenting into combining carbon fibers in place of the glass fibers and again that is certainly where you would find using cellulose as a viable alternative to the carbon."

The nanocellulose is lighter and also comes from a renewable resource, so it becomes more environmentally friendly as well, according to Fox.

"Glass is quite heavy," he said. "So when you put it into plastics, you're adding weight to the material. Cellulose is very light. It has the lowest density of those type materials. And it ends up

having higher strength as well than the glass, especially when you do it on a per weight basis."

### CARBON ALTERNATIVE

Nanocellulose is a viable alternative to carbon, too.

"One of the things that is potentially improved by going to cellulose from carbon is that you can improve toughness in addition to tensile strength, all while reducing the weight of the composite" Fox said. "Another advantage for cellulose over carbon is that nanocellulose, depending on how you make it, could reduce some of the processing. Some reports show that cellulose is cheaper than carbon."

However, Fox cautions that as of now, the cost factor is difficult to judge.

"There's work on the way to try and

*Continued on page 48*

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increase production as more and more applications are becoming available,” Fox said. “But the smaller production size makes it kind of hard to judge cost between them at this time. The materials are very comparable in strength and in stiffness, and cellulose is a renewable resource, whereas carbon, most of the time, is coming initially from a petroleum-based polymer.”

## CHALLENGES

However, the new technology is not without its challenges. Cellulose has a tendency to aggregate, especially when it’s dry, Fox said.

“So once you dry it you want to be able to redisperse it,” he said.

Cellulose is hydrophilic, whereas most polymers are hydrophobic.

“So you have an interfacial problem where you’re trying to maximize the interaction between two materials that are principally dissimilar,” Fox said.

In some applications, the way cellulose is made with acid lowers its thermal stability.

“So you do have a temperature limitation on it,” Fox said. “It won’t affect most epoxy systems; however, ones that have higher curing temperatures or things that are thermal plastics, you have to worry about degradation.”

And the primary challenge is actually the water absorption, according to Fox.

“Cellulose really likes water, creating a problem in composites, especially outdoors where you might have freeze/thaw situations,” he said. “And the work we’re doing is addressing those problems. We’ve developed a method that simultaneously addresses all of them. Initial results are encouraging, showing improvement in all four properties.”

Nanocellulose already is being used in some applications, according to Fox. Most notably is its use in curing cement, speeding up the process and increasing early strength.

Other applications are probably five to 10 years away, he said.

In the interim, the advantages of nanocellulose will need to be expressed to an industry accustomed to working with glass and carbon.

“You have to show that it’s a viable alternative,” Fox said. “You have to show that it can perform as well, or the industry is not going to embrace it. Alternatively, the driver to keep industry interested in it is that it’s a renewable resource. It can potentially be cheaper, because it is renewable. And, it’s lighter, and that can reduce operating costs.”

## OTHER USES

Making lighter wind turbines is not the only potential use for nanocellulose. Fox said many industries possibly could get a boost from this field.

“Cellulose is a very good oxygen barrier in most plastics,” he said. “You could potentially reduce the cost in packaging. Right now if you want a good oxygen barrier, you have to use multi-layer film processing where you’re using a very expensive polymer as your oxygen-blocking material.”

Cellulose is also nontoxic, so it could be used in relation to food-type products.

Research also is being done using cellulose in medical implants, according to Fox.

“I’ve used cellulose as flame retardants,” Fox said. “You do have to modify it in some way, but it doesn’t burn as quickly as plastic. You can modify it to enhance that capability.”

The nanofiber is also being used in the paper industry.

“One of the reasons why is because a very small addition of nanofiber increases the strength of the paper,” Fox said.

## POLYMER COMPOSITES

Fox started working with polymer composites after college, specifically working with clay to reduce the flammability of plastics.

“Since I always had an interest in the environment, my projects always revolve around sustainability,” Fox said. “I read several articles on cellulose being a good charring agent, so I started working with cellulose as a flame retardant. I’ve used other plant materials as well as I’ve gone along. Again, I’m trying to keep with natural products to reduce the flammability of polymers. As I was considering other materials, one of the things that came to mind is that carbon nanotubes are very good flame retardants. So I wanted to investigate the use of cellulose nanocrystals, which are similar in size, but sustainable alternatives. It turns out that, on their own, they are not that good as flame retardants, but it did lead into looking at nanocrystals in polymers for other applications. So ... that’s kind of where it had its genesis.”

## NIST COLLABORATION

Fox credits a good collaboration with the National Institute of Standards and Technology (NIST) that has enabled a lot of the nanocellulose research to get accomplished.

“The collaborations with NIST are very good for bridging research with commercial applications. Part of their mission is to promote U.S. industries because it’s part of the Department of Commerce,” Fox said. “And the collaborations with leading scientists at NIST are a large part of what’s moved this research forward.”

And Fox said that research has made significant improvement toward addressing issues that have hindered the use of cellulose nanocrystals in wind turbines in the past.

“In my lab, and in other research groups using different approaches, we are all moving toward addressing the commercialization barriers so it can be used in polymer composites, such as those found in automobiles and wind-turbine blades,” Fox said. ↵

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