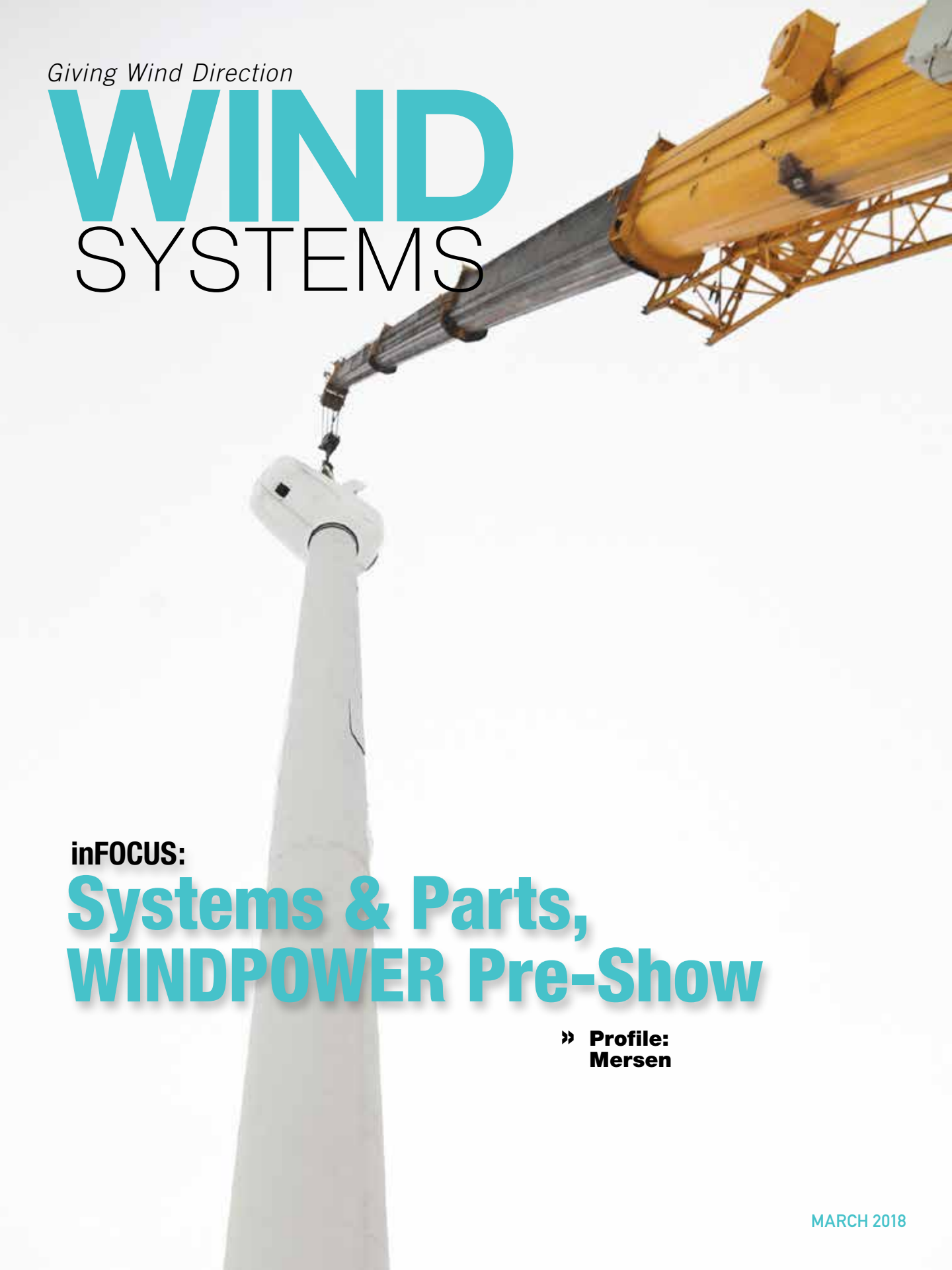

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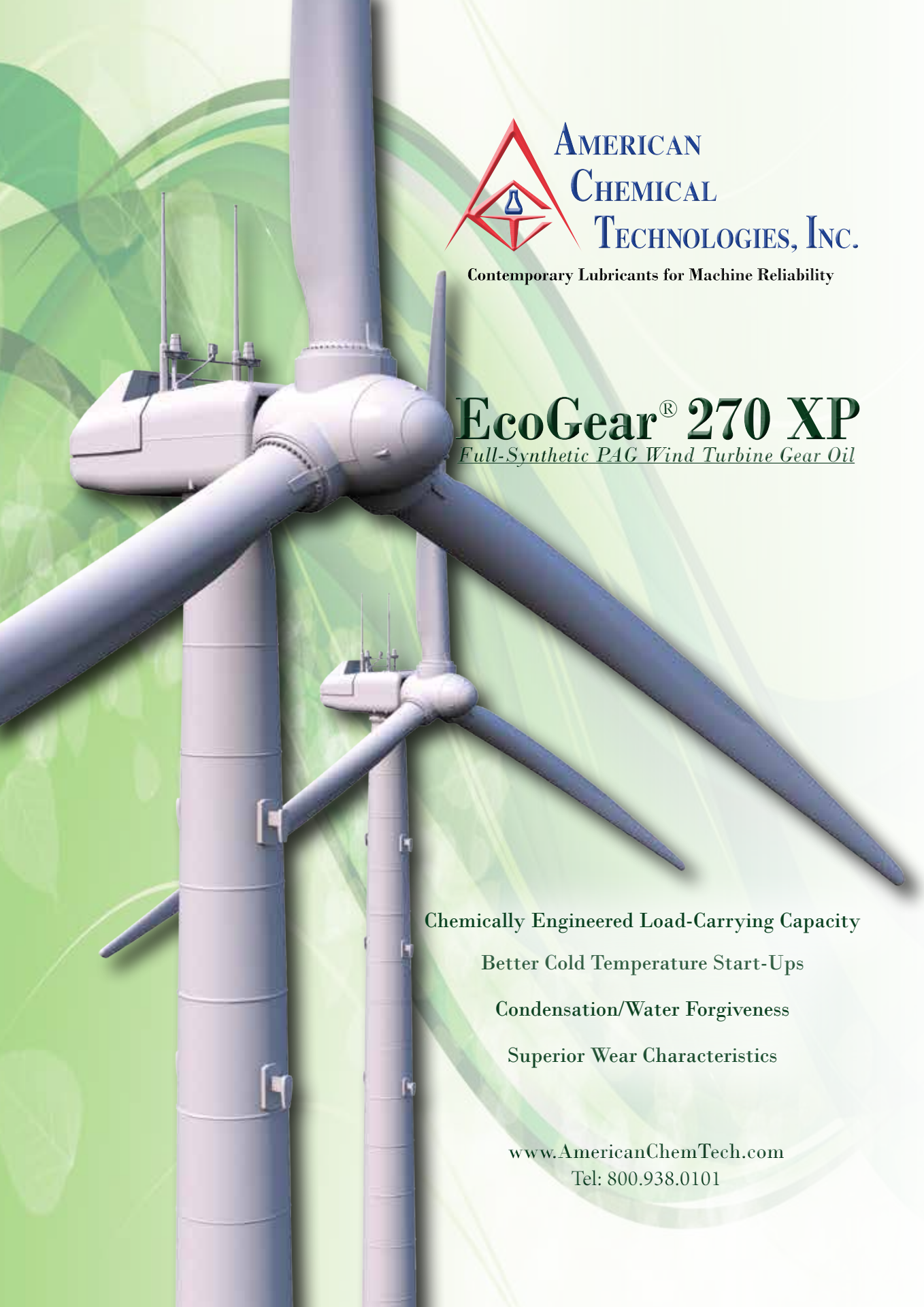

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EDITOR'S DESK

Spring ushers in warm winds

2018 seems to be flying by as we already head into spring.

As the temperatures get warmer (at least for some parts of the country), it just gets us at *Wind Systems* excited because that means the AWEA WINDPOWER show is just around the corner.

We realize that this year's show in Chicago — insert Windy City joke here — is always the biggest wind industry event of the year. That's why, for the first time, *Wind Systems* has added a WINDPOWER pre-show focus topic to give readers a little primer for our big show issue next month.

In addition to some extremely interesting articles on wind-turbine systems and parts, some of our regular features include some talking points from a few industry experts and insiders who will be at the Chicago event.

In our company profile, I talked with Mersen's Benoit White. Along with all the amazing products Mersen offers the wind industry, White also talks about what attendees can expect from Mersen at WINDPOWER.

In this months' Conversation, I had the honor of talking with Greg Hennigan, wind lubricants technical adviser with ExxonMobil. He goes into detail about how ExxonMobil's SHC Gear 320 WT is the first industrial lubricant to receive the DNV GL conformity statement. It's a big deal, and it should go a long way in helping to extend the life of turbines in the future.

Other articles in our inFocus section include one on how DNV GL and Group NIRE have established a new verification site for its remote sensing devices. Another article from Business Network for Offshore Wind discusses the current state and future trends for offshore wind energy in the U.S. and Canada. The experts from BNOW will be offering their insight on the industry on a regular basis for *Wind Systems*. I'm excited to include them and share their knowledge with you.

And finally, in Crosswinds, our friends from New Energy Update have talked with four senior executives in the U.S. wind sector. I hope you find the Q&A as informative as I did.

Spring has definitely sprung for us at *Wind Systems*. I hope our March issue serves as a taste of what's to come for the industry as we get ready to head to Chicago.

Thanks for reading!

Kenneth Carter, editor
***Wind Systems* magazine**
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Wind business still booming in the U.S.

Courtesy of AWEA

- American wind and solar capacity has increased 471 percent since 2008.
- Consumer spending on electricity fell to 1.3 percent of personal consumption in 2017, the lowest in records dating to 1959 and down from a peak of 2.3 percent in 1982.
- The U.S. now has enough installed wind capacity to power more than 26 million American homes.
- American wind farms built in 2017 attracted $11 billion in private investment.
- There were nearly 29,000 MW of new wind under construction or in advanced development at the end of 2017, a 34 percent year-over-year increase.

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

AWEA AMERICAN WIND ENERGY ASSOCIATION

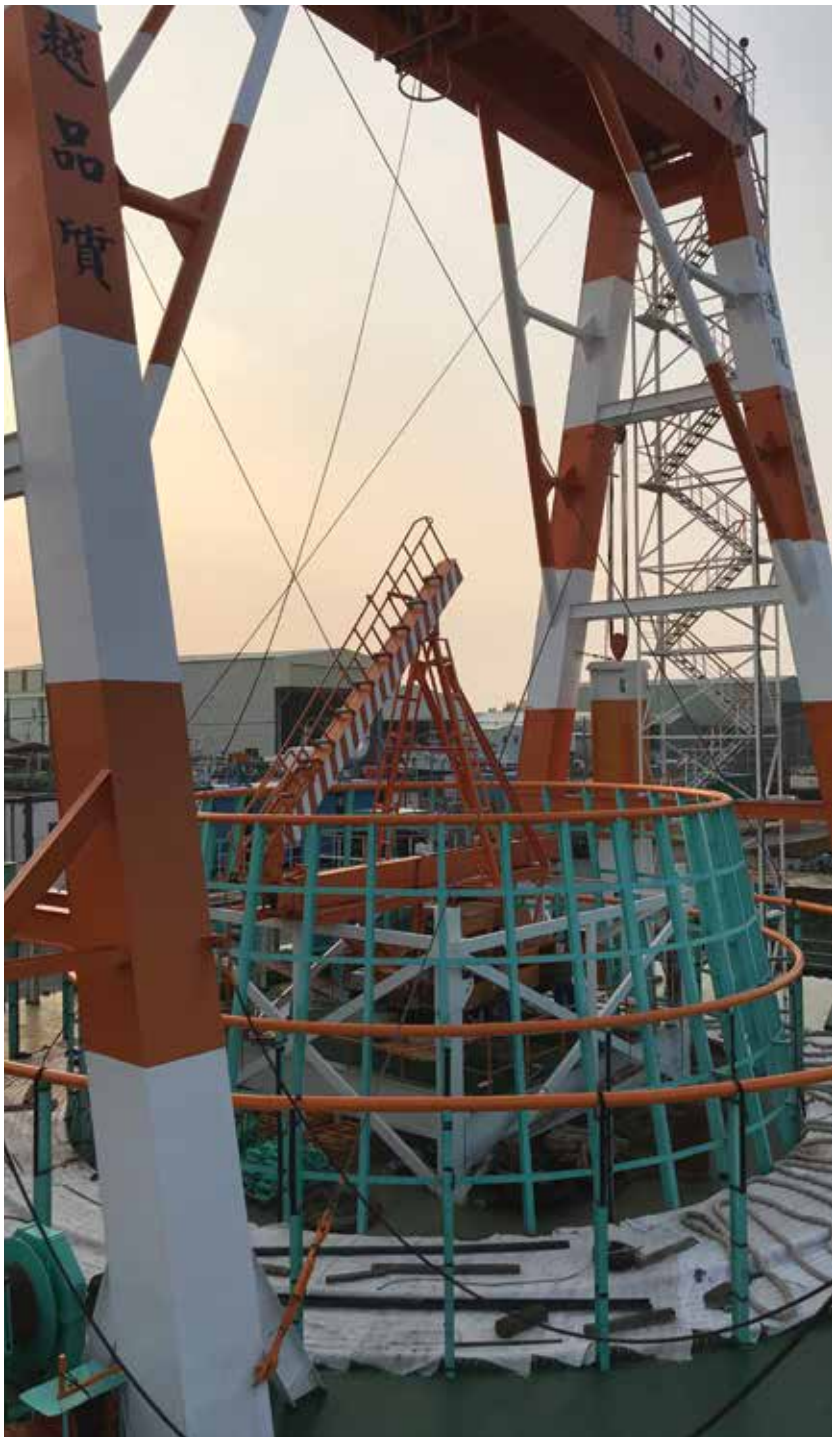
LOC Renewables signs on to deliver offshore wind cabling expertise in Taiwan

LOC Renewables, through its specialist naval architectural design and engineering team, Longitude Engineering, has been contracted to undertake a month-long feasibility study on behalf of premier Taiwanese subsea cable installer, Woen Jinn Harbor Engineering. The agreement will see the Longitude team assess a cable lay barge for Woen Jinn and advise on the specifications and conversion work required to fit the barge for offshore wind operations.

With significant natural wind resources and excellent conditions for offshore construction, Taiwan is aiming to develop 3GW of offshore wind capacity by 2030. In order to achieve this target, local firms are increasingly looking to work with experienced offshore wind-energy firms and benefit from the transfer of skills and knowledge from more established European markets.

Indeed, late last year LOC Renewables signed a memorandum of understanding (MOU) with four regional partners, outlining its intention to further offshore wind-farm development and construction in Taiwan. This feasibility study will now see Longitude identify the cable lay barge specifications required for Taiwanese offshore wind farms and advise on the upgrades required to meet these.

In addition to better quantifying the scope of conversion work required to prepare Woen Jinn's flagship cable installation barge, the WJ#5, for the offshore wind market, Longitude



Woen Jinn's flagship cable installation barge, the WJ#5, is being converted for the offshore wind market. (Courtesy: LOC Renewables)

will provide ongoing support during the barge's operation life. Longitude is also working with Woen Jinn to determine its role as owners' engineer, during the necessary design engineering to convert the cable lay barge to a fit-for-purpose vessel.

"We're proud to be working alongside Woen Jinn on what is a long-term collaboration to enhance their cable-laying capabilities and build out the local supply chain," said Nicolas Cazeres, managing director at Longitude's Singapore office. "We are delighted to have been recognized for our expertise and look forward to adding value and learning from Woen Jinn's operational experience."

"Supported by staff in the U.K., our Chinese-speaking team in Singapore will ensure that the knowledge and experience we have built up in European markets is successfully leveraged and deployed in Taiwan and the surrounding region," he said.

"As the leading cable installation company in Taiwan, we played a key role in the completion of the country's first offshore wind turbine in 2016," said Cheng Yu (Bruce) Lee, director at Woen Jinn Harbor Engineering. "As we plan for the future of offshore wind power in Taiwan, our co-operation with Longitude Engineering in barge design and related verification activities will allow us to continue to deliver a first-class local cable installation service in Taiwan."

As Taiwan's offshore wind sector continues to develop, Longitude and LOC Renewables will bring their end-to-end experience across the project lifecycle to bear on all stages of the evaluation and review of offshore wind farms.

Source: LOC Renewables

For more information,
go to loc-group.com/renewables

The Meadow Lake wind farm. (Courtesy: EDP Renewables)

Nestlé moves closer to 100% renewable goal

Nestlé in the U.S., in partnership with EDP Renewables, a global leader in the renewable energy sector and one of the world's largest wind energy producers, recently announced a 15-year power purchase agreement that will provide approximately 80 percent of the electricity load for five Nestlé facilities in southeastern Pennsylvania. The agreement is a major step forward for Nestlé's ambition to procure 100 percent of its electricity from renewable sources.

EDP Renewables' Meadow Lake VI wind farm will generate and deliver 50 MW of electricity through the PJM Interconnection grid to manufacturing facilities and distribution centers operated by Nestlé Purina PetCare, Nestlé USA, and Nestlé Waters North America in Allentown and Mechanicsburg, Pennsylvania. Because the wind farm and the recipient facilities are on the same regional grid, the power purchase agreement provides traceability from the Pennsylvania facilities back to the wind farm. With the addition of the energy from the wind farm, 20 percent of the electricity Nestlé uses in the U.S. will come from renewable sources in 2019.

This power purchase agreement is in line with Nestlé's support and advocacy for state policies to ensure companies have access to renewable energy. This renewable energy project will help Nestlé cut energy costs, avoid the volatility of fossil fuel prices, and stay competitive.

"Our partnership with EDP Renewables propels us forward in our ambition to create zero environmental impact by 2030, and is another example of our business transformation journey," said Kevin Petrie, chief supply chain officer at Nestlé USA. "This power purchase agreement perfectly illustrates our creating shared value strategy — that we create value for our business through contributing to a healthier future for the planet."

Through this power purchase agreement, EDPR will expand the

capacity of its Meadow Lake VI wind farm in Benton County, Indiana. The expansion will add 50 MW, enough to power approximately 17,700 homes for one year, to the existing 150 MW EDPR has already secured for the project.

Additionally, the wind farm will bring a number of economic benefits to the state of Indiana in the form of jobs, landowner and tax payments, and money spent in local communities. Construction on the expansion project will begin in the next two months, and the facility will be fully operational at the end of 2018. With the completion of the wind farm, the six-phase Meadow Lake project will total 800 MW.

"This power purchase agreement enables EDP Renewables to further expand our presence in Indiana, the state in which we are the leading producer of wind energy," said João Manso Neto, CEO of EDP Renewables. "EDP Renewables is proud to partner with Nestlé to help in achieving its forward-looking goal of obtaining all of its energy from renewable sources."

NESTLÉ COMMITMENT

Providing climate change leadership is just one of many societal commitments against which Nestlé transparently reports its progress every year.

Reducing greenhouse gas emissions by becoming more efficient and switching to cleaner fuels, including renewable energy, is a core focus area for the company.

By 2020, Nestlé aims to reduce its global GHG emissions (Scope 1 and 2) per metric ton of product in every product category to achieve an overall global reduction of 35 percent in its manufacturing operations versus a 2010 baseline.

Nestlé has made significant progress toward its environmental sustainability goals in the U.S., as reported in its 2016 Nestlé in the U.S. Creating Shared Value Report.

Source: EDP Renewables

For more information, go to www.edpr.com/en or www.edprnorthamerica.com

Summit recognizes role for wind-farm operations to support a greening grid

Untapped opportunities for Canada's expanding wind-energy industry to enhance grid reliability and add value for consumers in the shift to a low-carbon future were in the spotlight as more than 230 wind-energy professionals attended the Canadian Wind Energy Association's (CanWEA) fourth annual and largest-ever Operations and Maintenance (O&M) Summit in January.

CanWEA's fourth annual Operations and Maintenance summit featured an expanded exhibition showcasing leading companies in Canada's growing wind energy O&M market. (Courtesy: CanWEA)

The summit brought owners, operators, manufacturers, and service providers together to discuss operations issues in the world's ninth largest wind-energy fleet, and explore innovative tools and techniques to increase efficiencies, drive down costs, and unlock the technical potential of modern wind power facilities.

With wind-farm operators and turbine technicians active at 295 wind farms across Canada, workforce development and a range of health and safety best practices in areas such as electrical safety, fall arrest equipment, up-tower rescues, confined spaces, and ergonomics were on the summit agenda. Data-driven maintenance strategies, emerging technologies, and service offerings, icing challenges, and repowering opportunities were also key topics discussed by the summit's line up of expert speakers from across North America.

A highlight of the event was the presentation of two new CanWEA awards, recognizing excellence in health and safety and innovative approaches to O&M. Cartier Énergie Éolienne took home the inaugural Health and Safety Excellence Award, while LiftWerx won CanWEA's first O&M Outstanding Achievement Award.

This year's summit also featured an expanded exhibition showcasing leading companies in Canada's

growing wind energy O&M market.

"Electricity markets across Canada are evolving as they adapt to rapid technology change and the increasing emphasis on clean growth, and wind-farm operations need to evolve as well," said Phil McKay, CanWEA's operations and maintenance program director. "The discussion at CanWEA's O&M Summit made it clear that new challenges and opportunities are presenting themselves and our rapidly maturing industry is taking steps to meet them head on. We can contribute to the services grid operators require, in addition to the low-cost, emissions-free energy consumers want."

"Wind energy has been the leading source of new electricity generation in Canada for more than a decade, and today wind energy is the lowest-cost source of non-emitting generation available in Canada," said Robert Hornung, CanWEA president. "As a mainstream player in the power sector, our industry is committed to setting a strong example for effective, efficient and safe operations. CanWEA's 2018 O&M Summit gave operators, manufacturers, and service providers a chance to work collaboratively to meet that goal, by sharing information and expertise, developing solutions to current challenges, and looking ahead to the needs of the electricity grid of the future."

Source: Canadian Wind Energy Association

For more information, go to canwea.ca

Siemens Gamesa to develop offshore supply chain in Taiwan

Siemens Gamesa Renewable Energy intensifies its activities in the preparation for the offshore business in Taiwan. After a first agreement with Taiwan International Ports Corporation (TIPC) in December, the wind-turbine manufacturer has now signed a further Memorandum of Understanding with Yeong Guan Energy Technology Group to collaborate on the development of an offshore wind supply chain in Taiwan.

Under the terms of the non-binding MoU, Yeong Guan Energy Technology Group will be investigating the establishment of a foundry, machining, and painting facilities at the Taichung Harbor in Taiwan.

Siemens Gamesa, drawing on its experience as a leading turbine manufacturer, will provide advice and support with regards to compliance to offshore wind quality and HSE standards, as well as for YGG to become a competitive supplier for offshore wind in Asia Pacific (APAC).

A timeline has not been set for finalization of the cooperation agreement.

"The promising potential of the Taiwanese offshore market combined with our positive experience with the government has encouraged us to intensify our efforts," said Andreas Nauen, CEO Offshore, Siemens Gamesa. "We are convinced that this emerging market offers interesting business opportunities. As one of the world's leaders within the offshore wind industry, we look forward to gaining a foothold in this market."

"The Taichung Harbor is a choice location, close to Changhua County, off of which the majority of the zones defined by the Taiwanese government for offshore wind projects are found," said Rainer Mueller-Wallenborn, head of Offshore Procurement, Siemens Gamesa Renewable Energy, who signed the MoU. "As we stated in December 2017, there are over 10 GW of projects under planning overall in Taiwan according to official information. We therefore believe the Taichung Harbor has the potential to become a regional hub for the industry, and we are very happy to reinforce our commitment to its development with YGG."

In 2017, Siemens Gamesa Renewable Energy signed a MoU with Taiwan International Ports Corporation to investigate possibilities for a potential manufacturing site, office facilities, and staging areas.

Siemens Gamesa also installed Taiwan's first offshore wind-power plant, the 8 MW Formosa Phase 1 demonstration project, back in 2016.

Source: Siemens Gamesa

For more information, go to www.siemensgamesa.com

inFOCUS

Verifying remote sensing devices

DNV GL and Group NIRE establish new verification site for RSDs.

By Luke Simmons

Edition 2 of the International Electrotechnical Commissions (IEC) 61400-12-1 standard for power performance measurements was released in early 2017. This new standard codified the use of remote sensing devices (RSD) for primary wind-speed measurement in power-curve evaluations in simple terrain. Use of RSD requires verification of each device against a reference meteorological (met) mast before or during the campaign.

In December 2017, DNV GL and Group NIRE Renewable Energy Solutions (GNIRE) commissioned an RSD verification site at the Reese Technology Center in Lubbock, Texas. This is DNV GL's second verification site worldwide. The first site is in Janneby, Germany, which was developed in 2013.

The GNIRE site, established in 2010, covers more than 2,000 acres and provides optimal real-world conditions with consistent wind speeds throughout the year. GNIRE has partnered with GE, Gamesa, Hover Energy, and other manufacturers for prototype wind-turbine testing activities. The RSD verification site has a 125-meter meteorological (met) tower instrumented with six levels of high-quality measurements to offer industry leading RSD verification capabilities. Measurement and verification services offered by DNV GL are accredited by the American Association for Laboratory Accreditation (A2LA) to IEC/ISO 17025.

While the primary purpose of the site is for RSD verification, it is also well suited for research and development activities related to new sensor technology, sensor mounting equipment, mounting uncertainty, verification of other wind speed, and more.

REMOTE SENSING DEVICES

RSDs have been an important part of the evolution of the wind-measurement industry, and DNV GL has been active in ground-based RSD measurements since 2005. The ability to measure meteorological conditions with technologies such as Lidar and Sodar allow for more economical meteorological assessments and have potential to reduce overall measurement uncertainties depending on the configuration and application at the project measurement site.

The economic savings are rooted in the fact that ground-based RSD can measure conditions across typical wind-turbine rotor heights with only a short met mast for monitoring of the RSD. There are no exposed, rotating components at heights, and this keeps operational and maintenance costs down. There are also no costly aviation permits required, and short-term installations can be completed within a few hours with little more equipment than a pickup truck. The value of RSD has been realized for many years with groups such as the International Energy Agency's (IEA) Task 32 being actively involved with publishing best practices and removing barriers to apply Lidar technology.

In 2017, the IEC published Edition 2 of its standard, 61400-12-1 for power performance measurements. This new release cemented RSD's position in the future of the wind industry as a leading technology because, for the first time, an IEC-compliant power-performance measurement of a wind turbine can be performed using

The GNIRE site, established in 2010, covers more than 2,000 acres and provides optimal real-world conditions with consistent wind speeds throughout the year. (Courtesy: DNV GL)

RSDs. However, there are few publications regarding the actual magnitude of the measurement uncertainty when applying Lidar for power performance measurements. The hope of the industry was that RSD would provide a rapidly deployable method for measuring power performance that would also result in a lower uncertainty due to having measurements across the entire turbine rotor. IEA Task 32 coordinated a comparative, or round robin, exercise to allow the industry to practice applying the new uncertainty guidelines and to also get an estimate of the differences in uncertainty when using Lidar with or in lieu of cup anemometers. While already understood by many in the industry, this study clearly demonstrated that standalone Lidar had a higher relative uncertainty compared to using the traditional cup anemometer primarily due to higher verification and classification uncertainty. To reduce the uncertainty relative to a cup anemometer, improvements are needed in the verification and classification process. A

high-quality reference mast such as at the GNIRE site will facilitate those improvements.

In the wind-resource field, the application of RSDs has been growing consistently for many years. RSDs are primarily used in conjunction with cup anemometry to reduce wind-shear extrapolation uncertainties. In simple to moderately complex terrain, the RSDs may be used as a primary measurement to help inform the wind flow across a site when certain minimum validation requirements are met. Therefore, before the RSD adds value to the project, high quality, calibrated cup anemometer data are used in some way as the reference against which remote sensing measurements are evaluated to establish a relative understanding of site-specific accuracy.

TEST SITE

The GNIRE verification site provides the necessary high-quality reference mast to minimize RSD verification uncertainties for applications in power performance or wind-resource studies. With verification uncertainties reduced, RSD can be a leading measurement technology for multiple applications. While several such sites exist in Europe, this site is the only high-quality tall reference mast in the United States. Further, the site can support a large number of concurrent RSDs for verifications. The site is well positioned to serve RSD owners in the North American market who want to avoid a longer term overseas logistical challenge to verify a device.

The RSD verification site boasts a 125-meter met tower instrumented with first class anemometers, wind-direction sensors, temperature, pressure, and relative humidity sensors. Ultrasonic anemometry is also included to provide measurements of wind-speed deviations from horizontal. Wind speed and direction measurements are available at six heights with redundant first-class anemometers of different types at each level. All cup anemometers include MEASNET calibrations, and overall, the mast exceeds the requirements of the newest edition (2017) of the IEC Standard for power performance measurements. Sensor data are recorded using a robust industry standard data acquisition system, capable of sampling high data rates and exporting multiple time series averaged

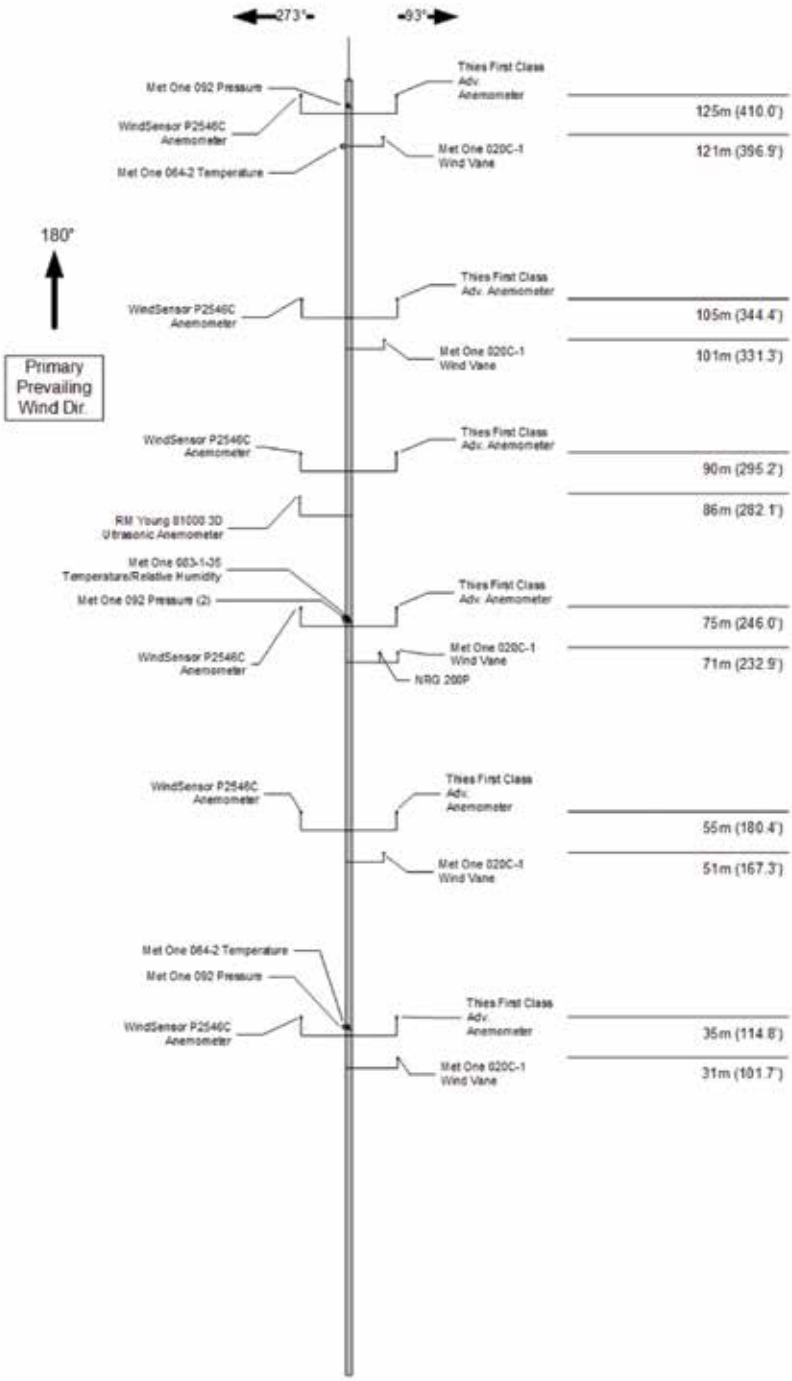


Figure 1. Overview of mast. (Courtesy: DNV GL)

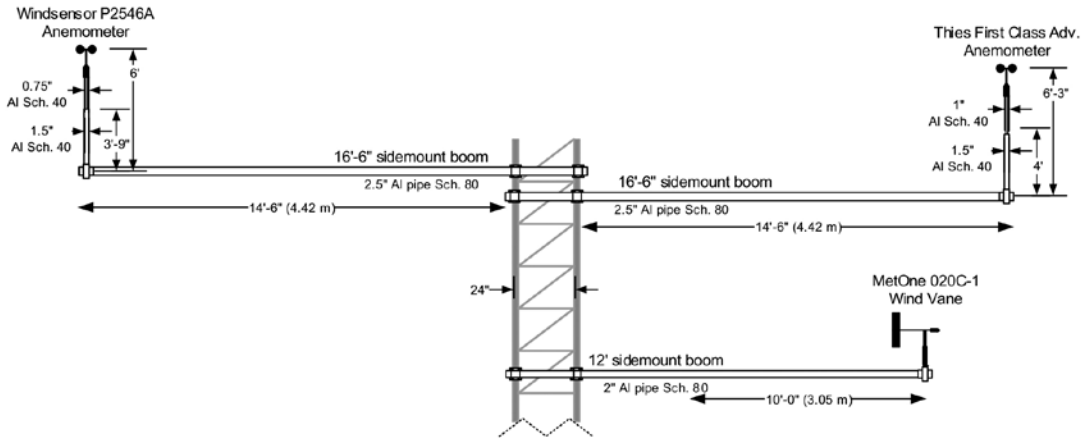


Figure 2. Details for instrumentation at each measurement height. (Courtesy: DNV GL)

Figure 3. The mast prior to installing the full instrumentation package. (Courtesy: DNV GL)

statistics (e.g., one minute, 10 minutes, etc.).

DNV GL is using the industry standard black box concept for verifying and assessing the measurement accuracy of ground-based RSD. Using the black box concept, the performance of the Lidar system is verified by comparing its outputs (e.g., horizontal wind speed and wind direction) with equivalent reference values. The site can also be used for verification of nacelle Lidar RSD technologies. For this type of service, the nacelle Lidars would be mounted at ground level and tilted upward to use the 35-meter level instrumentation.

It is clear the future is bright for RSD in the wind industry. DNV GL expects the new verification site will help enable growth in the application of RSD for various applications in North America and globally.

Luke Simmons is the global lead for Power Performance Measurements. With more than 10 years of experience at one of DNV GL's four IEC/ISO17025 accredited laboratories, he supports more than 100 power performance measurements annually conducted by DNV GL offices in the U.S., Spain, Germany, Australia, China, and India. He is an active member on the IEA Task 32 Advisory Board for the application of Lidar and IEC 50-3 developing a standard for the application of nacelle Lidar for power performance measurements.

LS Cable America/Durocher Marine. (Courtesy: Business Network of Offshore Wind)

Priming the grid for green

Moving from 30 to 3,000 MWs offshore wind means rethinking the transmission grid.

By Liz Burdock

Connecting the East Coast's first offshore wind development (Block Island Wind Farm) to the electric grid involved installing new overhead and underground lines onshore, upgrading substations, installing a new substation and switching station, laying 20 miles (and 5 million pounds) of submarine cable from Block Island to the site, and overcoming those water complications.

To create a viable worksite, crews had to build a cofferdam along the shoreline, then restore the area once the project was complete so it could once again serve as one of Block Island's most popular recreational beaches. Working with a cable vessel and jet plow, crews were able to lay just one mile of submarine cable per day, and weather sometimes impeded that progress. Furthermore, the area had seen some World War II activity, so crews had to take extra precautions to avoid potential sites of torpedo tests.

On land, the grid-connection portion of the development required seven years of project management and permitting work. The interconnection had to clear 20 separate permitting processes from three levels of government and "almost every one of our permits needed some kind of modification throughout the project for something that had changed," according to Mary Ellen Paravalos, director of strategy and performance for National Grid, who spoke at the Business Network for Offshore Wind's International Offshore Partnering Forum on this subject.

A key lesson from the Deepwater Wind project, she said, was that grid connections require meticulous attention from the start of OSW developments because "sometimes the permitting and network upgrades can take as long as the turbine projects themselves."

DESIGN CHOICES, COST DIFFERENCES

"The grid is the last thing that anyone wants to talk about in a project," said Alastair Mills, business development and sales manager of Offshore Grid Access at Siemens. "They think we will go and get some turbines, have some contracts with people to build foundations, get some permits for some cables and then we'll say, 'build me a grid.' It is really the worst place to put the grid people is at the end."

Permitting times alone make that practice untenable. That practice can also preclude project teams from spending the time necessary to make smart design choices that can save money on a costly portion of the project.

For example, decisions about AC or DC transmission, voltage levels, and other specifics can greatly alter the size and price of OSW substations as well as the resources needed to install them.

"When you start talking about high-voltage, direct-current, then we are talking about things that are the height of the Statue of Liberty and the weight of the Eiffel Tower," Mills said. "They are mammoth structures."

One such project entailed 1.3 billion euros of converters and cables. The substations on Statoil's Dudgeon project in 2014 weighed so much they had to be installed by heavy-lift vessels that were European-flagged and not Jones-Act compliant.

"Do you really want to design a grid system where you have to build a vessel or come up with a new, more risky installation method?" Mills said.

There are alternatives. Offshore wind developers have worked to reduce the weight and cost of offshore substations. The substation for the 180-MW Galloper project in 2010, for example, exceeded 2,300 tons. The substation for the 588-MW Beatrice project last year weighed in at 700 tons.

Choices about cable design can also greatly influence project costs. The submarine cables connecting the wind farm to shore are designed to transport high voltages while limiting the EMFs released with layers of insulation. Depending on the amount of electricity generated at the windfarm, the cabling costs for a project can vary.

Emerging technologies could offer new opportunities to optimize productivity and profits at offshore wind installations. Some U.S. developers, for example, are pursuing plans to install storage capacity at offshore sites.

"It is not that easy to do because you need an island or you need to build an artificial island," Bernard said. "But it makes sense."

Offshore wind farms can't always deliver full production to the grid due to lack of capacity on lines, or they deliver power during periods of low demand and low prices.

Offshore energy storage, Bernard said, would resolve both issues "and reduce the cost of transmission."

Block Island wind turbines were connected by undersea cables both to the island and the Rhode Island mainland. (Courtesy: Business Network of Offshore Wind)

MARKET SHIFT

Since the 30 MW Block Island Wind Farm started generating electricity in December 2016, the U.S. offshore wind market has shifted dramatically with 3,960 MW scheduled to be built by 2025 from Virginia to Maine. With such a large amount of clean energy to be generated, there is an opportunity for states and the Federal government to integrate a holistic offshore transmission planned design that leverages opportunities to not only provide generation interconnection but simultaneously to upgrade the existing infrastructure.

For example, an offshore wind export cable could be grid interconnected with an old substation and circuit near the coast that is at the end of its operational life and in need of refurbishment. With careful planning, the facility could be rebuilt in conjunction with providing the interconnection, providing the ratepayer with a new, flood-resistant substation with higher-capacity circuits for a lower total cost than would be available if these transmission challenges were addressed independently.

A BACKBONE APPROACH

Connecting offshore wind to the grid is complicated as illustrated from the Block Island experience. Reflecting on the lessons learned from Block Island Wind Farm and Europe, the U.S. has the opportunity to develop a marine grid with one main line on both coasts.

"We compare the backbone approach to the spaghetti approach," said Pierre Bernard, CEO and chairman of the board of Friends of the SuperGrid. "If you can hook up different offshore wind developments to one, single cable (a backbone), you will significantly reduce the cost of offshore wind … In the spaghetti approach, every wind farm hooks itself to the grid … It is not only expensive for the wind farm, but it is expensive at the end of the day for the consumer."

An offshore wind transmission design would:

- Minimize ratepayer costs.
- Connect a large variable generating resource to load while preserving reliability.
- Capture synergies that advance grid reliability and efficiency.
- Minimize curtailment of offshore wind farms during regular operation and in the event of cable failures.

An integrated, holistic design also would consider the future need to interconnect several wind farms and provide a low-cost way to accommodate future substation expansion and circuit upgrades as the wind projects are built without overbuilding in anticipation of demand. Further, an offshore transmission plan would seek to maximize the standardization of offshore transmission equipment, such as voltages, transformers, and offshore platform design.

BENEFITS OF HOLISTIC TRANSMISSION SYSTEM

An offshore transmission plan would evaluate the need to connect individual offshore wind projects at low cost, while also considering the long-term interest of ratepayers and grid reliability.

An offshore transmission plan would seek to maximize the standardization of offshore transmission equipment, such as voltages, transformers, and offshore platform design. This would maximize U.S. job opportunities as well as the use of standardized, manufactured, and serially produced components help to lower costs. The transmission design should be developed in collaboration with wind-farm developers to determine the parameters for these optimized components.

Today, U.S. submarine cable production is limited. Standardizing cable voltages, transformers, and other

equipment would increase product volumes and begin to create the level of demand that will justify U.S. production and the corresponding employment opportunities.

Offshore transmission planning also would improve transmission systems, operations, and maintenance. Within the European market, the lesson has been learned that submarine cable failures do occur, and because they can take a long time to repair, they cause significant wind-farm down-time (i.e., loss of energy production) and financial loss. As has been seen in the German, Danish, Belgian, and U.K. markets, comprehensive transmission planning results in more reliable, lower cost submarine cable systems that are installed right the first time and receive appropriate preventative maintenance.

A marine transmission effort with focused responsibility for design, construction, and operation of offshore transmission in one entity would have the expertise, personnel, and equipment to maintain and repair offshore transmission cables. This capability would reduce the number of submarine cable failures and the duration of outages and their financial cost. As risks are reduced, ratepayers will experience savings.

As a variable resource, wind energy has typically been credited with low-capacity value. Holistic transmission planning would recognize the differences between offshore wind-energy production profiles and other variable clean energy resources such as terrestrial wind and solar. When coupled together and matched with demand response and/or storage, these resources do have the ability to provide reliable capacity. When ratepayers get more capacity value out of variable renewable energy resources, they require less capacity from traditional fossil resources and save money. Planning from multiple perspectives and with a view to achieving multiple objectives will result in the best outcome. A piecemeal transmission approach cannot achieve these goals.

Some of the massive electrical systems powering cranes and other machinery during construction of the Block Island wind farm. (Courtesy: Business Network of Offshore Wind)

CONCLUSION

The long-term success of offshore wind in the United States requires the industry to demonstrate steadily declining costs for the clean, reliable energy that consumers need. Planning and building the transmission interconnections for the state's new offshore wind farms can contribute to the needed cost reduction, can deliver high quality jobs throughout the system life, and cannot be an afterthought. There are many opportunities to reduce costs, create jobs, improve reliability, and deliver greater value for consumers when transmission is done right.

The Business Network for Offshore Wind's 2018 International Offshore Wind Partnering Forum, April 3-6, in Princeton, New Jersey, will gather both industry and regulators. A Smart Approach to Offshore Transmission Networks, will be explored as an idea worth sharing and implementing. With 3,940 MW of offshore wind needing to be grid connected by 2025 and many more to come thereafter, now is the time to prepare and plan — there are no excuses for future inefficiency.

Liz Burdock is the executive director of the Business Network for Offshore Wind. This article is taken from the 2016 IPF presentation and the Network's Grid and Transmission Working Group's White Paper.

DuraGear® W100 is based on nano- and micro-particle bonding components and can be used not only in wind applications but also in industrial, shipping, and automotive applications. (Courtesy: Rewitec)

Improving the friction power of gears and bearings

Proper lubrication can extend the overall contact fatigue life of gearboxes by a factor of 3.3.

By Dipl.-Ing. Stefan Bill

A machine that runs endlessly without any wear and frictional losses — who wouldn't dream of that? Unfortunately, such a machine does not exist yet. However classic car fans know that through solid technology and ongoing service, cars can even outlast their owners. However, this does not happen with machinery of all industries.

In the wind industry, statistics indicate that gearboxes need to be replaced two to three times during a 20-year period. They wear out due to high stress, unsuitable lubricants, and poor maintenance management faster than originally thought.

In the context of tribological properties of gears and bearings, Sentient Science held a presentation in Hamburg in 2016 on the lifetime calculation of wind-turbine gearboxes via the high-tech software called "DigitalClone." Sentient Science introduced its conclusive proof that the lifetime of a WEA-gearbox can be extended by a factor of 2.6 to 3.3 by reducing the friction forces. The results obviously apply not only to gearboxes of a wind turbine but also to a variety of machines where friction and wear occurs.

DIGITAL CLONE

Sentient Science developed a material-science based predictive model of a GE 1.5 SLE Winergy 4410.2. This DigitalClone® gearbox model was used to study the fatigue life impact of Rewitec's surface refinement technology DuraGear® W100. The lubricant is based on nano- and micro-particle bonding components and can be used not only in wind applications but also in industrial, shipping, and automotive applications. In the test with Sentient Science, the treatment was applied on surface-damaged bearings and gears of the Winergy gearbox. As a result of the measured reduction in surface damage, Sentient's DigitalClone® technology predicts that Winergy 4410.2 gearboxes will exhibit a significant improvement in life compared to untreated gearboxes operating under field representative operating conditions.

Specifically for bearings, the treatment shows an improvement of the overall contact fatigue life by a factor of 3.3. For gears, the overall fatigue life is improved by a factor of 2.6.

TRIBOLOGICAL RESEARCH

The first calculations for friction were done by Leonardo da Vinci at the beginning of the Modern Era. Nowadays, tribological fundamentals come from research institutes such as the Institute for Applied Physics of the University Gießen and the Competence Center for Tribology of Mannheim University of Applied Sciences, which investigate the friction phenomena with special testing machines and measuring methods. Dr. Paul Feinle, a researcher at Mannheim University, and his team found that roughness and friction (as well as wear and temperature rise) can be reduced by up to 43 percent with the support of specialty lubrications like the innovative nano- and micro-particle-based surface refinement technology from Rewitec.

The lubricant in this case acts as a means of transportation and carries the silicon coating onto loaded metal surfaces. By using friction energy and crystalline temperatures that arise in the so-called mixed friction range, the products passivate the surface and reduce the roughness. This increases the service life and safety of the systems.

This innovative technology ensures that life and machine performance are enhanced over the long term, and the wear in the tribological systems is reduced. Once added to the lubricant, the Rewitec products, specifically developed for each respective purpose, provide protection over many hours of operation. The concentrated active agents are generally supplied premixed in a neutral oil, which is compatible with practically all standard lubricants.

EXAMPLES OF APPLICATION GEAR TEETH THE MEANING OF ROUGHNESS

Less roughness of rubbing surfaces of bearings and gear teeth results in less friction. Less friction means less wear, and less wear prevents failures and system insecurity. This would certainly lead to positive effects as cost reduction, material and energy savings, less CO2 emissions as well as greater sustainability. If roughness is the origin of the chain of negative effects, how is the problem solved?

The solution is called predictive maintenance, which is based on historical data and maturity calculations. The scientific material data comes from manufacturers of different components, which gain their information through online monitoring on the basis of real load collectives.

In addition to that, research institutes such as Mannheim University investigate the effect of lubrications containing certain additives on special test benches. With the support of this data, Rewitec was able to develop a treatment that contains life-extending properties able to minimize the roughness and its subsequent negative effects. The University of Mannheim and the University of Gießen proved that the roughness on treated interfaces were reduced by up to 55 percent. Equally significant was the reduction in the friction in gears and bearings by up to 43 percent. Corresponding to that was the fall in temperature and undesired vibration, as the results of vibration analyzes showed.

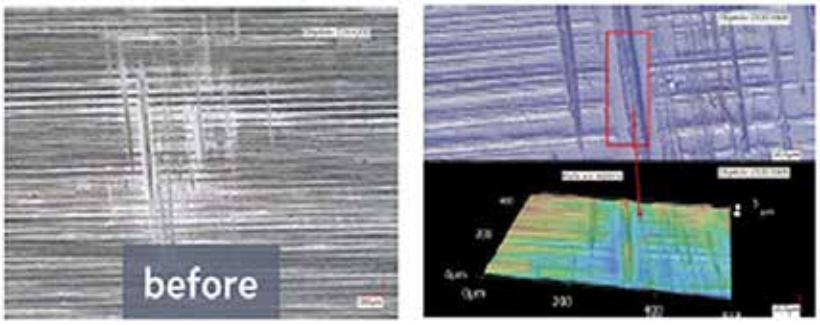


Figure 1: Imprints before the application.

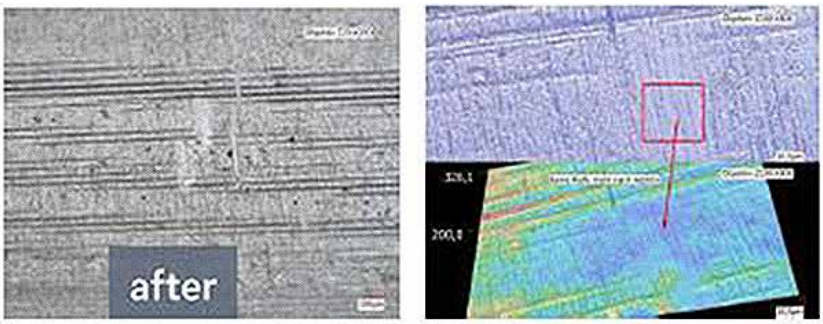


Figure 2: Imprints after the application.

SCIENTIFIC TESTS

The Competence Center for Tribology of Mannheim University of Applied Sciences examined the effect of the specialty lubrication in gear oils under rolling-sliding motion with a rolling wear tester. The experiment was carried out on a modern two-disc test assembly that makes it possible to simulate tooth-flank operating conditions. The evaluation showed the extent of change in friction behavior and temperature after adding Rewitec to different high-performance PAO (Polyalphaolefines)-based gear oils. Each test was performed with and without the addition of the Rewitec® concentrate during 40 running hours. The first 20 running hours were performed without the concentrate and the next 20 running hours with the Rewitec® concentrate. On average, there was a lower surface roughness after treatment of 30 to 50 percent and up to 50 percent less friction.

EXAMPLE RESULT: CASTROL OPTIGEAR SYNTHETIC X320

In the first test round, the friction force increases steadily while running before adding the Rewitec® substance. After the substance is added, the friction force decreases by 22 percent. At the end of the test, the friction force still did not reach its minimum level (blue curve). Test run number two (red curve) shows what happens without adding the Rewitec® substance. The friction force increases steadily. After 40 hours, a constant friction force seems to be reached. In the third round, the Rewitec® substance is added at the beginning of the test run (green curve). The test run shows the effectivity of Rewitec® from the start up through 40 hours, and the friction force steadily decreases.

FE-8 TEST

The FE-8 test is used to examine lubricating oils and greases to gauge their wear and friction behavior under lubricant and bearing-specific in-

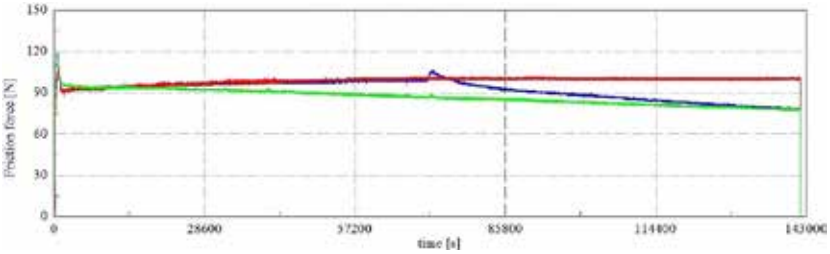


Figure 3: Example Result with Castrol Optigear Synthetic X320.

fluences. To assess the suitability of the lubricant to be tested, the friction, the temperature, and the wear are determined through the resulting weight loss of the bearings in the test arrangement. The tests also allow the ability to perform surface measurements, lubricant performance, and reaction layer analyses. In addition, volume-based wear can be determined through weight measurement.

- Light run marks and smoother surface
- 17 percent less wear with the Rewitec®-concentrate

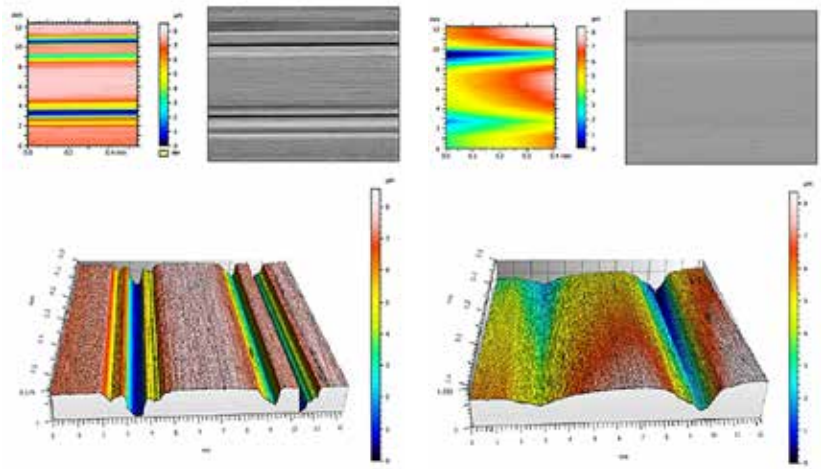


Figure 4: Bearing examination under a microscope without and with Rewitec.

MIXED-EHL MODEL

To take the influence of micro asperity into account for the determination of probabilistic fatigue life, Sentient Science used EHL (elastro-hydrodynamic-lubrication) solver, which uses simulated surface roughness profiles in an explicit deterministic calculation of surface tractions. Surface traction refers to the pressure transmitted between two surfaces through a lubricant.

Outcome: The performance of a given surface finish during the generation, sustainment, and/or failure of an EHL film at the contact zone can directly be determined.

Figure 5 illustrates the surface pressure of two such modeled rough surfaces interacting (left) and two (DuraGear treated) smooth surfaces interacting (right).

FIELD APPLICATION

The company used Rewitec DuraGear W100 Gearbox Surface Protection to a gearbox after 10 months of operation. Based on the evaluation, the application of the Rewitec product resulted in an improvement to the surface structure and roughness of the tooth flanks, a reduction in run through marks, micropitting and seizure and the electrical resistance from the gearbox improved significantly.

"In dealing with Rewitec products, experience has shown that the wear of our wind turbines is significantly delayed," said Jochen Holling, mechanical engineer, global technical support and engineering, Availon GmbH. "In most cases, the progressive damage in certain gearboxes and bearings with pre-mechanical damage was even eliminated."

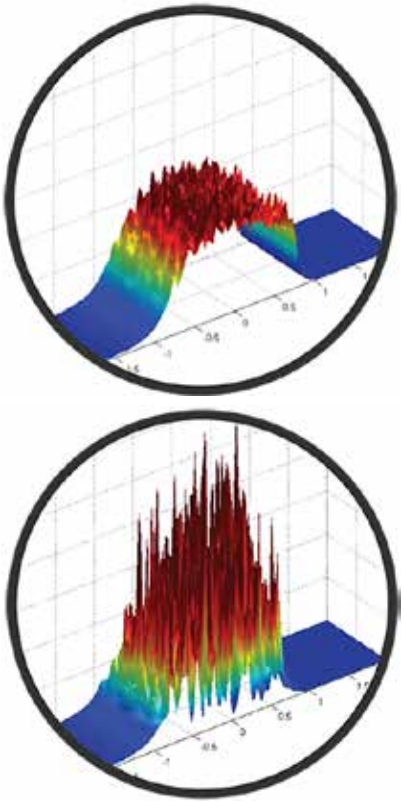


Figure 5: Modeled surface pressure of two rough surfaces.

Dipl.-Ing. Stefan Bill is managing director and an executive partner of Rewitec® GmbH, Lahnau. His company was a finalist in the 28th Innovations Awards of the German Economy 2007. He received the 1st HUSUM Wind Energy Award in 2009, the Industry Award 2014 Category — Best of 2014 for DuraGear®, Finalist Wind Energy Award 2016 — Supplier of the Year.

Small component, big reliability

Fiber optic rotary joints are being considered more and more as a replacement for conventional precious metal contacts in wind turbines.

A fiber optic rotary joint installed in a slip ring. (Courtesy: United Equipment Accessories)

By Jesse Shearer Sr.

When extremely high-speed data communication is a necessity in a wind turbine, one solution is a fiber optic rotary joint (FORJ).

While not a new component, FORJs are becoming more prevalent with the need for reliable data transmissions in even the harshest of environments and applications.

A fiber optic rotary joint is used in wind turbines to transmit data between the top box and the hub of the wind turbine. In most cases, FORJs are used in conjunction with a slip ring that is transferring power and possible other signal lines. They are generally mounted to the slip ring itself and are limited to communications only. For most wind-turbine applications, a single channel FORJ is usually sufficient.

Why switch from conventional precious metal contacts to fiber optic rotary joints? Conventional slip rings are being pushed to the max, and the need for increased data transmissions have challenged engineers to develop more reliable components such as fiber optic and wireless solutions. When compared to conventional slip ring data circuits, a FORJ can be more reliable in circumstances with very high speeds, when high levels of data are being

A fiber optic rotary joint. (Courtesy: United Equipment Accessories.)

A fiber optic rotary joint with mounting plate. (Courtesy: United Equipment Accessories.)

transmitted, or in environments with a lot of electromagnetic radiation. In addition to reliability, FORJs are a good option when it comes to physical dimension restrictions and even cost.

Fiber optic rotary joints are built for, and can handle, the toughest of environments to assure longevity and reliability. They are mounted on the slip ring itself, which is located on the front or back of the gearbox. They can be completely sealed, allowing them to withstand temperatures from -40 degrees C to 60 degrees C as well as high elevations, low to high humidity, and a range of vibrations.

The upfront cost for implementing a FORJ can tend to run higher than with precious metals used in the slip ring circuits it is replacing. The tradeoff of this upfront cost is little-to-no maintenance, saving time and money down the road for customers. Since they are mounted on the top of the slip ring, if maintenance or replacement is necessary, they are easily accessible.

United Equipment Accessories (UEA) has been using FORJ's in conjunction with its slip rings for several years, but recently the company is seeing them being used more often. Some wind customers who have being using precious metal contacts in conventional slip rings are in the process of changing over to FORJ's to allow them to increase the data speed being transferred.

As increased data transfer speed continues to become a necessity, a smart option to consider is a fiber optic rotary joint. Less maintenance, more speed, more reliability, and more savings are just a few of the benefits that can be seen from this small, yet powerful wind-turbine component.

Jesse Shearer Sr. is an application/design engineer at United Equipment Accessories (UEA) in Waverly, Iowa.

PROFILE

Mersen

Mersen is not only a leading supplier to the wind power industry, but also works with its customers to ensure they are getting the most from the components they are using.

Mersen's most popular wind industry collector ring runs on more than 2,000 turbines in the U.S. (Photos courtesy: Mersen)

By Kenneth Carter
Editor | Wind Systems

Mersen differentiates itself by not just offering a new product that will work better than the previous one, but by rethinking the application in order to offer serious upgrades that can make a real difference.

The European-based Mersen has been operating almost 80 years in North America, and it has become a leader in the wind industry in the U.S., according to Benoit White, global market manager for wind power and power transfer technologies.

"We want our customers to rely on us as the technical experts in the industry," he said. "We are really focused on performance and the technical aspect of the product more than anything else."

Mersen

Founded:
1892

Headquarters:
Paris

Website:
www.mersen.com

For the wind industry, Mersen manufactures electrical sliding contacts for power and signal application.

"That's the core business for our division," White said. "We do a lot of other things for wind such as fuses and advanced busbars, but when it comes to our business unit, electrical sliding contacts or current collectors is what we focus on."

Most of the components that Mersen supplies are in the wind generator. They are called slip-rings, brush-holders, and brushes, which are basically the components that connect the converter of the wind turbine to the generator rotor winding, according to White.

TURBINE TYPES

There are two main technologies of turbines in the field. One is a fully converted turbine, in which 100 percent of the power generated needs to be rectified to meet the grid

requirements. As the wind speed changes, the rpm of the generator changes, hence the need for full power conversion.

The turbines that Mersen's technology is being used in are the DFIG or double fed induction generator turbines, according to White.

"This technology features many benefits," he said. "It has been for nearly two decades the most widely spread technology, and that's where we come in. That's the technology that we support, because with that technology, only about 20 to 30 percent of the power is converted. This type generator coupled to a DFIG converter produces a clean power directly at the frequency of the grid. And in order to achieve that, we need to control what's going on in the rotor windings of the generator or, to be more specific, the frequency of the excitation, which means having a power component to control the current inside the generator rotor while in rotation."

The DFIG turbines tend to be more cost-efficient technology in terms of dollars per megawatt, which means the DFIG technology remains less expensive than a fully converted machine, White said.

"We know the pressures the industry is facing now in the U.S. and in many other countries throughout the world," he said. "Some of the projects are optioned now, and the lowest bidder gets the project. So, we work actively to keep lowering the cost of the DFIG turbine to ensure it remains the preferred technology out there for the next two decades or more."

Mersen's mission, according to White, is to support those technologies and make it even more attractive for large power turbines.

"As the turbines get bigger and bigger, these power components on the generator are also going to get larger and larger, and it's our responsibility to make these components viable for this technology," he said. "Our role in the industry is to support that effort and convince the rest of the manufacturers that this is the way to go, and that we can handle the technological challenges."

CLOSE TO CUSTOMERS

In order to help accomplish that goal, Mersen tries to stay close to its customers in the field, according to White.

"We have an extended sales network of people who are certified to climb turbines to perform inspections and support our products and solutions in operations and suggest upgrades" he said. "Having access to the turbines is very important to us, and it's more than just replacing product A with product B. It helps us truly understand the performance of our solutions and understand the specific needs from each one of our customers. That's what we've really been focusing on: Always working to improve reliability of the system, and lower the total cost of ownership by creating customized solutions for our customers."

And a lot of times, those customized solutions actually begin with the customer.

"We have a typical process when we see there is room for improvement or when the customer is concerned about something or when we see that something could be done better or designed better," White said. "We have the capability of bringing that back to the design office and designing something different as a drop-in

A newly launched phase brush for turbines equipped with newly designed holders.

> That's what we've really been focusing on: Always working to improve reliability of the system, and lower the total cost of ownership by creating customized solutions for our customers.

A phase brush for turbines 1.5 MW up to 1.85 MW

A 2.4MW turbine phase brush

replacement to improve the overall performance."

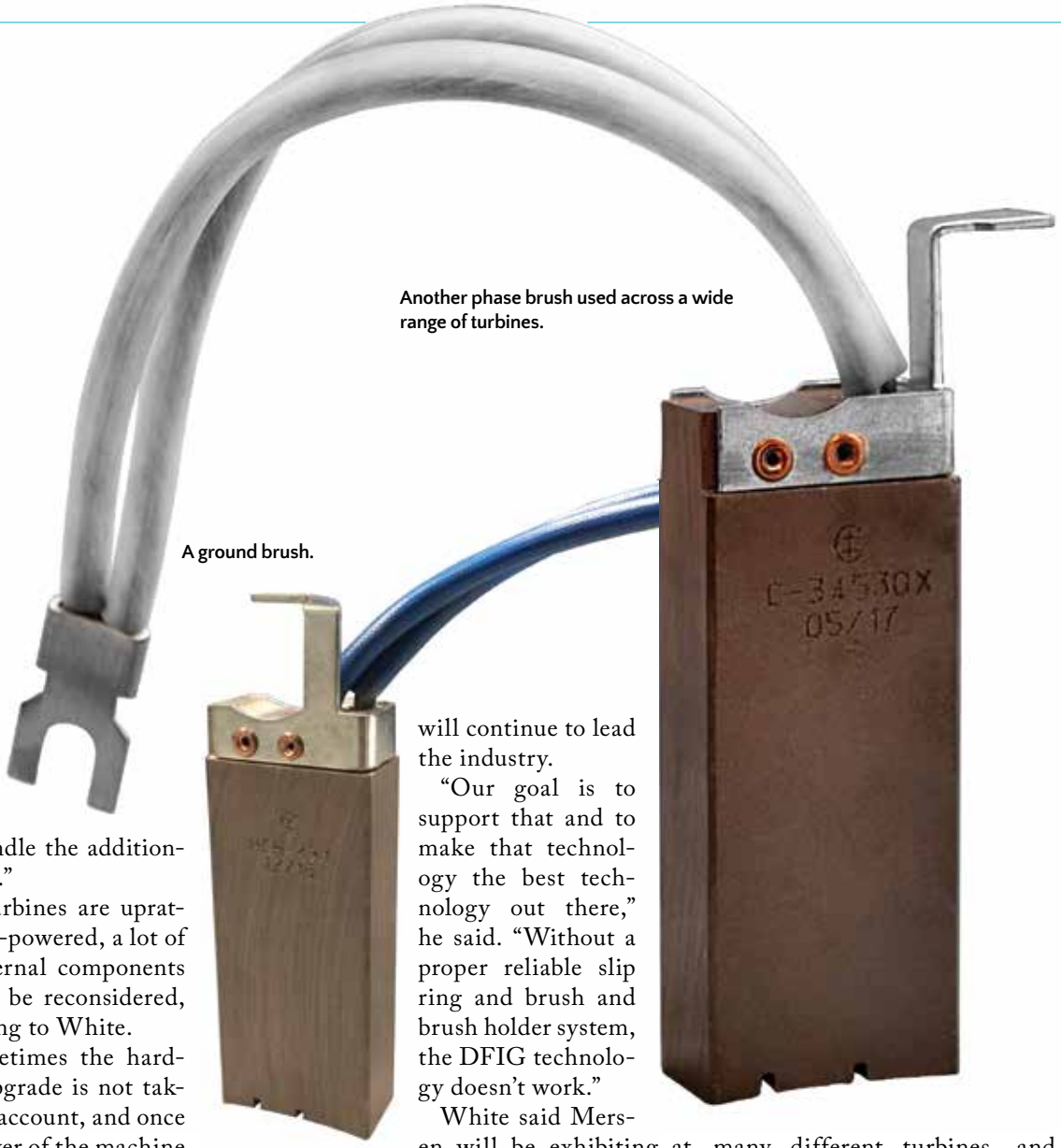
Mersen calls that a retrofit or redesign. Although Mersen manufactures its solutions in large quantities, it has the flexibility and capability to rapidly manufacture prototypes that can be taken to a customer and tested for a specific application up-tower, according to White. New products often originate from customer-specific needs, feedback, and experimentation.

"Although Mersen is one of the largest suppliers to the generator OEM and turbine OEM, what we have found — at least for us in wind — is that our biggest success stories and the biggest sellers that we have are often products that are born like that — when it's initiated through a partnership with a customer and re-thinking a product, perfecting it, and validating it," he said. "Having that connection is very important."

RE-POWERING

Mersen is heavily involved in the trend of re-powering older turbines, according to White.

"The game has changed," he said. "Before, the turbines would come out of the factory, be commissioned, and operate at their original nominal rated power for years and years. But now the turbines are changing. Manufacturers offer their existing customers a boost in power or a power up-rating. But it basically means that out of the same turbine, the same hardware, through a software upgrade, turbines get pushed a little further to optimize the power curve: for example, a 2 MW turbine can now produce 2.2 MW and this can cause additional stress on the turbine components. And what we've done successfully is to design ranges of solutions to support that



Another phase brush used across a wide range of turbines.

A ground brush.

and handle the additional loads."

As turbines are uprated or re-powered, a lot of the internal components have to be reconsidered, according to White.

"Sometimes the hardware upgrade is not taken into account, and once the power of the machine has been upgraded, then we could start seeing phenomena that we didn't see in the past," he said. "We have designed solutions that support that upgrade that are very easy to implement — minimal changes to the machine with more robust components, advanced materials, more heavy duty, that are able to support that new trend. That's the focus of our next upcoming ad campaign."

LEADING TECHNOLOGY

As Mersen enters its next decade, White said the DFIG technology will continue to lead the industry.

"Our goal is to support that and to make that technology the best technology out there," he said. "Without a proper reliable slip ring and brush and brush holder system, the DFIG technology doesn't work."

White said Mersen will be exhibiting at WINDPOWER 2018 in Chicago in May. Among what attendees should expect are Mersen's signal and power transfer systems (SPTS). It's also called a hub slip ring, and it is the compact slip-ring that sits on the low speed end of the gearbox and sends signal and power back-and-forth from the nacelle to the hub in order to communicate with all the electronics and even actuate the pitch the blades.

"We spent a lot of R&D in making this product more reliable," he said. "And we're coming out this year with a range of products for many different turbines, and I know we're going to be exhibiting that. But our big focus remains to support customers through their power up-rate programs and present them with options best suited to their specific requirements."

Helping customers harkens back to Mersen's core goal of being more than just a product supplier but a solution provider, according to White.

"We share the experience; we share the success stories, and we show how our solutions can help with that," he said. "Expertise is our source of energy."

CONVERSATION

Gary Hennigan
Wind Lubricants Technical Adviser
ExxonMobil

'It underscores our technology leadership'

ExxonMobil's Mobil SHC Gear 320 WT is the first industrial lubricant to receive the DNV GL conformity statement. Gary Hennigan, wind lubricants technical adviser with ExxonMobil, discusses what that means.

What do you do with ExxonMobil?

I've been with ExxonMobil for 20 years and have supported the wind industry for more than a decade. In my current role, I oversee the wind energy portfolio — specifically supporting wind operators manage their lubrication programs.

Tell us about the DNV GL statement of conformity.

DNV GL is one of the world's leading quality assurance and risk management companies, providing classification, technical assurance, software, and independent expert advisory services to the renewable energy industry, among others. Receiving this conformity statement means that DNV GL has independently assessed the performance characteristics of Mobil SHC Gear 320 WT gear oil and confirmed that it meets the global IEC 61400-4 standard. This is a landmark international standard that identifies test criteria to ensure reliability for wind-turbine gearboxes.

Receiving this statement supports our claims that the technology behind Mobil SHC Gear 320 WT gear oil is best-in-class and is capable of supporting equipment reliability for the short, medium and long-term.

When you have the engineering team of a third-party organization confirm the performance of your technology, it's something that gives owner-operators and investors peace of mind knowing that our technology is reliable and can truly help protect their equipment for the long haul.

How important is the conformity statement from an operator's perspective?

I think it validates ExxonMobil's belief in terms of the quality of this gear-oil technology, especially since we're the first lubricant manufacturer to receive this statement of conformity. I think the industry would recognize and appreciate it, but to me, it underscores our technology leadership and ExxonMobil's commitment to providing our customers with products they can count on.

What is the role of the lubricant in protecting wind-turbine equipment?

Wind turbines are exposed to some of the harshest operating conditions in the industrial world — extreme temperatures, heavy loads, strong winds, water exposure, just to name a few. Given these conditions, lubrication is often the first line of defense when it comes to making sure that your equipment keeps running as needed.

But not all lubricants are the same. The lubricant needs to be formulated to meet the needs of the job at hand. For example, wind-turbine gearboxes require an oil formulation thick enough to prevent metal-to-metal contact at lower rotations and higher loads, but thin enough to flow when turbines reach full speed.

Mobil SHC Gear 320 WT synthetic gear oil was developed using a balanced formulation approach, meaning it has the right mix of advanced base oils and additive technologies to perform as needed in the harsh and severe conditions common to most wind-turbine operating environments.

What makes this lubricant stand out compared to competitive products?

The biggest performance benefit — and differentiating benefit — is its long life. Most gear oil changes today happen within a three- to five-year period, depending on the OEM and the turbine conditions. The technology behind Mobil SHC Gear 320 WT guarantees the oil to last at least seven years, meaning operators can go years longer without conducting an oil change. Over the 20-year life of a turbine, that longer oil life could help eliminate one entire oil change. We back this performance up with a seven-year warranty on the product.

Another benefit of this product is that it is proven to not contribute to a leading cause of bearing failure in a gear box — white etching cracking (WEC). Working with leading bearing manufacturer Schaeffler, we were able to confirm that Mobil SHC Gear 320 WT gear oil does not contribute to WEC thanks to its metal-free formulation. There are a number of factors and bad actors that can contribute to WEC in a bearing, but the "a-ha" insight is that Mobil SHC Gear 320 WT does not. It is one more reason to choose this oil.

Our ability to engineer and manufacture such a high performing oil is a result of ExxonMobil's investments in technology, research, and development, as well as the 20-year plus legacy of our equipment builder group. Our equipment builder group works closely with OEMs around the world to develop lubrication solutions tailored specifically to meet the needs of their most advanced equipment. So, for example, when the wind industry first started looking at issues of how bearings were failing early, these relationships helped us become one of first companies to introduce a synthetic gear oil.

With the PTC phase out on the horizon, how will lubrication factor into operators' decision-making moving forward?

We're entering a new period in the industry where operators are expected to do more with less. Once the PTC phases down, there will be increased pressure to keep O&M costs as low as possible, since most operators will have less upfront capital to finance projects. For example, according to the Energy Information Administration, the levelized cost of energy (LCOE) is expected to increase by approximately 30 percent from 2019 to 2022 while fixed O&M costs will remain about the same.

At the same time, many operations will have turbines that are entering a post-warranty period, so the responsibility and burden of keeping those turbines running will fall on the operators themselves. The stakes are higher.

How can operators get the most out of their maintenance budget to help keep turbines running and costs down over the long term?

To do this, wind operators should make smart investments in their operations and maintenance programs.

That includes investing in a robust lubrication program built around advanced lubricant technologies and services such as routine used oil analysis. As the performance of Mobil SHC Gear 320 WT gear oil indicates, using high quality oils can be a difference maker as long-term O&M costs can be better managed. The less often you conduct an oil change, the more you save.

This is particularly true for gearboxes, which are still one of the primary bad actors in unplanned downtime situations. If I'm an owner-operator, or if I'm an OEM provider or service provider, I'd want to focus my efforts on making sure the gearbox is properly protected so that turbines are running with as much availability as possible.

For more information, go to www.mobil.com/industrial

> When you have the engineering team of a third-party organization confirm the performance of your technology, it's something that gives owner-operators and investors peace of mind

Cyberhawk gets three-year framework with major renewable energy operator

Cyberhawk, a world leader in inspection, survey, and asset management using unmanned aerial vehicles (UAV), has been awarded a three-year framework with one of the U.K.'s largest renewable energy operators.

As part of the framework, Cyberhawk will undertake wind-turbine blade inspections across the operator's network across the U.K. and Ireland.

"We continue to make great inroads in renewable energy as a result of our UAV data collection and asset management software, iHawk," said Cyberhawk CEO Chris Fleming. "We are experiencing an increase of work in this sector, which is highlighted by this recent framework award, and will continue to work closely with renewable energy suppliers around the globe to develop solutions which meet their needs."

The award of the framework marks the end of Cyberhawk's most successful year since its launch in 2008, with revenue increasing by a third, increased profitability and the completion of a series of major projects.

In oil and gas, Cyberhawk took a stronghold in the U.S. market following the launch of its Houston office in 2016, winning new projects in the region and securing accreditation from the American Bureau of Shipping for its internal tank inspection solution. As well as helping to develop Oil & Gas U.K.'s offshore drone guidelines, Cyberhawk has also completed multiple long terms projects in Africa, the Middle East, Asia, and Europe, where the company achieved a 50 percent cost saving for one of the North Sea's largest

Cyberhawk has made significant headway in the renewables sector, both in onshore and offshore wind. (Courtesy: Cyberhawk)

operators. First projects were also completed in the Caribbean and in the Mediterranean.

Cyberhawk has made significant headway in the renewables sector, both in onshore and offshore wind. As well as the recent framework award, the company also has secured a global framework with wind-turbine manufacturer Siemens Gamesa. Projects have been completed onshore and offshore throughout Europe including first projects offshore Germany. Multiple successful offshore converter and substation inspections also supplemented the wind-turbine blade inspection.

2017 has also been a busy year in the electricity transmission and distribution sector, with Cyberhawk having now completed work for the majority of U.K. and Ireland transmission network operators (TNO), distribution network operators (DNO), and major tier 1 contractors. Not only did the firm receive a contract with a TNO to inspect 2,000 towers, it also implemented its field tablet solution for a DNO to allow completion of ESQCR inspection and ground patrols on over 4,000 towers.

Software remains a major part of Cyberhawk's business across all sectors, and ongoing development has taken place over the last 12 months to meet increasing needs from clients. Two new modules were launched on iHawk, Cyberhawk's cloud-based asset management software, specifically for substation asset management and tower bar-by-bar inspections; iHawk will continue to represent a significant part of Cyberhawk's growth strategy during 2018 and beyond.

"2017 has been an exciting year for Cyberhawk, and we have been extremely encouraged to see the uptake of UAVs for inspection and survey increase exponentially," Fleming said. "We believe this is only set to continue, and our team is using the success of the last 12 months as a springboard for 2018. Cyberhawk will continue to innovate, grow our talented team, and develop customer-centric solutions to challenges across a range of industries. We are very excited to see what 2018 will bring."

Source: Cyberhawk

For more information, go to www.thecyberhawk.com

The Roemheld USA rotor lock is available with hydraulic or electromechanical locking mechanisms and withstands side loads up to 5,500 kN. (Courtesy: Roemheld USA)

Rotor locks simplify maintenance in wind power plants

New rotor locks from Roemheld USA are designed to simplify maintenance for wind-power plants. The double-acting hydraulic cylinder locks the rotor blade up to 6.5 MW, from -30 degrees C to 70 degrees C.

The Roemheld USA rotor lock is available with hydraulic or electromechanical locking mechanisms and withstands side loads up to 5,500 kN. Other designs can be produced for special needs.

A new, long-lasting coating prevents rust in the locking bolt, and non-contact position monitoring avoids mechanical wear and extends component life. The surface protection of rotor lock components corresponds to DIN ISO 12944, C4, for use in offshore operations.

Source: Roemheld USA

For more information, go to hilma-usa.com/rotor-locks

Pattern Energy pilots Uptake's software at wind site

Uptake, the industrial data science and artificial intelligence (AI) software leader, recently announced that Pattern Energy Group Inc. will pilot Uptake's wind software. Pattern Energy, the seventh largest wind operator in the U.S., will pilot the predictive analytics software at its Logan's Gap Wind farm in Comanche County, Texas.

The site's 87 turbines have 200 MW of capacity, the amount of energy needed to power approximately 50,000 homes.

"Deploying Uptake's software will reduce downtime and increase the number of megawatts Pattern Energy's turbines produce," said Ryan Blitstein, vice president of renewable energy at Uptake. "With more users, our software will generate better insights for all customers to create a more productive, reliable, safe, and secure world."

A report by Uptake recently found that the U.S. wind fleet could produce 12 TW/h more energy by eliminating downtime — enough energy to power nearly every home in the city of Chicago.

"Pattern Energy has been impressed with the value Uptake has brought to wind fleets and major companies in other industries," said Ben Rice, a senior engineering manager for Pattern Energy. "We are eager to test Uptake's software so as to connect the issues we see in our operations center to our technicians in the field."

In March 2017, Uptake announced two Berkshire Hathaway Energy subsidiaries would be the first to deploy Uptake Wind software. Uptake Wind is commercially available and enables wind power owners to increase availability, maximize online performance, and optimize maintenance and site operations for wind fleets around the world.

Pattern Energy, headquartered in San Francisco, manages its fleet through its Operation Control Center in Houston.

The company has an operating portfolio of 20 wind-power facilities in the U.S., Canada, and Chile, producing 3,775 MW of clean energy.

Source: Uptake

For more information, go to www.uptake.com/wind

New standard ratcheting combination wrenches designed for high torque

The new standard ratcheting combination wrenches from Williams are designed to handle higher torque applications without rounding or deforming hex fasteners points.

The Supertorque® ratcheting box end design means no contact is made at the corners. Rather, wrenching pressure is placed on the flat surfaces behind the points. Additionally, the wrenches' Supercombo® open end has specially designed grooves that direct wrench force away from fastener corners.

Features and benefits of the new standard ratcheting combination wrenches include:

- Ratcheting gear with up to 80 teeth, minimizing swing arc in tight places.
- Nickel-chrome plating protects against corrosion and makes cleaning easy.
- Sized for optimum comfort and balance.
- Handles forged in the U.S.
- Built with special alloy steel and heat treated for superior strength and durability.
- Standard and metric sizes available.

Source: Snap-On Industrial

For more information, go to www.snaponindustrialbrands.com

Duke Energy Renewables protects eagles with IdentiFlight system

Duke Energy Renewables recently ordered 24 IdentiFlight® units to be installed at its Top of the World Windpower Project in Wyoming as part of its comprehensive avian protection program.

Duke Energy Renewables' Top of the World Windpower Project in Wyoming. (Courtesy: Duke Energy Renewables)

The system from IdentiFlight International blends artificial intelligence with high-precision optical technology to detect eagles and prevent them from colliding with rotating wind-turbine blades. Duke Energy Renewables is the first wind operator to commercially deploy this technology.

"Duke Energy understands the importance of balancing the need for clean, renewable energy while protecting wildlife, including the iconic bald and golden eagles," said Tim Hayes, environmental director, Duke Energy Renewables. "Since Top of the World began operations, we have tested a variety of techniques and technologies to reduce impacts to eagles. The IdentiFlight system has shown great promise for effectively reducing eagle collisions."

The Top of the World site has been a part of the IdentiFlight innovation story from the beginning, with early versions installed and modified at the facility during development of the technology.

"Duke Energy Renewables has been an amazing partner throughout the testing and development of the IdentiFlight technology and has proven to be in the forefront of the industry in addressing this critical issue," said Tom Hiester, president of IdentiFlight International. "Avian collisions with turbine blades have been an impediment to growth in the wind industry. IdentiFlight was developed to address this problem and promote the successful coexistence of avian wildlife and wind energy."

Recently, an array of IdentiFlight units underwent third-party independent testing at Top of the World during elevated eagle activity. The testing focused on the system's ability to detect and classify golden eagles and other large raptors within a timeframe that supports the use of informed curtailment to minimize collision risk. The full report is expected to be published in a scientific journal early next year.

"The real-world testing conducted by The Peregrine Fund and the American Wind Wildlife Institute (AWWI) produced compelling results that validated IdentiFlight's accuracy and effectiveness," Hayes said. "It is a great addition to the many strategies we employ to protect wildlife and their habitats."

"AWWI is excited by the promise of innovative technologies to produce meaningful reductions in wind-energy impacts to wildlife," said AWWI Executive Director Abby Arnold. "Through AWWI's collaboration with a variety of stakeholders, we will continue evaluating cutting-edge solutions for raptors and bats, and we see these technologies as having great potential to help wind power achieve full conservation value."

HOW IDENTIFLIGHT WORKS

Automatic detection and species determination occur within seconds for birds flying within a 1-kilometer hemisphere around an IdentiFlight tower. If an eagle's speed and flight path indicate risk of collision, an alert is generated to shut down that specific wind turbine. By providing highly targeted, informed and objective curtailment decisions, unnecessary and costly interruptions are avoided, and conservation of protected species is achieved.

Source: Duke Energy Renewables

For more information, go to www.duke-energy.com/renewable

Vestas to acquire Utopus Insights

Vestas has entered into an agreement for the acquisition of Utopus Insights, Inc., an energy analytics provider with 15 years of experience in solutions development, a suite of innovative digital products, more than 30 patents, and a highly experienced team with data science expertise in analytics, power engineering, energy software development, and meteorology.

The acquisition price for Utopus Insights is approximately $100 million on a debt- and cash-free basis. The consideration will be paid in cash from readily available sources. For 2017, Utopus Insights is, on a stand-alone basis, expected to report consolidated revenues below $10 million. Utopus Insights will be included in Vestas' financial reporting from the time of closing, which is expected to be within the first quarter of 2018 and is subject to necessary third-party approvals being in place.

With the acquisition of Utopus, Vestas is looking to offer customers digital solutions to deliver greater predictability, increased renewable energy production, more efficient operations, and better integration with energy grids. (Courtesy: Vestas)

As the global energy sector is transforming, Vestas is looking to offer customers digital solutions to deliver greater predictability, increased renewable energy production, more efficient operations, and better integration with energy grids. This transformation means energy systems and power-plant owners must improve forecasting accuracy for renewable production, optimize output from each individual generation asset and orchestrate a portfolio of resources across multiple sites and equipment types. They must also do so in a cost-effective manner that ensures grid stability as renewable energy sources gradually replace conventional, fossil-fuel generated power plants. With this purchase, Vestas seeks to seize the opportunity afforded by this ongoing transformation to deliver faster, smarter, and more holistic solutions.

"Vestas' strategic objective is to accelerate the transition toward a fully decarbonized energy sector in the most efficient and cost-effective way possible — both for our customers and for our planet," said Anders Runevad, Vestas' Group president and CEO. "Acquiring Utopus Insights significantly improves Vestas' existing market-leading capabilities for advanced analytics and integrated energy software solutions. We will now be able to provide our customers improved forecasting, output optimization, and coordination between assets, and support the larger energy ecosystem's increased uptake of renewable energy."

U.S.-based Utopus Insights has its origins in IBM's Smarter Energy Research Institute and has a rich pedigree in data science, software, utility operations, meteorology, and renewable and distributed energy. Utopus Insights offers five software tools for the renewable energy industry and continues to develop new products based on its store of more than 30 issued patents related to energy innovation. Vestas and Utopus Insights also will sign joint development agreements that support advanced predictive and prescriptive analytics products. Utopus Insights will continue as a stand-alone entity under Vestas Service, including separate branding.

"Utopus Insight's mission is to accelerate an era of distributed, reliable, clean and cost-effective energy," said Utopus Insights CEO Chandu Visweswariah. "Combining with Vestas represents a quantum leap forward in our ability to accomplish that mission. The significant synergies gained from applying our breakthrough tools to Vestas' global-leading wind energy resources and existing offerings will demonstrably benefit customers and the grid. We are appreciative of the opportunity to work with a team and a company whose commitment, mission, vision and values align so perfectly with our own."

"Vestas can now provide customers with additional digital tools that can further leverage available data, increase their operational agility and help them make smarter decisions to lower their costs, increase their revenues and better manage their power plants," said Christian Venderby, group senior vice president and head of service at Vestas. "Joining our unequalled experience and data repository with Utopus Insights' incomparable data analytics expertise creates a digital solution powerhouse that will enable us to meet and exceed our customers' needs."

Source: Vestas

For more information, go to www.vestas.com

Siemens Gamesa introduces new turbine for the American market

Siemens Gamesa Renewable Energy (SGRE) has launched the new SG 2.7-129 wind turbine designed to address the diverse wind conditions of the American market.

By optimizing turbine technology to deliver a higher capacity factor at a lower cost of energy, the powerful new turbine delivers sustainable value for the full lifecycle of the project.

Production of the SG 2.7-129 is targeted to commence in the U.S. in early 2019. The blades for this turbine will be manufactured at the company's blade manufacturing facility in Fort Madison, Iowa, and the nacelles and hubs will be assembled at Siemens Gamesa's nacelle facility in Hutchinson, Kansas.

The SG 2.7-129 was developed with an eye toward increasing energy production for sites with medium- to low-wind conditions in the U.S. It features modularized components for increased flexibility and reliability. It also employs advanced technology with a 129-meter rotor, boasting an increased swept area of 16 percent compared to its predecessor, the SG 2.6-120. Additionally, the SG 2.7-129 features a state-of-the-art drive train that has been optimized to deliver maximum energy capture.

The product design also incorporates several added safety and operational benefits related to the service and maintenance of the turbines, including increased accessibility of key components and access to the weather station from inside the nacelle.

The SG 2.7-129 wind turbine. (Courtesy: Siemens Gamesa)

"We are very excited to introduce the new SG 2.7-129 to our portfolio — the next generation in a fleet of turbines with a proven track record and high availability," said José Antonio Miranda, Onshore Americas CEO, Siemens Gamesa Renewable Energy. "With an increase of more than 8 percent in annual energy production compared to its predecessor, this turbine will deliver greater returns and is another important step in reducing the levelized cost of energy. This product is also unique in that it was co-designed to include best practices from both former companies, making it a best-in-class wind turbine for the U.S."

The SG 2.7-129 is the latest addition to the Siemens Gamesa 2.X product platform. Combined with the SG 3.4-132 and the SG 4.2-145 wind turbines, these products can address all of the diverse needs of the U.S. market.

With 73 GW of onshore installed capacity worldwide and several decades of joint experience, Siemens Gamesa combined proven design components and lessons learned from previous platforms into the development of the SG 2.7-129, taking another step toward increased competitiveness and continuously reducing the levelized cost of energy.

Source: Siemens Gamesa

For more information, go to www.siemensgamesa.com

The ALL Family of Companies is expanding its fleet with the purchase of eight cranes from manufacturer Manitowoc. (Courtesy: ALL Family of Companies)

ALL adds eight units from Manitowoc

The ALL Family of Companies is expanding its fleet with the purchase of eight cranes from manufacturer Manitowoc. The package includes two each of the MLC650 crawler, Grove TMS760E truck-mounted crane, and Manitowoc 999 crawler, plus two more truck-mounted units: a Grove TMS800E and the all-new Grove TMS9000-2. The deal punctuated the final quarter of 2017. The cranes will be deployed across the company's network of branches, targeting markets where they are in the highest demand.

When ALL initially acquired two MLC650s last fall, the large-capacity crawlers proved extremely popular with customers, providing impetus for the acquisition of additional units. The MLC650 has a 716-USt capacity and features Variable Position Counterweight™

(VPC™) technology that automatically positions the crane's counterweight to match lifting demands. VPC helps reduce the operating footprint, minimizes ground preparation, and reduces matting, adding up to a potential savings of thousands of dollars per month on longer-term projects.

"This capacity — 700 to 900 USt — is in high demand across all geographies and in multiple sectors," said Rick Mikut, crawler crane division manager for the ALL Family of Companies. "The MLC650's large capacity and site-friendly ground bearing pressure will ensure these new units will be deployed almost immediately for energy-related projects."

Of no less importance, although at the opposite end of the capacity range for this crane package, ALL is excited to take delivery of its first Grove TMS9000-2 truck cranes. Manitowoc developed the TMS9000-2 with the input of customers and dealers to create a crane that delivers in real-world applications. It is a 115-USt capacity truck crane that is significantly lighter than similar models, making it easily configured for local roadway weight limits. It has a longer 169-foot main boom with jib options available. Strength was boosted by 5 percent across the load chart.

"Our truck cranes are an important part of our taxi rental fleet — the in-and-out work that is really important to our business — and Manitowoc is doing a great job reinventing these TMS units to keep them strong and increasingly more roadworthy," said Michael L. Liptak, president of ALL. "And our crawler division is booming right now, perhaps seeing the highest demand in a decade. Our new 'triple 9s' and MLC650s are a direct response to this need. We will continue to define our response to this demand by our commitment to a modern, technologically advanced fleet."

Source: ALL Family of Companies

For more information, go to www.allcrane.com

OFS introduces new, thermally stable Pyrocoat® K optical fiber

OFS, a leading designer, manufacturer, and supplier of innovative fiber optic products recently highlighted its new Pyrocoat K optical fiber at the Photonics West Exposition in San Francisco, California.

Pyrocoat K optical fibers offer an improved coating that enables wider operating temperatures than any commercially available polymer-coated fibers. With its reliable performance for fiber optics in extreme conditions, Pyrocoat K optical fiber provides thermal stability over various continuous temperatures/lifetimes: 275 degrees C for 80 years, 300 degrees C for 13 years, 325 degrees C for 2.2 years, and 350 degrees C for 18 days. These new optical fibers can also withstand short excursions at even higher temperatures and long-duration stability at low temperature extremes at and below -65 degrees C.

Pyrocoat K optical fiber. (Courtesy: OFS)

"We're excited to add Pyrocoat K optical fiber as a problem-solving technology to the growing family of LineaSens® distributed sensing products," said Michael Hines, OFS market manager for industrial sensing. "OFS has quantified the reliability of optical fibers over a broad range of high operating temperatures, closing significant, industry-wide performance gaps and opening new opportunities for optical fiber use in harsh environments."

"The Pyrocoat K optical fiber development illustrates the OFS long-term commitment to the fundamental sciences that enable fiber optics to extend into new and exciting market areas." said Dr. Jane Cercena, senior vice president, OFS — specialty optical fiber.

Source: OFS

For more information, go to www.ofsoptics.com

Valley Forge & Bold Mtg. Co. hires new director

Valley Forge & Bolt Mfg. Co. recently announced that James Brooks has joined the company as director of engineering and new business development.

Brooks is an engineering graduate from the University of London (U.K.) and brings significant experience in the field of specialty engineered fastening solutions. This includes direction of a large Swedish/U.S. specialty fastener company. In addition, he has significant experience in the development and execution of global strategies along with a long list of sales growth. Brooks will soon be moving to Phoenix, Arizona, to Valley Forge's U.S. corporate headquarters.

"I am delighted to be joining the team at VFB," Brooks said. "The timing is great as Valley Forge has the proven capabilities to innovate and support the next generation of fasteners. Their bolted joint monitoring solutions are being increasingly sought after in many industrial market segments."

Valley Forge & Bolt Mfg. Co. is an international manufacturer of hot forged industrial fasteners, bolting solutions, and load indicating technology. Its wide range of patented products are trusted for their quality, performance, and reliability. Located in Phoenix, Arizona, Valley Forge & Bolt recently celebrated its 43rd Anniversary.

Source: Valley Forge & Bolt Mfg. Co.

For more information, go to www.vfbolts.com/

> "The timing is great as Valley Forge has the proven capabilities to innovate and support the next generation of fasteners. Their bolted joint monitoring solutions are being increasingly sought after in many industrial market segments."

Siemens Gamesa to supply 1.4 MW for world's largest offshore wind farm

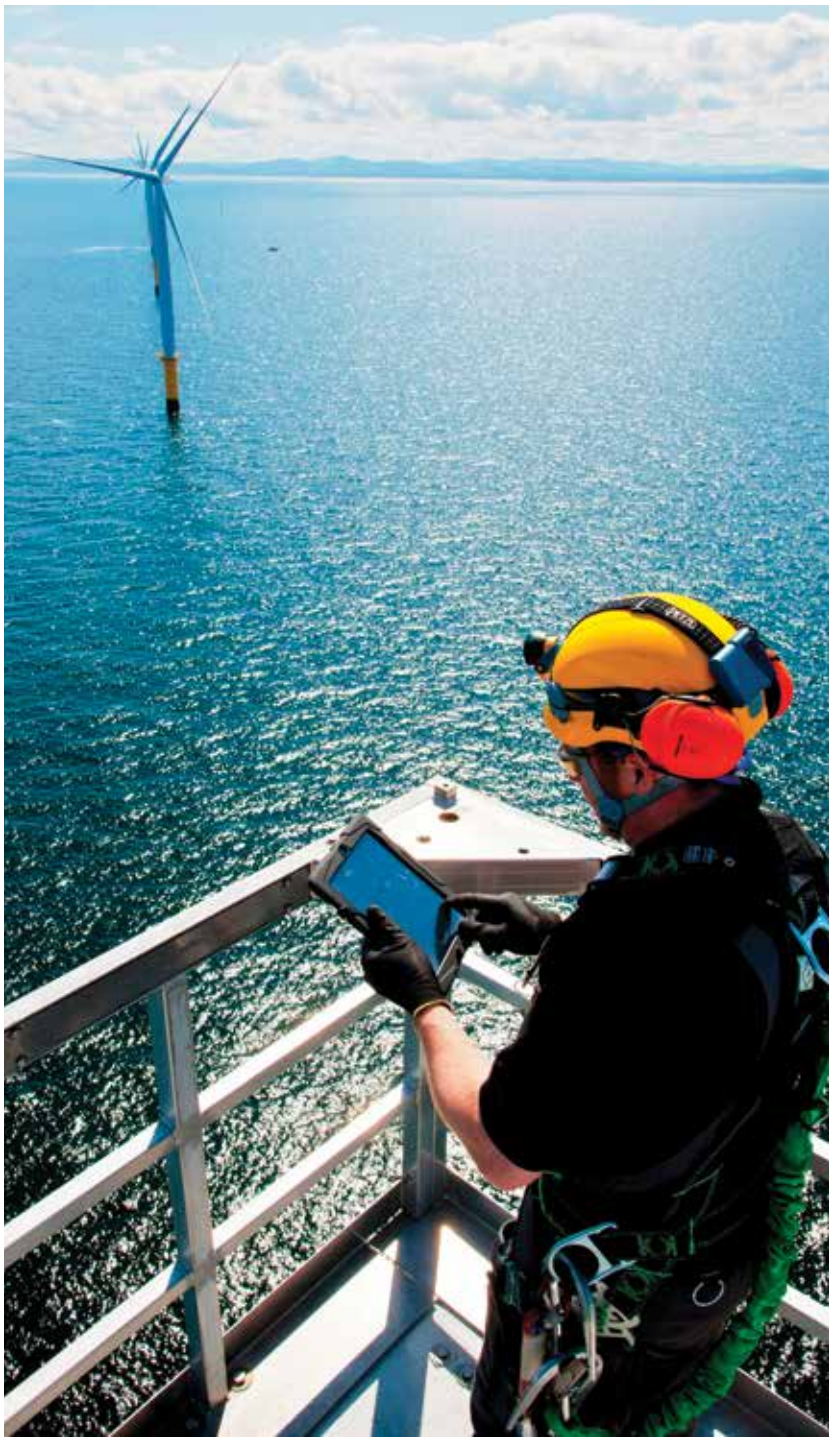
Siemens Gamesa Renewable Energy (SGRE) has been awarded exclusivity by Danish energy group Ørsted for the supply and service of wind turbines for the Hornsea Project Two offshore wind project being developed in British waters, where it will install its SG 8.0-167 DD turbines with total capacity of 1,386 MW.

This offshore wind farm, which will be the world's biggest offshore wind farm when operational in 2022, is also the largest offshore project in Siemens Gamesa's history, the biggest to date being Hornsea One (1,218 MW), similarly developed by Ørsted.

Located 89 kilometers off the east coast of England, the wind farm will span 462 square kilometers.

The nacelles will be produced at the new factory in Cuxhaven, Germany, while the majority of blades will be made at the factory in Hull, U.K., where the pre-assembly work will also be carried out. Towers are expected to be partly sourced from U.K. suppliers.

"We are very pleased that Ørsted has placed its trust in Siemens Gamesa once again," said Andreas Nauen, Offshore CEO at SGRE, who also highlighted the fact that offshore wind power is playing an increasingly important role in Europe's energy mix. "Hornsea Project Two will be a benchmark in Europe, not only on account of its size but also its technology. Siemens Gamesa will install the



SGRE boasts the longest track record among offshore turbine OEMs. (Courtesy: Siemens Gamesa)

newest model from its offshore platform at this facility. The SG 8.0-167 boosts annual output by 20 percent and offers higher returns."

A single 8-MW turbine is capable of generating enough electricity for about 8,000 European households, so that the power generated by this complex will cover the annual power consumption needs of about 1.3 million homes.

The new SG 8.0-167 DD is equipped with a rotor 167 meters in diameter.

The blades, 81.5-meters long, deliver an 18 percent wider swept area and 20 percent more annual output than its predecessor, the SWT-7.0-154.

It features the technology proven in the direct drive platform combined with a larger-scale rotor in order to offer customers higher returns while minimizing the associated costs and risks.

Siemens Gamesa and Ørsted already have worked together on several offshore projects, notably: Hornsea One, London Array, Race Bank, West of Duddon Sands, Walney Extension East, and Westermost Rough in the U.K.; Anholt in Denmark; and Borkum Riffgrund 1 and Gode Wind 1 and 2 in German waters.

Having pioneered the sector as far back as 1991 and installed more than 11GW, SGRE boasts the longest track record among offshore turbine OEMs.

The company has cemented itself as the leading player in the offshore segment with a market share of the 70 percent in Europe.

Source: Siemens Gamesa

For more information,
go to www.siemensgamesa.com

Wind farms such as Bruenning's Breeze produce clean, reliable, and affordable homegrown American energy for many years. (Courtesy: E.ON)

E.ON closes financing for Bruenning's Breeze

E.ON recently announced the successful tax equity financing of its 228 MW Bruenning's Breeze wind farm in Willacy County, Texas.

A subsidiary of JPMorgan Chase & Co. and an undisclosed investor provided tax equity financing in exchange for a partial interest in the Bruenning's Breeze project. The project achieved commercial operation and closing of tax equity in December 2017.

"We are delighted to expand our constructive partnership with the investors in our Bruenning's Breeze project," said Dr. Verena Volpert, senior vice president, Group Finance, E.ON SE. "The tax equity financing of Bruenning's Breeze marks E.ON's 10th tax equity financing since the market re-opened in 2011, financing more than 2 GW in nameplate capacity."

Located in Willacy County, Texas, Bruenning's Breeze is a 228 MW wind farm comprised of 76 Acciona AW-125 3.0 MW turbines that can create enough electricity to power approximately 75,000 homes. Since 2005, E.ON has developed more than 3 GW of wind projects in the United States.

"Wind farms such as Bruenning's Breeze produce clean, reliable, and affordable homegrown American energy for many years," said Patrick Woodson, chairman, E.ON North America. "Equally important, projects like these create much needed immediate and long-term economic impact through temporary and permanent jobs and increased tax revenue to rural areas. We appreciate the assistance of our landowners and area officials leading up to the commercial operation of Bruenning's Breeze."

A team of more than 250 construction workers completed the Bruenning's Breeze project, and 14 personnel, including skilled technicians, are stationed on-site day-to-day.

During the next 25 years, Bruenning's Breeze is projected to generate more than $57 million in property taxes for Willacy County. This additional revenue will support essential county services and local schools.

Source: E.ON

For more information,
go to www.eon.com

Seacat Services renews ISO seal of approval

Class-leading offshore energy support vessel (OESV) operator, Seacat Services, has attained a fresh set of international organization for standardization (ISO) accreditations, following independent assessment by certification body DNV GL.

Seacat Services is one of the first operators in the offshore wind sector to achieve the updated ISO9001: 2015 quality management and ISO14001: 2015 environmental management standards, affirming its commitment to maintain the highest possible levels of service for wind-farm developers, operators, and contractors. With crew and technician safety remaining a top priority, Seacat Services has also renewed its OHSAS 18001 health and safety certification.

Each vessel in the 14-strong Seacat Services fleet is class-certified by DNV GL. (Courtesy: Seacat Services)

As the offshore wind industry has matured, the expectations of project development and construction teams have increased when it comes to the service provided by contractors and suppliers. Independently assessed ISO and OHSAS accreditation are consequently starting to become a must-have for support vessel operators as an indicator of quality and safety.

However, there is scope for the industry at large to take a more proactive approach to securing accreditation and raising overall standards of operation. While the final deadline for upgrading to the new ISO 9001: 2015 and ISO 14001: 2015 standards is in September, it is estimated that 90 percent of accredited firms across all industries — including offshore wind — are yet to make this transition.

Having completed its assessment with DNV GL this January, Seacat Services is ahead of the curve and will be well-placed to focus on upholding its renewed commitments to safe, reliable operation throughout 2018. Furthermore, as one of the few OESV firms to comply with the international safety management (ISM) standard — a more stringent accreditation more commonly held by operators of larger vessels over 500 metric tons — the business is well-acquainted with the risk-based methodologies introduced by the updated ISO standards.

"At face value, the ISO, ISM, and OHSAS accreditation processes might look like a series of administrative hoops to jump through," said Mark Drew, head of business support, Seacat Services. "But what they do, in reality, is encourage a business to think very carefully about the risks and opportunities inherent in its operations and, crucially, how it delivers on the promises it is making."

"For Seacat Services, these accreditations are more than just a way to show our customers that we can meet a minimum requirement," he said. "In combination with the experience we're gaining in the field, they inform and motivate an ongoing program of incremental improvements, which ensure that both our fleet and the team that supports it continue to exceed expectations.

In addition to these ISO, ISM, and OHSAS certifications, each vessel in the 14-strong Seacat Services fleet is class-certified by DNV GL, in line with the firm's core values of safety, technical availability, and customer service. This commitment to maintaining the highest standards of operation has been recognized by developers and operators of offshore wind projects throughout the U.K. and Europe, with the business frequently named as a preferred supplier, and more than two-thirds of the fleet locked down in long-term charter agreements for 2018.

Source: Seacat Services

For more information, go to www.seacatservices.co.uk

Optimizing wind and current trends

An in-depth Q&A with senior executives in the U.S. wind sector

By Kerr Jeferies

Pressure from wind owners to shift from availability driven operational models to performance optimized strategies has never been stronger. The trick, however, is being able to carefully balance OPEX reduction with optimization opportunities to protect efficiency and safety portfolio wide.

To provide critical forward-looking insights, New Energy Update sat down with four of the leading executive speakers ahead of the 10th Annual Wind Operations Dallas 2018 conference & exhibition (April 16-18) to share their perspective on where they see opportunities and challenges for optimizing wind in their own portfolios and about current trends in wind-farm operations and maintenance (O&M).

Those executives include Duke Energy's Jeffrey Wehner, Excelsior Energy Capital's Matthew Burt, Pattern Energy's Chris Shugart, and Elawan's Aday Magec.

Is your business starting to look at O&M earlier in the lifecycle? If so, what impact is this having on your bottom line?

Matthew Burt: Absolutely. Often developers have fairly aggressive assumptions, so we spend a lot of time looking at the OPEX costs and the best strategies to drive the cost down to the point where it is as low as possible, but you can still maintain the asset efficiently.

Chris Shugart: Our development, construction, and operations teams work together to ensure we're putting forth the most competitive projects we can in a competitive business, while also being confident we can deliver on the economics we model for them.

ABOUT THE EXECUTIVES

Jeffrey Wehner
Vice president of operations, Renewables, at Duke Energy Corporation

Duke Energy Renewables primarily acquires, develops, builds, and operates wind and solar renewable generation throughout the continental U.S. The portfolio includes nonregulated renewable energy and energy storage assets. Duke Energy Renewables' renewable energy includes utility-scale wind and solar generation assets that total 2.9 GW across 14 states from 20 commercial wind and 63 solar projects.

Matthew Burt
Managing director, operations, at Excelsior Energy Capital

Excelsior Energy Capital is a pure-play renewable energy private investment fund focused on long-term investments in new build and operating wind and solar power plants in North America. The Excelsior Energy Capital team combined has a proven track record of more than $20 billion in transactions, most recently acquiring 2.3 GW of wind and solar projects over a three-year period.

Chris Shugart
Senior vice president, operations, at Pattern Energy

Pattern Energy, which was born out of Pattern Development, its affiliated development company, is a major force in North American wind energy. Pattern Development's main role is to finance and build the wind projects. Once they are operational, it sells them to Pattern Energy, which owns and operates the facilities for the long term.

Aday Magec Mederos Sosa
Technical manager, Elawan

Elawan (formerly Gestamp) is focused on developing, constructing, and operating its own wind farms throughout the world with the goal of becoming a significant player of the wind-energy sector over the next few years. To date, Elawan has participated in the development, construction, maintenance, and operation of wind farms with a capacity of more than 680 GW.

When we have new challenges, such as difficult weather or a unique location, we properly consider all those impacts, not throwing an irrational amount of money at challenges that make the project uncompetitive just because we haven't evaluated it properly.

Aday Magec: Yes. Our view of O&M starts with financial process, even though it is not a substantial amount. If you are able to speak with your service providers earlier, in our experience it is truly positive for wind-farm performance.

Do you have any key success stories you can highlight from production gained or costs reduced in the past 12 months your business is proud of?

Jeffrey Wehner: Our organization continuously strives for operational efficiencies in our legacy wind fleet and on behalf of our customers. Some of the most effective cost reduction techniques we have implemented include optimizing fleet scheduling and planning functions, which are enabled by user-friendly digitized solutions. As a result, we have seen significant improvement in KPI for man-hours spent on unplanned work.

MB: On the off-site side, there's some big opportunities for large savings. We've looked at management approaches, parts supply, insurance, and property taxes. On the site side, there's both performance issues and the potential for AEP increases.

CS: Certainly, our biggest milestone has been that 2017 was our first year going 'self-perform' at almost 1,000 MW of our fleet and using our own technicians for core service activities.

This has really allowed us to achieve a superior level of alignment on safety, quality and bottom-line results.

AM: We have a Nordex wind farm, and we agreed with the service provider manager to try to get more proactive about working in low wind. It ended up being our best-performing wind farm in North America.

Are there any new job titles/departments in your business this year? What are they focused on and why are they necessary?

MB: We're a new company, so I have the luxury of being able to hand-pick the roles and the people for our exact needs. When we pick a team, each team member would have a different skill set from the others, to improve working efficiencies.

CS: Our newest areas of growth and focus are in supply chain and training: areas that are secondary when you have most of your O&M outsourced but quickly become important as you take on more scope as an operator, even if you're not going full self-perform.

Continued on Page 48

WIND SYSTEMS

Giving Wind Direction

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I think we'll see enormous growth, particularly, in supply chain and procurement in our industry as more and more of this scope shifts away from original equipment manufacturers and to owners.

Everyone keeps talking about "big data," but what practical applications are you looking for from big data to help your field teams this year?

JW: Duke Energy Renewables has implemented digital solutions that are taking big data and turning it into big intelligence and putting actionable tools into the hands of our field employees. These applications include real-time process overviews seen through mobile devices and learning algorithms that can spot and categorize failures and predict rotating equipment failures far into the future.

MB: Big data has been a key part of my business approach for many years now. When big data is used correctly, it's a very powerful tool. The key to doing that is having an efficient and mostly automated way to process it, and to give clear outputs.

CS: While a lot of the hype is around advanced things like predictive analytics, which we are absolutely investing in, equally important is how you put data in the hands of your field operations teams.

AM: It seems like everybody is talking about it, but nobody sees real applications. We think it would be good if we are able to get data to get the turbines to correct themselves based on the behavior of neighboring turbines.

What's the most exciting new/improved technology you would like to use if money was no object?

MB: For me, there's nothing really mind-blowing that's out there at the moment. There are some good ideas, but you might spend $5,000 and only save $1,000, so there's no point in doing it. It's probably improved control systems, slicker interfaces for the techs.

CS: We need to continue to advance drivetrain technology to have a reliable life, to better detect when that's not going to be the case, and for cost-effective proactive repair solutions prior to failure.

AM: We have a farm in Maryland that has a 3 percent loss because of icing. If I could, I would get blade de-icing technology installed. It's a proven technology, but it's six digits in cost.

What are you most excited to learn more about at Wind Operations Dallas 2018?

MB: These events are a way to gauge how the industry has evolved, especially how the service companies and supply companies are expanding or improving their offerings. It's a good way to touch base with those types of companies.

CS: Networking with fellow operators and sharing best practices across the spectrum, from safety, data systems, and analytics to the market for parts and services, and component technology trends.

AM: What I would like is to try to understand more about the strategies used by companies like us, and understand lessons learned from mistakes. I'm interested in ways to master turbine performance in real time.

What value to you gain from networking at these events?

MB: Although you have relationships with people, if you're not directly doing business, you don't really talk that much during the year, so for me it's a good way of maintaining relationships with industry peers and other operators.

AM: What makes attendance worthwhile is to meet face-to-face with people who can help me out with day-to-day issues with my technology.

Where do we go from here?

As the PTC winds down, all owner operators must pivot their strategies hard to ensure they'll boost profits long-term. Remember, "this is about profitability, not availability. And that's only going to work with all our efforts in optimizing production" (Patrick Woodson, Chairman for Wind, E.ON Climate & Renewables North America at Wind O&M Dallas 2017).

For owners, a successful strategy to secure revenue growth will rely heavily on attacking wind operations from three fronts: lower LCOE, increase AEP, and leverage transformative data-driven decision making to optimize profits. The learning curve to balance all three, as well as secure site safety and enhance turbine reliability, will require no mean feat of ingenuity to master.

For vendors, a failure to act fast and pivot equally towards innovation will leave them adrift as the rest of the market competes for a slice of the booming $17 billion-plus wind O&M pie. What's more, they must build and nurture a network of essential relationships with key buyers — no small task when the major budget holders reside in one of the most fluid, fast growing, and dynamic of job markets in the world.

ABOUT THE AUTHOR

Kerr Jeferies is the projects director for New Energy Update. For information on the final speaking, attendance or exhibition opportunities at the 10th Annual Wind Operations Dallas 2018 conference & exhibition, contact Jeferies at kerr@newenergyupdate.com or at +44 (0) 207 375 7565.

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