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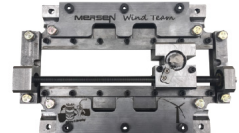
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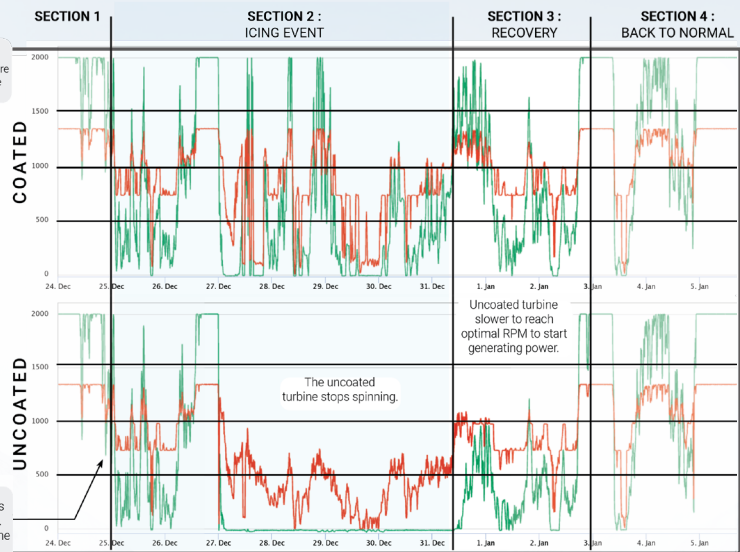
Grid Production average, General RPM Average Grd RPM Avg. Grd Prod Pwr Avg.

Results

EVENT DATE : February, 2022
LOCATION : Midwest USA

5	TOTAL TURBINES
144	DURATION OF EVENT (hours)
\$199	Est. \$mW/h
0.109	AVERAGE mW/h INCREASE
15,696	Event Total mW/h INCREASE
\$3,123.50	EVENT REVENUE INCREASE PER TURBINE
\$15,617.52	EVENT REVENUE INCREASE ALL TURBINES

SECTION 1
PRE-ICE EVENT
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operating at the same
levels.



UPCOMING SHOWS 2023:

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MARCH 27-29
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LOGISTICS CAPACITY CRUNCH COULD JEOPARDIZE OFFSHORE TARGETS

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THE FUTURE OF WIND



DIRECTION

*X1 Wind's X30 floating wind prototype produces first kWh ▼
U.S. rule change equips offshore developers for faster growth ▼
OEG Offshore's Fern opens Aberdeen office*



CROSSWINDS

EARLY UNION ENGAGEMENT KEY TO OFFSHORE WORKFORCE SUCCESS

The offshore wind workforce will require an experienced core of people to work up and down the eastern and western seaboard.

TAILWINDS

THE BUSINESS OF WIND

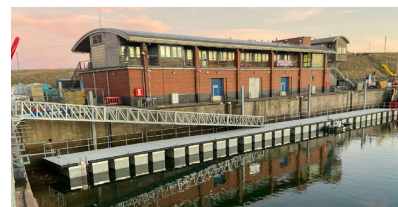


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Canadian Renewable Energy Association
WIND, SOLAR, STORAGE.

Association canadienne de l'énergie renouvelable
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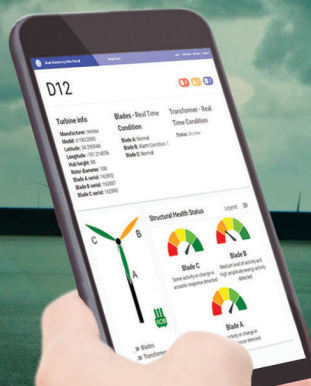
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Fleet Data View



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FROM THE EDITOR

Getting ready for CLEANPOWER

Our April issue is here to serve as a bit of a primer for the CLEANPOWER 2023 show in New Orleans, Louisiana, scheduled for May 22–25, 2023.

This month's issue has several interesting pieces that hopefully will keep you informed and get you excited for CLEANPOWER.

In addition to being a catalyst for the trade show, April also tackles the topic of training and workforce.

Beginning with our cover story, SparkCognition's Robert Budny shares his insights on how artificial intelligence can turbocharge the renewable sector by successfully scaling a diversified fleet.

An article from Dave Acton, CEO of Motive Offshore Group, looks at how a required expansion of offshore logistics could risk adding more costs and delays to the energy transition by affecting the supply chain.

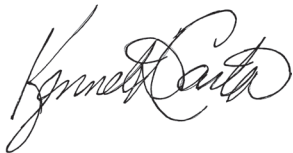
In our Crosswinds feature, Brian Davis and Adam Barnes of JDP discuss how early union engagement could be the key to success for the offshore wind workforce.

To get you ready for CLEANPOWER, in this month's Conversation feature, we talk with Rosanna Maietta, chief communications officer and sr. counselor to the CEO of the American Clean Power Association. In the Q&A, she talks about what attendees can look forward to at this year's CLEANPOWER show.

This year's CLEANPOWER preview issue also includes a bonus. Now that CLEANPOWER is made up of many renewable-energy sectors, shuffling through the wind-only exhibitors might be a challenge.

To help with that, inside you'll find a list of all the wind-only exhibitors and their booth numbers. And, if the company is part of *Wind Systems*' online community, we've added those companies' wind expertise, website address, and a phone number contact. We plan to publish this list again in our May CLEANPOWER issue, so if you missed out on this month, be sure and contact one of our sales representatives so you can be included in May's print issue that will be distributed at the show in New Orleans. You can find copies at our booth (#2958), so stop by and say hi.

Looking forward to seeing all of you in The Big Easy, and, as always, thanks for reading!



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Giving Wind Direction
WIND
SYSTEMS

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President

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Operations Director

ACP challenges offshore disinformation

From American Clean Power Association

American Clean Power Association CEO Jason Grumet recently issued a statement in response to disinformation regarding whale deaths on the East Coast. Much of this disinformation has been pushed by long-time opponents to offshore wind and irresponsible news outlets who have blamed these deaths on the offshore wind industry without any evidence.

“Disinformation shouldn’t dictate policy. Opponents of offshore wind development are weaponizing a convenient narrative to block critical infrastructure that’s contributing to America’s energy independence, creating economic growth, and strengthening the grid,” Grumet said. “The evidence is clear: There’s no link between offshore wind and recent tragic whale strandings. Scientists from three federal agencies have unequivocally stated that offshore wind is not to blame. There is ample bipartisan common ground to build the energy infrastructure we need to work toward greater energy independence. ACP is hopeful that lawmakers will see this for what it is and focus on passing legislation, like permitting reform, that will allow the clean energy industry to deliver affordable power, jobs and security for all Americans.”

► **Fact:** Federal scientists have been studying an increase in whale deaths since 2016, well before the construction of offshore wind projects began in the area.

► **Fact:** The biggest threat to whales is marine vessel strikes — but only 2 percent of traffic in this region is currently associated with offshore wind development.

► **Fact:** Stopping offshore wind development would do nothing to address whale strandings, which have been high since before offshore wind development began, and fails to consider the extensive measures the industry follows to protect marine mammals.

No other marine sector goes to the same lengths as the offshore wind industry to mitigate and monitor for marine mammals during vessel transit, including operating all vessels under seasonal speed restrictions to protect whales.



American Clean Power is the voice of companies from across the clean-power sector that are powering America’s future. For more information, go to www.cleanpower.org

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DIRECTION

THE FUTURE OF WIND



X1 Wind's X30 prototype has delivered its first kWh to PLOCAN's smartgrid in the Canary Islands. (Courtesy: X1 Wind)

X1 Wind's X30 floating wind prototype produces first kWh

X1 Wind's X30 floating wind prototype, installed in the Canary Islands, has successfully produced its first kWh.

The milestone marks the world's only floating wind platform installed with a TLP mooring system, which reduces environmental footprint and improves compatibility with other sea uses. It further heralds Spain's first floating wind prototype to export electricity via a subsea cable.

First power was fed into PLOCAN's offshore platform smartgrid via a 1.4-kilometer underwater cable connected to a 20kV transformer. Local teams now enter the last phase of a test and verification program that started with the platform installation in November 2022, in preparation of the technology industrialization and certification for commercial scale projects now under development.

"First power represents a huge milestone for X1 Wind, and the 'lift-off' moment we've been building towards for many years," said Carlos Casanovas, X1 Wind CTO and co-founder. "The first kWh is always a symbolic moment for any new energy generation project, and for our team, partners, and supporters, it crystalizes the immense journey we've been on and the exciting path which lies ahead. Floating wind is set to play a vital role supporting the future energy transition, global decarbonization, and ambitious net-zero targets. (The) announcement marks another significant stride forward for X1 Wind accelerating towards certification and commercial scale ambitions to deliver 15MW platforms and beyond in deep-water sites around the globe."

The X30 platform is equipped with an adapted V29 Vestas turbine and ABB power converter. Another key design feature, developed through the EU-backed PivotBuoy Project, combines advantages of SPM and TLP mooring systems. The proprietary SPM design enables the floater to "weathervane" passively and maximize energy yields, with an electrical swivel ensuring elec-

tricity transfer without cable twisting. The TLP mooring system also reduces the seabed footprint, compared to traditional designs proposing catenary mooring lines.

"Now generating power, we've commenced a second phase to assess the floater behavior during operation," said X1 Wind's Electrical Engineering Manager Adrian Oliva. "This all forms part of X1 Wind's extensive testing verification program to fully validate the platform in real world operational conditions and de-risk our technology. The novel X30 platform is equipped with all the electrical systems that the commercial platforms will contain, including a commercial turbine, power converter, transformer, slip-ring and dynamic cable as well as our in-house SCADA system with multiple sensors to control and monitor the platform's behavior. All this data is being fed into our commercial scale design which is advancing fast working closely with certification body DNV."

"This marks a significant milestone for the Spanish floating wind industry," said Plataforma Oceánica de Canarias (PLOCAN) CEO Dr. José Hernández Brito.

MORE INFO www.x1wind.co

U.S. rule change equips developers for faster growth

Last month, the Biden administration set out new streamlined regulation for offshore wind development as it chases its highly ambitious installation target of 30 GW by 2030.

In the first major regulatory shake-up since 2009, the U.S. Interior Department will offer more flexibility on survey requirements, reform lease auctions, and improve the verification of project designs, it said. The new rules come as the Interior Department plans to hold up to four additional off-

shore lease sales by 2025 and aims to complete environmental reviews of at least 16 offshore wind projects by 2025, representing more than 20 GW of new capacity.

Subject to 60-day public consultation, the rule changes represent a "very big package of important incremental improvements" that is "long overdue," Seth Kaplan, Director of Governmental and Regulatory Affairs at Ocean Winds North America, told Reuters Events.

In particular, more flexibility on surveys in construction and operations plans (COPs) will simplify the permitting and approval process.

"The new rule adds flexibility in the timing of data submittal, which saves costs, and enables developers to do fewer unnecessary surveys," said Josh Kaplowitz, vice president of Offshore Wind at the American Clean Power (ACP) association.

The Interior Department will also clarify leasing criteria and release five-year leasing roadmaps, providing investors with much-needed certainty.

The rule improvements "will provide the necessary predictability to grow the domestic clean energy economy," Joris Veldhoven, CEO of Atlantic Shores Offshore Wind, told Reuters Events. The rule changes "give the industry certainty moving forward," an Equinor spokesperson said.

Under the proposals, developers will be allowed to submit a range of design parameters in their construction and operations plan (COP) and defer certain survey requirements until later in the development process.

This new approach is less prescriptive and more similar to the project design envelope (PDE) process used in Europe and would give developers greater flexibility to tweak their designs and incorporate the latest technology before installation begins.

Developers could install larger, more efficient turbines "without having to restart the process, so long as you were approved to use a larger model,"



Fern Communications managing director and co-founder Jennifer Cushion cuts the ribbon at the opening of a new office Aberdeen, Scotland. (Courtesy: OEG Offshore)

Kaplowitz said. Suppliers continue to release higher capacity turbines as developers seek a lower cost per megawatt.

The approval of Vineyard Wind, the U.S.' first large offshore wind project, was delayed when BOEM expanded the scope of the environmental review to take into account larger turbine considerations, previously unavailable fishing data, a new transit lane alternative, and cumulative risks from multiple offshore wind projects. The environmental review took three years to complete and the 800-MW project is due online in Massachusetts waters in 2024.

The new rules also remove the requirement for site assessment plans (SAPs) for meteorological buoys, providing further savings for developers.

Developers will also be allowed to pay the cost of decommissioning the asset at the end of its life incrementally over the lease term, rather than upfront as required currently, which will create significant savings over the life of the project.

BOEM estimates that the new rules will save U.S. offshore wind developers \$1 billion over 20 years, mostly due

to the change to decommissioning funding.

The rule changes will help clarify development processes and avoid some delays but the exact impact on project timelines is unclear. Approval processes will remain rigorous and can involve around a dozen federal agencies, industry sources said.

More specific timelines within the rules would help developers plan resources, Kaplowitz said.

"Adding these timelines could be very helpful in terms of making the length of the process more predictable," he said.

MORE INFO www.reutersevents.com/renewables/wind

OEG Offshore's Fern opens Aberdeen office

Fern Communications, an OEG Offshore company, has opened a new office in Aberdeen and appointed an experienced engineering team to service Scotland's mixed offshore energy sector.

Managing Director Jennifer Cushion and Technical Director Clive Cushion formed Fern Communications in 2002. OEG acquired the company in 2021. Fern's new facility is at Cairn-robin Business Park, Marywell, south of Aberdeen, and will act as a regional hub for the company to service its clients across the northeast of Scotland.

"Having premises in Aberdeen has been a dream of Clive and I for over 15 years," Cushion said. "Fern can now support customers, giving them the confidence that we are local with the ability to roll with them through the demands of the offshore industry."

The Fern Aberdeen team is headed by James Coverley, who is responsible for supporting key customers and delivering growth in the renewables and offshore energy sectors.

Fern recently won the contract award for Moray West Offshore Wind Farm (MOWL) to supply, install, support, and maintain Moray West's communications system.

MORE INFO ferncom.com

Shoreline Wind names Tuohy as new COO

Shoreline Wind, the wind energy leader in design simulation, construction and O&M solutions, recently announced it has appointed David Tuohy as chief operating officer.

This latest move strengthens the company's leadership team, bringing into the fold an experienced executive with a proven international track record in scaling energy software platforms.

The move also capitalizes on what the company sees as positive policy developments in key markets regarding wind energy, including the U.S. In January, the U.S. Department of the Interior announced it will reform its regulations for the development of wind-energy facilities on the country's outer continental shelf, in order to meet key climate goals.

With 30 years of relevant interna-

tional experience, Tuohy has spent the last 15 years leading private equity backed climate technology companies, both at C-level and in board roles. He has worked with technologies from solar PV and power electronics for grid integration of wind power to SaaS solutions for energy efficiency and demand response management.

He is also a non-executive director of publicly listed Climate Transition Capital. Tuohy has an engineering background and studied at University College Dublin, INSEAD, and the UCLA Anderson School of Management.

“Shoreline makes a real contribution to carbon reduction goals by enabling faster and cheaper deployment of wind energy at a global scale,” Tuohy said. “With its market-leading SaaS offering,

Shoreline is well on its way to become the industry standard for project design, construction, and O&M for wind energy. This company can make a real difference. I am really excited to be part of the team.”

Since 2014, Shoreline has been developing and deploying cutting edge SaaS solutions that deliver the essential, data-driven insights wind-farm developers, operators, OEMs, contractors, and consultants need to make wind energy more cost-efficient throughout the entire wind farm lifecycle.

Last year Shoreline secured additional funding from U.S.-based Ecosystem Integrity Fund (EIF) and Nordic investor Ferd Capital. Existing investor Blue Bear Capital also participated in the round.

The funds are being used to drive Shoreline’s growth in the U.S. and APAC, and to expand the company’s feature set for lifecycle asset optimization. Since closing the investment, Shoreline has increased staffing two-fold with hires in Norway, Denmark, Germany, Sweden, and most recently in the Netherlands.

“Right now, Shoreline is perfectly positioned to realize exponential growth in lockstep with the growing global demand for wind energy,” said Ole-Erik Vestøl Endrerud, CEO and founder of Shoreline. “We have prov-

en to our customers that our patented technology can drive down construction and O&M costs. The next phase is all about scaling the business and execution capabilities.”

Ambitious wind-energy installation and energy production goals are being announced globally with planned installations in APAC and the U.S. leading the trend.

Wind-farm developers and operators are increasingly reliant on smart simulation solutions to virtually plan and optimize construction and operation, and subsequently deploy and manage the assets using digital solutions. This is key to maximize return on investment in what is an increasingly cost-competitive market.

Shoreline provides solutions to major global players such as Siemens Gamesa, Ørsted, Equinor, Ocean Winds, and Vattenfall, with more local players also adopting Shoreline’s solutions. Whether acting global or local, Shoreline is committed to ensuring its platform and people deliver what these customers need to achieve their goals.

“David has worked for multiple clean energy tech scale-ups and he is really passionate about the energy transition,” said Geoff Eisenberg, partner at EIF. “There are not many people around who have worked for big energy companies and a leading energy SaaS unicorn. The investors are thrilled to have him join the leadership team to help Shoreline realize its full growth potential.”

Shoreline provides enterprise solutions for the wind industry using intelligent data integration and simulation software to optimize and execute wind-farm construction, asset management, and business cases, and their solutions are deployed globally with the world’s largest energy companies, OEMs and service companies.

Shoreline Wind’s solutions are cloud-based, distributed on Software as a Service terms and available to customers on subscription basis, along with an appropriate training and support package. ✈

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IN FOCUS

TRAINING & WORKFORCE

AI TURBOCHARGES RENEWABLES: SUCCESSFULLY SCALING A DIVERSIFIED FLEET

Artificial Intelligence (AI) is already doing some heavy lifting in the day-to-day operations of wind, solar, and battery storage assets. (Courtesy: SparkCognition)



Artificial intelligence is the catalyst to full-feature performance optimization that owners and operators need to ensure continuously profitable operations, enabling them to deliver on PPA commitments while ensuring worker safety and the achievement of sustainability goals.

By ROBERT BUDNY

The global community's expectations for corporations have changed as climate-related catastrophes continue to strike with increasing devastation. In 2020, Bloomberg investigated board members across 20 European and U.S. organizations and found that "the greening of global finance had not yet reached the boardroom." As the world reels from a turbulent geopolitical landscape, the vulnerabilities and volatility of the energy market, and a heightened urgency for energy independence, board directors worldwide are beginning to discuss ESG and tactics and actions for managing decarbonization and integrating climate change into their oversight responsibilities.

It is international scientific consensus that, to prevent continued climate damage, global net human-caused emissions of carbon dioxide (CO₂) will have to fall by 45 percent from 2010 levels by 2030, reaching net zero around 2050.

The role of the corporate board is changing. The world's most prominent corporations are clamoring to demonstrate how seriously they are taking climate change, with an increasing number pledging to eliminate their carbon footprints in the decades ahead. The topic is now a firm fixture on board agendas. To rebuild corporate structures to conduct the policy, actions, and affairs necessary for the new world, all eyes are on the expansion and widespread adoption of renewable energy.

In 2020, worldwide renewable capacity increased by 45 percent or about 280 GW – the highest year-on-year increase since 1999. In 2021, worldwide renewables accounted for 90 percent of new capacity expansion. The United States is on track to generate 24 percent of its energy from renewables by the end of this year, owing to rapid growth in solar and wind capacity. In the next decade, the U.S. will build roughly 100



Accurately calculating losses due to grid curtailment is also challenging for operators. (Courtesy: SparkCognition)

GW of wind and solar capacity annually to hit its longer-term climate targets. While these are great strides, more must be done to meet the aggressive 2030 and 2050 goals. Renewable energy operators will require maximized operational efficiency and production. In this era of widespread digital transformation and the IIoT, renewable assets generate vast amounts of data, but providers are challenged with transforming their raw data into actionable insights that drive operational excellence. Additionally, energy operators are increasingly diversifying the kinds of assets in their fleets, often managing a mix of wind, solar, and battery storage assets simultaneously under the same project. While there are some synergies between these different asset types, optimizing the performance of a mixed fleet is challenging.

Artificial Intelligence (AI) is already doing some heavy lifting in the day-to-day operations of wind, solar, and battery storage assets. By fully leveraging AI, operators can:

- Improve operational efficiency by democratizing access to data to all that can benefit from it.
- Maximize wind-energy production by quickly detecting and correcting under performance due to yaw misalignment, control system issues, and other factors.
- Minimize unplanned maintenance costs by predicting component failures months in advance, and in some cases preventing costly failures from occurring.
- Increase solar production with enhanced O&M practices to detect and quantify panel soiling, identify stuck trackers, and surface combiner box issues

PRODUCTION FORECASTING

The probabilistic and variability of wind energy distinguishes it from other renewable resources. For farms with large-scale capacity, a wind-speed variation of 1 m/s can influence power generation significantly, which makes forecasting critical to help guarantee power system reliability and to help balance supply and demand.

An industry-specific AI model can accurately forecast

variable wind-energy production to help manage supply and demand fluctuations. A single cloud-based SaaS solution can manage multiple asset types — wind, solar, and battery energy storage — and provide a comprehensive solution suite for holistic management that supports ISPs, IPPs, and utilities. The result is increased energy production, reductions in maintenance costs, and improved operational efficiency. Wind power becomes more profitable, which creates the catalyst for being more widely used in power systems worldwide.

IDENTIFYING WIND-TURBINE YAW MISALIGNMENT

With the increased and rapid development of large-scale wind turbines, yaw misalignment has become a large-scale issue. Static yaw misalignment degrades turbine power production and can create blade fatigue, and because it's invisible to the turbine controller, specialized methods are required to identify and address it.

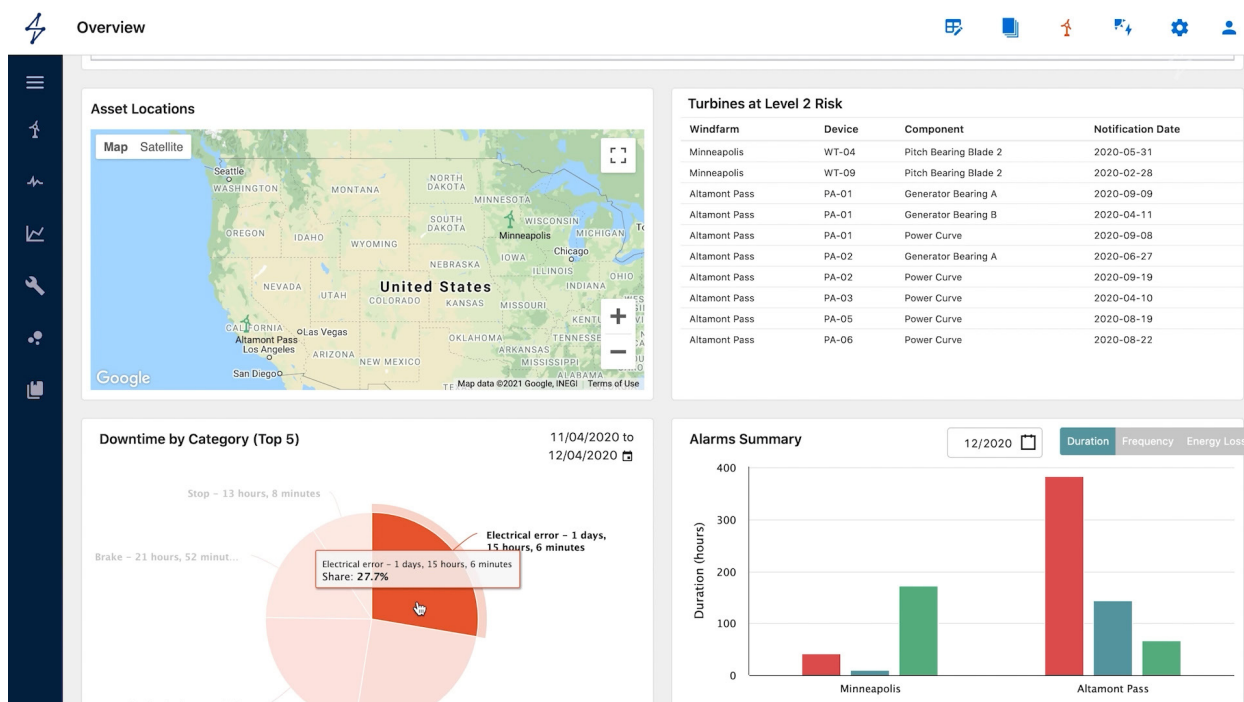
The legacy methods for identifying yaw misalignment were light detection and ranging (Lidar) measurement or physics-based methods applied to turbine SCADA data. Both techniques have significant disadvantages compared to AI. With Lidar, every turbine requires its own sensor, which makes it cost prohibitive, and physics-based methods require data over an extended period, typically a year, when yaw misalignment is present, which makes it time prohibitive.

A machine learning-based solution can act as an extension of the physics-based method by using only two months of historical data to train the machine learning model to detect a yaw misalignment of five degrees or more with 96 percent accuracy. In the event of a misalignment (positive or negative), a controller is automatically notified of the magnitude and direction of yaw so the issue can be rectified expeditiously. An AI cloud computing platform operates 24/7 with no input required from controllers. Because there are fewer tower climbs, safety risks or additional costs are minimized, and turbines operate optimally.

As an example of efficacy, an operator updated the turbine yaw offset remotely, resulting in as much as 2 percent additional Annual Energy Production (AEP) — an annual revenue increase of \$45,000/turbine for the project.

PREDICTING PITCH BEARING FAILURES

Pitch bearing failure is a significant issue for the wind industry. Pitch bearings connect the rotor hub to the blades to facilitate the required oscillation, which affects the lifting force of the horizontal turbine to rotate. They experience static and dynamic forces throughout a turbine's lifetime, presenting varying modes of failure. The costs associated with repair or replacement are significant, especially if the turbine is offshore. In an extreme case, a pitch bearing failure can accelerate or advance the loss of a blade, which comes at quite a cost. As of May 2022, a single wind-turbine blade costs an average of \$2.6 million to \$4 million.



Accurate calculations of wind-power energy losses are critical for owners with or without an OEM warranty. (Courtesy: SparkCognition)

The traditional method of diagnosing pitch bearing health is by taking samples of the lubricant from the bearings and analyzing them. The quantity and size of the wear particles in the lubricant provide some insights into the health of the bearing, but obtaining samples is both time-consuming and expensive. The inoperable turbine must be taken offline, and technicians must enter the hub to pull samples.

Predicting bearing failures in advance can significantly reduce unscheduled operations and maintenance costs. AI uses data from existing sensors on the turbine to detect pitch bearing issues remotely. Signals can include commanded pitch position, actual pitch position, pitch motor current and temperature (for electric pitch systems), pitch system pressures (for hydraulic pitch systems), turbine fault history, and other relevant signals.

With an AI platform explicitly built for renewables, the pitch bearing health algorithms run on a cloud computing platform 24 hours a day, with no input required from analysts or controllers. The algorithms use only existing signals from the turbines, so no additional hardware is required. The data required for the algorithms are continually sent to the platform without taking the system offline or physically climbing the turbine. When a faulty pitch bearing is detected, it automatically notifies controllers so the damage can be confirmed.

AI can predict failures with more than 90 percent accuracy up to six months in advance, which gives operators a long enough lead time to put replacement bearings on order, thereby minimizing downtime and repair expenses.

BOOST PROFITABILITY BY MAXIMIZING ENERGY PRODUCTION

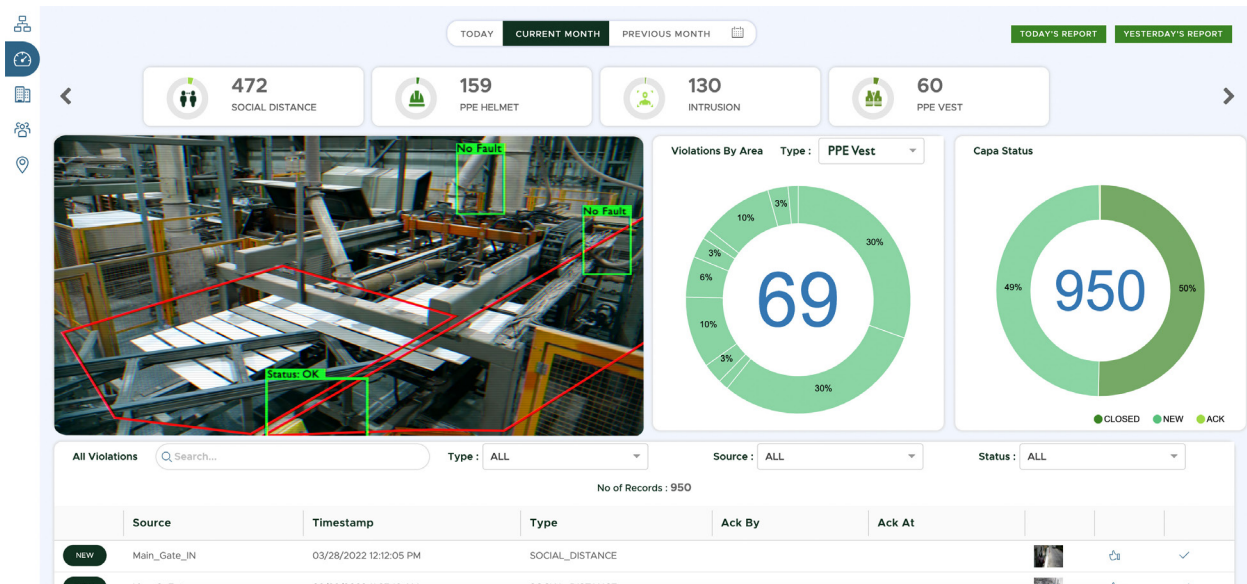
Another challenge for wind-turbine owners and operators is understanding the causes of energy loss and the subsequent revenue shortfalls. Wind farms can range in size from only a handful of turbines to more than 100. They also vary in terrain from flat and low-slope areas to very complex, highly turbulent areas.

With the repowering of older sites, many wind farms have mixed turbine types, making understanding actual energy losses and their causes far more problematic. It applies to both self-performing wind farms and those under full-wrap supply agreements.

The typical method for calculating lost turbine energy is to use the nearest neighbor to calculate the energy loss during downtime. This method provides accurate results under a very narrow set of cases, such as a wind farm with flat terrain and significant distance between turbines. For more typical wind farms with AAI effects, complex terrain, and mixed turbines, the calculated energy losses using this method can be off by as much as 10 percent. It adversely affects the calculation of Availability Damages or Availability Bonuses and the operator's bottom line.

Accurate calculations of wind-power energy losses are critical for owners with or without an OEM warranty. Because wind farms are data rich, physics-informed machine learning approaches can provide a more accurate framework to calculate losses.

For example, an owner-operator of more than 1 GW of



AI is the catalyst to full-feature performance optimization that owners and operators need to ensure continuously profitable operations. (Courtesy: SparkCognition)

wind assets with wind farms ranging from just a few MW to more than 200 MW has a fleet of multiple OEMs. The challenge was to provide a unified view of all their assets and reconcile energy losses provided by all the OEMs, which only provided energy loss results for downtime related to turbine unavailability. There was a complete lack of visibility into revenue lost due to Balance of Plant (BOP) processes or contractually excluded downtime. Traditional energy loss calculations can result in significant errors. Given appropriate input variables, including wind direction, velocity, and power for each turbine, AI can predict the power of a wind farm accounting for the wake losses, determine whether a correction is required, and improve the accuracy of loss calculations.

In another situation, when a site had a wind-farm section down for more than a month because of an electrical outage, AI calculated energy loss due to BOP issues such as a feeder failure or substation outage. The OEM did not report the energy loss because it was outside their scope. There was no SCADA data available for the timeframe for the affected turbines. The AI model calculated the energy loss for the affected section of the project. The energy loss was significantly higher than the owner's calculation method, and the energy-based BOP availability was reduced by more than 8 percent. In addition to an accurate accounting of the energy loss, it guided the owner's decisions for spare parts inventory planning.

Accurately calculating losses due to grid curtailment is also challenging for operators. Project economics related to curtailment is often based on an average wind speed across a particular site using a single power curve. For a wind farm

with many mixed turbines, using a single power curve calculation methodology is destined to be flawed.

Using a data-driven method allows owners and operators to accurately calculate the energy loss from curtailment and get accurate curtailment compensation from the offtaker. AI can help operators receive the true value from their O&M contracts and help owners understand where energy is being lost so that they can focus their efforts on corrective actions with the highest ROI.

PV SOILING AND PANEL MISALIGNMENT

For renewable energy providers whose mixed assets include photovoltaics (PV), environmental conditions often affect photovoltaic performance. Panels accumulate dust, pollen, dirt, algae, snow, bird droppings, and other debris, which reduces the ability to turn solar energy into electric power. Uneven soil patches can also affect some PV module cells, which disrupts the flow of current throughout the entire module. It creates hot spots that eventually damage sensitive components, shortening panel lifespan. According to Solar Energy Power Association, dirty solar panels can lose 20 percent of their energy output.

The National Renewable Energy Laboratory (NREL) puts that figure even higher, at 25 percent. In arid regions like the Middle East, energy output reductions due to soiling can reach 50 percent per year, creating multi-billion dollar revenue losses.

Soiling also creates higher operating costs with constant equipment monitoring, cleaning, and replacing damaged assets. A renewable-specific AI-powered asset management platform can ingest the available SCADA data while contex-

tualizing current and future weather conditions, project capacity, power purchase agreements, and curtail protocols. The technology can help solar power operators quantify the economic value of lost production caused by panel soiling and identify ways to address the issue most efficiently by interpreting weather forecast data.

Operators can determine when a precipitation event of sufficient magnitude to clean the panels will occur. All the data sources are combined with the actual cost of cleaning the panels, and an optimization process provides the project operator with the ideal time to perform panel cleaning for maximum project profitability and eliminate the need for soiling stations.

CONCLUSION: POWERING A SAFER FUTURE

Society's expectations are finally beginning to influence the way companies operate. The impetus for corporations to switch to renewable energy for manufacturing, industry, and service is steeped by the aspiration of a future defined by clean energy. It diversifies energy sources to hedge against fluctuating fossil fuel prices and mitigates inclement weather service disruptions. It also positively touches the bottom line, reduces corporate greenhouse gas emissions, and strengthens stakeholder relationships and brand differentiation.

Renewable energy has experienced an exponential growth trajectory, making it the fastest-growing energy source globally. The industry is also realizing increased complexities of hybrid power generation sources, increasing pressure on profit margins, and shifting workforce demographics. In the face of these challenges, renewable energy must keep pace with the demand to facilitate the transition from fossil fuels while making the most of their capital and human investments.

Artificial intelligence is the catalyst to full-feature performance optimization that owners and operators need to ensure continuously profitable operations, enabling them to deliver on Power Purchase Agreement (PPA) commitments while ensuring worker safety and the achievement of sustainability goals. Artificial intelligence is uniquely positioned to enable that vision as the world races to unwind a century of fossil-fuel-powered energy production. ✈

ABOUT THE AUTHOR

Rob Budny is VP of Sales for Renewable Energy where he leads the sales organization for SparkCognition's Ensemble Asset Performance Management solution for renewable energy operators. He holds a Bachelor of Mechanical Engineering degree from the University of Maryland, Baltimore County. SparkCognition's award-winning AI solutions allow organizations to predict future outcomes, prescribe next best actions, and help ensure worker safety. It partners with the world's industry leaders to analyze, optimize, and learn from all types of data, augment human intelligence, drive profitable growth, and achieve operational excellence. More info: www.sparkcognition.com.

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LOGISTICS CAPACITY CRUNCH COULD JEOPARDIZE OFFSHORE WIND TARGETS

The digital transformation and automation of legacy logistics equipment could also enhance the efficiency and performance of existing hydraulic equipment to support bigger offshore wind platforms and turbines. (Courtesy: Motive Offshore Group)

The required expansion of offshore logistics risks adding further costs and delays to the energy transition amidst increasing supply chain costs, raw material shortages, and shrinking subsidies, so the offshore wind industry needs to adopt a more efficient model of expansion.

By DAVE ACTON

The IEA predicts we must build more than 70 GW of new offshore wind capacity each year until 2030 to achieve net zero, and we have yet to address the enormous expansion in global logistics capabilities that this will require. With 80 percent of the world's offshore wind resources lying in deep waters, we will need the capability to make and maintain much larger floating wind farms, longer cable connections and bigger turbines. An expansion in our maintenance and decommissioning capabilities will also be important to maintain, repair, repower, and replace offshore wind across its lifecycle.

Amidst rising inflation, energy price rises, and material shortages, constructing large new installation and operations fleets and equipment could produce soaring logistical costs. The accelerating adaptation of oil and gas resources for offshore wind could offer a significantly faster, leaner, and lower cost route to renewable expansion. Motive, along with several other pioneering companies, are already transitioning fossil fuel vessels, equipment, and skills into offshore renewables and harnessing smart technology to reduce demands on logistic fleets. Yet, achieving this effectively requires the international harmonization of certifications and standards across offshore energy and the digital transformation of a traditionally conservative offshore logistics industry.

THE LOOMING LOGISTICS CAPACITY CRUNCH

Global installation, inspection, and maintenance fleets will need to support an average 18 percent annual growth in offshore wind until 2030 and 2,000 GW of new capacity by 2050. The expansion of offshore wind into deep-water sites with stronger winds will require fleets capable of installing and maintaining longer cables, larger platforms, and turbines. For example, average turbine sizes are expected to balloon to 20 MW by the end of the decade. We will also need a major increase in maintenance capacity to address persistent challenges such as corrosion and fatigue and the ongoing annual decline in output across many wind farms.

At the other end of the lifecycle, much of the new offshore wind estate is expected to reach retirement age in 20-25 years and 3.5 GW is already due to expire in 2035, which will entail a parallel increase in decommissioning capabilities. This comes as international offshore wind logistics chains are already reaching the limits of their current capacity.

Yet, a major expansion of logistics fleets and equipment could add further costs to the wind industry amidst post-COVID materials shortages and energy price rises. The industry faces the additional cost of recruiting and training a new skills base to support offshore wind expansion amidst

a global energy talent shortage. This could imperil the energy transition at a time when soaring supply chain costs and vanishing subsidies are already causing offshore wind manufacturers to retreat from markets, reduce production and hike prices.

A READY-MADE RESOURCE FOR OFFSHORE RENEWABLES

The accelerating energy transition is enabling a parallel transfer of logistical capabilities from fossil fuels to offshore renewables that could avert the need for excessive new construction. The many synergies between offshore oil and gas and offshore wind mean oil and gas logistical fleets, equipment and expertise form a ready-made resource for offshore wind.

For example, the vessels and techniques used to install oil and gas flowlines could be adapted for electrical cable laying. Jack-up construction vessels for oil and gas platforms can be adapted for offshore wind platforms. We are laying the cables for all of Taiwan's new offshore wind projects without building a single new installation vessel by refitting chartered vessels with rental equipment. We are now helping many renewable firms rapidly retrofit old multi-purpose vessels for offshore wind by adding a diverse array of equipment from high-capacity winches to spoolers. Much of this equipment has itself been repurposed from offshore oil and gas to renewables. This demonstrates how a circular economy of logistical assets could reduce the cost and carbon emissions of expanding offshore wind.

Similarly, 90 percent of offshore oil and gas workers have skills that are transferrable to offshore wind, and these workers could be seamlessly transitioned across, dramatically reducing the cost and time to develop a new renewable workforce. For example, Motive Offshore Group recently upskilled all its technicians and engineers from oil and gas to renewables.

The digital transformation and automation of legacy logistics equipment could also enhance the efficiency and performance of existing hydraulic equipment to support bigger offshore wind platforms and turbines. A recent Knowledge Transfer Partnership between the University of Aberdeen and Motive produced a device that can digitalize and optimize any hydraulic equipment in any environment for new applications such as offshore wind.

The data monitoring and acquisition device can be fitted to any subsea equipment in any environment, allowing legacy hydraulic equipment to be remotely monitored, managed, and even automated. It enables remote real-time monitoring of more than 50 parameters from equipment usage to fuel

efficiency, helping find opportunities to extract extra performance from existing equipment. By enabling remote and predictive maintenance of logistics equipment, it could also significantly reduce operations equipment and manpower requirements across offshore wind estates. By enabling the accurate simulation and calibration of legacy hydraulic tools or processes for new applications, the innovation could also help optimize everything from winches to spoolers for new requirements such as larger turbines or longer cables.

TOWARD A NEW MODEL OF OFFSHORE WIND EXPANSION

The required expansion of offshore logistics risks adding further costs and delays to the energy transition amidst increasing supply chain costs, raw material shortages, and shrinking subsidies. The offshore wind industry needs to adopt a more efficient model of expansion. This will require the digitalization and optimization of legacy logistics chains for new applications. We will also need to see greater harmonization of industry-wide certifications and standards to smooth the transfer of skills and tools from fossil fuels to offshore wind. This could provide a far faster, more efficient, and cost-effective route to net zero. ↵

ABOUT THE AUTHOR

Dave Acton is chief executive officer at Motive Offshore Group.



A circular economy of logistical assets could reduce the cost and carbon emissions of expanding offshore wind. (Courtesy: Motive Offshore Group)

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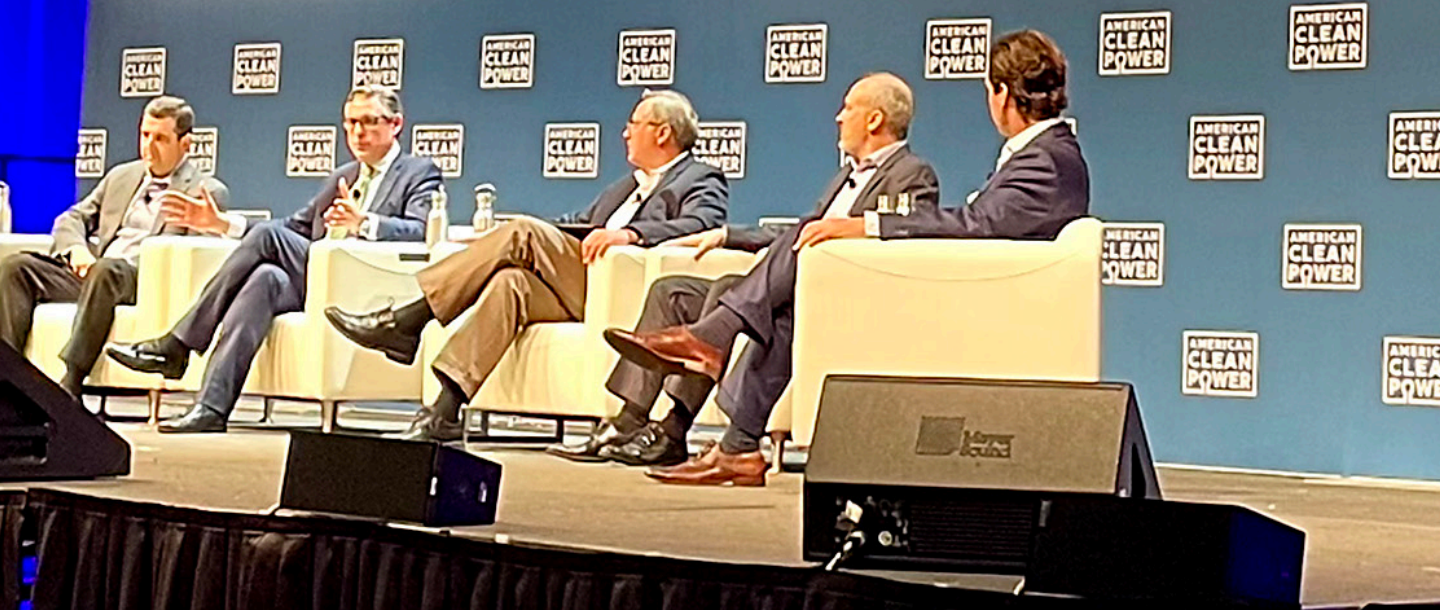
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A list of wind-related businesses exhibiting at the premier clean-energy trade show.

With CLEANPOWER 2023 focusing on wind energy, solar energy, and battery storage, looking for wind-only or wind-hybrid businesses might be challenging.

To help with your show decisions, *Wind Systems* offers this list of wind-related businesses exhibiting at the show along with their booth numbers.

The highlighted companies are part of the *Wind Systems* community, our online resource for locating products and

services that are exclusive to the wind-energy industry. These companies also have their wind-focused expertise and contact information included here.

If you'd like to be a part of our community section and have your company highlighted for our May issue that will be distributed at CLEANPOWER, contact Dave Gomez at dave@windssystemsmag.com.

For any late booth additions or changes, please refer to the floorplan at cleanpower.org/expo. ↗

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NKE Bearings offers standard and special bearings for all industrial applications, including wind energy, as well as technical services, product development, application engineering, consulting, documentation, and training.

By KENNETH CARTER ▀ Wind Systems editor

Bearings might not be the first thing thought of when looking at a wind turbine, but they are essential parts that allow it to not only generate power, but produce it as efficiently as possible.

Bearings are used in many areas of turbines, and NKE Bearings has been manufacturing those crucial turbine bearings as well as offering solutions to increase the life of existing bearings for more than two decades.

“Globally, we provide bearings and bearing solutions in the gearboxes, the pitch motors, the generators, and the main shaft bearings,” said Dan Karns, deputy general manager of NKE Bearings North America. “For both OEM and AFM, we supply bearings for the gearboxes and generators.”

BEARINGS FOR VARIOUS INDUSTRIES

Although NKE has been working with the wind-energy industry for nearly 20 years, the company has been making bearings for various industries for more than 30 years, including rail, slurry pumps, and mining, according to Karns. But it was the company’s expertise with gearboxes and electric motors that led it to wind.

“We shifted focus as a bearing manufacturing company ‘for everything’ to more specific applications, and we identified that we were really strong in gearboxes in general,” he said. “We have always been active and strong in rail and industrial gearboxes, so we thought we’d be a natural evolution to the wind sector. We just leveraged that, and it was the same with electric motors.

We have some insulated products that are just top-notch using both silicon nitrate and aluminum oxide, used to insulate rings or coat bearings on the ceramic balls. We’ve been able to leverage that in the wind sector specifically to really grow the business.”

As NKE’s experience with providing bearings for turbines increased, the company began to branch out into the commodity side of the industry to become more solutions oriented, according to Karns.

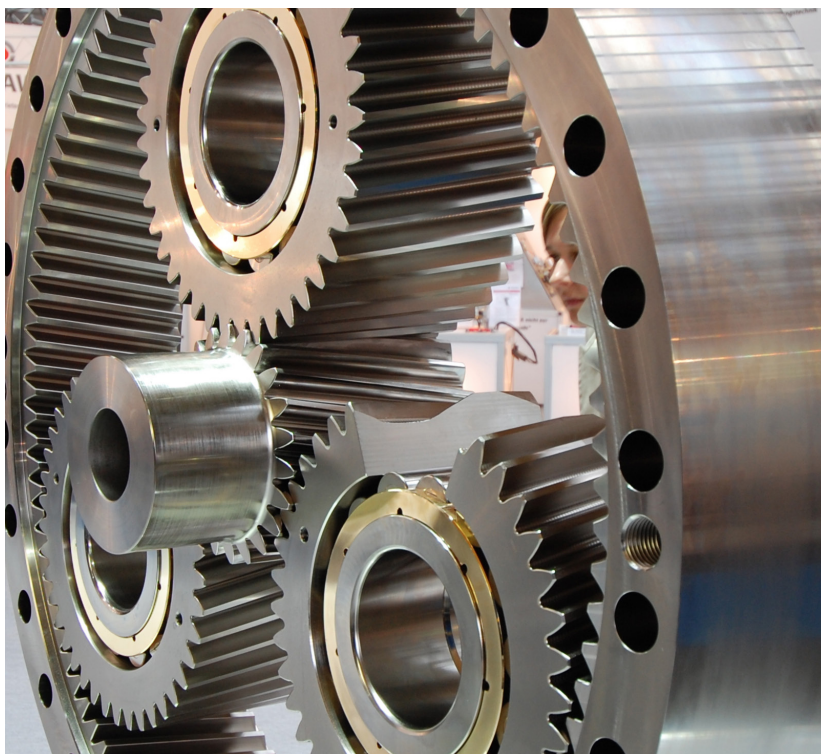
“Our black oxide coating and other coating solutions increase the bearing life in turbine gearboxes,” he said. “We

insulate pieces in the generators, and we offer high-temperature solutions in the pitch motor and on the service side to increase the life of the asset, providing some added value you don’t necessarily get on the OE side.”

SERVICE SIDE OF THE COMPANY

Offering expertise on the service side of the business allows NKE to work closely with its customers in order to find solutions to a wide range of challenges, according to Karns.

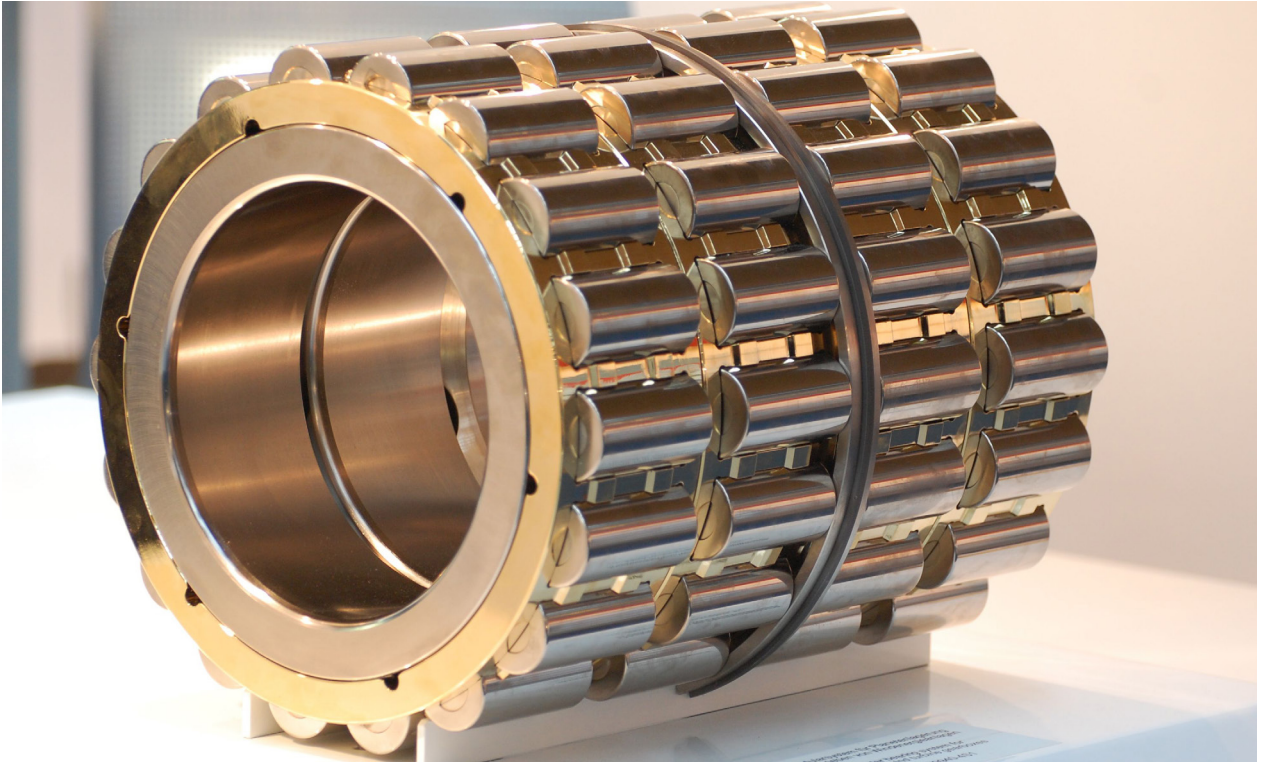
“We sit down and work together with our customers to



NKE Bearings’ black oxide coating and other coating solutions can increase the bearing life in turbine gearboxes. (Courtesy: NKE Bearings)

identify how we will deal with issues of operating conditions in the pitch motors as they’re re-manufacturing those motors — then we come up with a solution,” he said. “Our partnership with our customers is a big differentiator, particularly in the aftermarket, where many folks don’t necessarily have access to engineering. Our applications engineers are heavily involved to make sure we’re solving problems and anticipating their future needs.”

Those steps have become an essential part of NKE’s after-



Although NKE has been working with the wind-energy industry for nearly 20 years, the company has been making bearings for various industries for more than 30 years. (Courtesy: NKE Bearings)

market regimen, according to Karns. “That’s part of our service strategy in the aftermarket — to work with the people who are doing the repair work and be as close to the customer as possible,” he said. “We work on those things together. It’s a very collaborative process, and we’ve seen tremendous growth globally because of that switch. We have made an intentional move away from just being a bearing manufacturer in the commodity market. Now we bring added value by helping to solve problems and alleviate pain points.”

‘PUSHING THE ENVELOPE’

Karns believes the close relationship NKE has formed with its customers in order to take care of ongoing problems has become a major portion of the company’s expertise, while also investing heavily in technology and supporting green initiatives.

“We are always pushing the envelope on various initiatives on our R&D side, and so, we’re always trying to look at the ‘what’s next?’” he said. “We’re looking at sensoring and coatings, and what we can do to help streamline that and add value. Can we do some additional tooling that will help on the installation piece, for example? There’s just a myriad of things that we do to support our customers’ needs. We truly look at partnerships when we’re working with our customers. We are moving beyond the idea of a bearing as a commodity.”

Compared to other industries such as oil and gas, wind energy is still relatively young and learning how best to es-

tablish itself in the global energy landscape, according to Karns. But that youthful advantage often leads to bursts of development.

“If you look at a parallel to oil in the 1920s, we’re not thinking of oil today, which has 120 years behind it,” he said. “With wind, we still have a long way to go, but that allows for innovation to happen. Smaller wind turbines are starting to come to the end of their life cycle, so how do you support the bigger turbines? What lessons have we learned on the smaller turbines that can apply to the larger turbines? It’s the same when looking at onshore vs. offshore.”

AUSTRIAN ROOTS

The origin of the company can be found from the famous “Steyr Wzlager” (translated: Steyr Bearings), according to Karns. This company was acquired by SKF in 1989. The leadership, who had a wealth of bearing knowledge, decided in the mid-1990s to leave and start its own bearings manufacturing company, which became NKE. The company supported wind, rail, mining, and other industrial applications offering up to 10,000-part numbers.

However, six years later, building on its core competencies, NKE placed a strategic focus into wind (and rail). This shift has allowed the company to compete with the larger bearing manufacturers.

“We have experienced record turnover this past year as we have made our shift in our philosophy, and the company

has continued to just explode with growth,” he said. “It’s pretty cool to know you’re making an impact on a couple of different fronts: We are helping the environment because we’re helping reduce the carbon footprint, and we are helping diversify our energy streams and our energy needs.”

And this applies particularly to wind, according to Karns. “Wind is a big player in that,” he said. “And because we’re growing, we’re adding lines. And that’s creating more jobs and opportunities for people. Anything we can do to grow the economy and put people to work, whether it’s back in Austria where we manufacture or it’s here in the U.S. by adding engineers, sales folks, and warehouse personnel, those are all net positives.”

Some of that growth has been offshore jobs in Europe, but in the U.S., Karns said numerous onshore projects are keeping the company busy.

CONTINUED GROWTH

Even though NKE’s schedule continues to be full, Karns said there is only more advancement to look forward to in the wind sector as it continues to grow and mature as an industry.

“I think there’s still vast growth and opportunity and massive learning that’s happening, so I think innovation will continue to move quickly,” he said. “Officials have enacted some of the government legislation that provides a steady

runway to help support that growth. I know there’s controversy about whether this should be a government subsidy or not, but I think the reality is energy is subsidized. You look at oil and gas, and it is completely subsidized. It’s just a function of: ‘You’ve got to have energy.’”

That will only allow for NKE’s portfolio to become more robust, according to Karns.

“Just from an operational perspective going forward, I see us being involved more in the main shaft bearings; I think that’s just the next evolution for us,” he said. “And we’ll continue to help our customers solve problems. What we do well — and actually I think we do it probably better than many other bearing manufacturers — is that we are very agile and can move very quickly through the validation process. If there’s a challenge with a customer and they’ve got a pain point and they want to do something, we can design it, field test it, validate it, produce it, and do it quickly. Sometimes it takes larger companies upwards of two years to do something like that. We can do that in six to nine months.”

That’s the ideal arrangement, according to Karns, for customers with a business model that can’t afford to idly sit.

“If we can help keep their turbines turning and we can provide those solutions, then we’ll do that,” he said. ✎

MORE INFO www.nke.at/en

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Rosanna Maietta

Chief Communications Officer and Senior Counselor
to the CEO ▸ American Clean Power Association



“We are excited about the opportunity to bring the clean-energy industry together.”

CLEANPOWER 2023 will open in New Orleans, Louisiana, May 22-25. To help our readers get ready for the event, *Wind Systems* recently talked with ACP’s Rosanna Maietta on what attendees can expect when they get to The Big Easy.

▸ **The last time the show was in New Orleans was in 2016 and it was solely devoted to wind energy. What did you learn from that show and how will this one be different?**

ACP is proud to be the unified voice of the clean-power industry. Since the last show in New Orleans, AWEA became ACP—a new organization representing all the technologies that make clean energy. We are excited about the opportunity to bring the clean-energy industry together, with our new show, CLEANPOWER, while maintaining our strong ties with the wind industry. Attendees will find value in networking with representatives from across the renewable-energy sector.

▸ **If I were a first-time exhibitor, what should I expect to gain by attending the show?**

ACP cultivates exhibitor opportunities, programming, and target audiences to maximize opportunities that spur the growth of clean technology business growth. We help our exhibitors make the most of their time at the conference by providing them with marketing tools and briefings ahead of the event.

It’s recommended exhibitors sign up as soon as possible to put their organization in the best position to capitalize on space at CLEANPOWER. One exhibitor shared that last year’s show was a “very productive, well-attended event. The efforts in our three days there amounted to two months of progress for our business.”

Another commented, “All our clients, suppliers, vendors, and subcontractors attend this show, and we are able to set up valuable meetings that make (it) a great investment for our company.”

▸ **How will CLEANPOWER allow for networking?**

We weave networking opportunities throughout the confer-

ence—ensuring that each of the meals, sponsored receptions, and coffee breaks foster opportunities to meet new contacts and strengthen existing relationships.

This year, we’ll also host a “power networking” activity that matches exhibitors with interested parties. We’re crafting even more opportunities to connect, so keep an eye out for more announcements soon.

▸ **What issue areas can I expect presenters to address?**

Attendees can expect to hear a dynamic lineup of speakers throughout the conference.

Overarching topics include key policies driving the energy economy and the benefits unleashed by the Inflation Reduction Act and the Infrastructure Investment and Jobs Act.

Presenters will also discuss energy policy in the state, energy security & independence as well as cutting edge market assessments. To register and see the full conference agenda, please visit our website.

▸ **What about the conference will feel unique to the New Orleans location?**

We’re looking to charge up this conference in one of the most energized cities in the world. Throughout the event, we’re featuring local musicians and entertainers to immerse members of the clean-energy industry into the fun, lively city between focused presentations.

▸ **What are you personally looking forward to at this year’s show?**

The people who make up this industry are really special and spending time in a condensed, dynamic environment is one of the best parts of the job.

It’s about being present with the people coming from all corners of the industry and from around the world—getting to meet individuals who are connected with the broad and deep reach of ACP—while also seeing the latest in technology and what the clean-energy industry has to offer. ↪

MORE INFO cleanpower.org/expo

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Despite Russia's ongoing war against Ukraine, the DTEK Group is completing the construction of the first phase of Tyligulska wind-power plant. (Courtesy: DTEK)

► CONSTRUCTION

DTEK to complete construction of Ukraine wind plant

Despite Russia's ongoing war against Ukraine, the DTEK Group is completing the construction of the first phase of Tyligulska wind-power plant, with a capacity of 114 MW out of the total declared 500 MW. Nineteen wind turbines will start generating electricity to support Ukraine's energy balance.

The DTEK Group is planning to complete the Tyligulska wind-power plant to reach its full design capacity of 500 MW. The company is seeking options for the further implementation of the project, including negotiations with

international donors and partners.

"The war will not stop us," said Rinat Akhmetov, SCM Group shareholder. "We continue to create jobs, pay taxes, produce coal, generate electricity, restore grids, fight for our energy independence, and invest in the future. We will win the war."

"Ukraine creates, and Russia destroys," said Maxim Timchenko, DTEK's CEO. "This is the fundamental difference in our world views. DTEK is building new energy facilities because we believe in the victory of Ukraine. And we are sending a signal to international partners that it is possible to invest in Ukraine today without waiting for the end of the war."

The DTEK CEO expressed his gratitude to all the energy professionals who bravely put on body armor to

continue the construction of Tyligulska WPP, as well as all the partners for their support and help.

The implementation of the project in the Mykolaiv region in southern Ukraine is another step toward achieving the ambition of the "30 to 2030" initiative, with the aim of 30 GW of installed renewable energy capacity in Ukraine by 2030. Ukraine's current installed renewable energy capacity, including the temporarily occupied facilities in the south of the country, is about 10 GW. An increase in green-power generation to 30 GW would mean renewables make up 50 percent of Ukraine's power generation.

The president of Ukraine, Volodymyr Zelenskyi, has repeatedly emphasized the importance of green energy for the future of Ukraine, and the



Vaisala has added lightning data to its Helideck monitoring system. (Courtesy: Vaisala)

process of energy sector decentralization has already started. For the DTEK Group, the development of green power generation is a priority, helping lay the foundation for Ukraine's post-war recovery.

MORE INFO: dtek.com/en

INNOVATION

Vaisala integrates lightning data into weather suite

Vaisala, a global leader in weather, environmental, and industrial measurements, recently announced the integration of lightning data from Vaisala's Global Lightning Dataset GLD360, part of its Xweather suite of weather and environmental data services, into its Helideck Monitoring System.

Built to meet the demands of challenging offshore environments, Vaisala's Helideck Monitoring System uses thunderstorm and lightning information from GLD360, the only global sensor network that detects thunderstorms in real time anywhere, including oceans, seaports, and other areas outside the range of weather radars. Helicopter pilots, helideck operators, and offshore authorities can now make informed "waiting on weather" decisions that result in minimized op-

erational downtime, improved route planning, and reduced cost and impact of weather disruptions.

This solution for offshore operations delivers:

► **Detection efficiency and location accuracy:** Vaisala's global lightning data network identifies 100 percent of global

thunderstorms and locates lightning with a median accuracy of one kilometer.

► **Complete situational awareness:** The Vaisala Lightning Threat Zone provides storm and lightning trajectory in 10-minute increments up to 60 minutes out, advising when a location of interest may be impacted.

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ZX TM allows the power curve of GE onshore wind turbines to be measured and verified as a function of the hub height wind speed. (Courtesy: GE Renewable Energy)

► **Maintenance-free lightning data services:** With no capital investment needs or expensive offshore maintenance costs, the Helideck Monitoring System eliminates the need to purchase, install, or maintain single-point lightning detection sensors.

► **Highest-quality lightning data:** Vaisala's expertise in lightning data, and its ongoing investments in operating and maintaining the world's best global lightning network, safeguards offshore operations with real-time lightning data with better than 99.99 percent availability.

► **Proven lightning and offshore weather expertise:** Vaisala lightning detection networks are used by the U.S. Navy, U.S. Air Force, National Weather Service, Federal Aviation Administration, and many large power utilities and commercial organizations globally.

► **Lightning data when needed:** The lightning data services are compatible with 4G LTE, 5G, and all common satellite internet communication solutions used at sea with minimal bandwidth requirements.

► **Compliance with industry standards:** The certified Helideck Monitoring System solution complies with current CAP437 and Helideck Certification Agency requirements, and its CAA-certified software adheres to international aviation regulations.

"It's all about safety and efficiency. Lightning can cause power outages, damage helicopters and infrastructure, and even put people in harm's way. Monitoring lightning in real time to assess its impact is essential for protecting lives and assets and optimizing the timing of offshore helicopter take-offs, landings, hoist operations and fueling," said Mikko Nikkanen, head of maritime at Vaisala. "Our upgraded Helideck Monitoring System allows offshore customers to stay ahead of the weather and gain oceans of actionable insight to boost their operations with confidence."

Leveraging more than 85 years of measurement expertise, including 45-plus years in aviation weather and more than a decade of experience in demanding offshore weather applica-

tions, Vaisala's global support team has delivered hundreds of Helideck Monitoring Systems to partners around the world.

MORE INFO www.vaisala.com/helideckmonitoring

► INNOVATION

GE Renewable Energy approves Lidar ZX TM

GE Renewable Energy recently approved the use of the nacelle-based Continuous Wave scanning Lidar ZX TM from Lidar OEM ZX Lidars for power performance testing.

Within the past year, the International Electrotechnical Commission released the standard IEC 61400-50-3, Use of nacelle-mounted lidars for wind measurements. In anticipation of and response to this new standard, GE Renewable Energy studied the use of those devices for power performance measurements.

This specific Lidar, ZX TM, allows the power curve of GE onshore wind turbines to be measured and verified as a function of the hub height wind speed and may be, when agreed with the customer, used instead of the procedure described in the IEC61400-12-1:2017 (ed. 1/ed. 2) using a meteorological mast and anemometry installation.

In addition to hub height measurements specifically used for power performance tests, operational rotor equivalent power curves can also be measured with ZX TM's 50 points around the full rotor swept area, providing full veer and shear information. These measurements help to inform operational strategies relating to turbine performance outside of warranted conditions, and may be important for turbines with larger rotor diameters offshore and on sites with complex veer or shear profiles onshore.

MORE INFO www.zxlidars.com

INNOVATION

Vaisala WindCube deployed off French Coast

Ocergie SAS recently announced that its pilot OCG-Data Blue Oracle (Buoy with Lidar and Underwater Equipment for Ocean Resource Assessment and Characterization of Life in the Environment), is now anchored 30 kilometers offshore Leucate in the Occitanie region in 95-meter water depth in one of the pre-selected zones of the Mediterranean Floating Wind Tender (AO6).

Vaisala WindCube Lidar is integrated into the buoy data acquisition system. The buoy is fitted with TP Product structural compact flanges and was assembled at Euroports Marine Renewable Energy terminal in Port-la-Nouvelle.

"This key milestone closes the first year of the project, and the scientific



Vaisala WindCube Lidar is integrated into the buoy data acquisition system. (Courtesy: Ocergie)

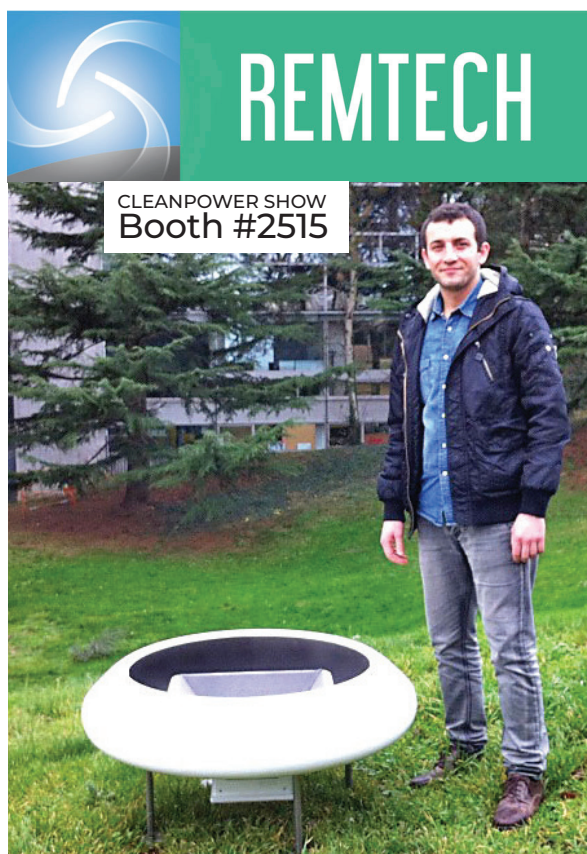
teams are excited to embark in the data acquisition and analysis year-long phase, which is expected to provide valuable biodiversity and environmental information," said Christian Cermelli, president of Ocergie SAS.

"In addition, this buoy serves as a one-third scale pilot of our OCG-Wind Floating Offshore Wind foundation

with important return on experience expected to further mature our FOW design."

The buoy data acquisition system is fully operational and high resolution metocean and bio-diversity data is already being acquired.

MORE INFO www.ocergie.com



REMTECH

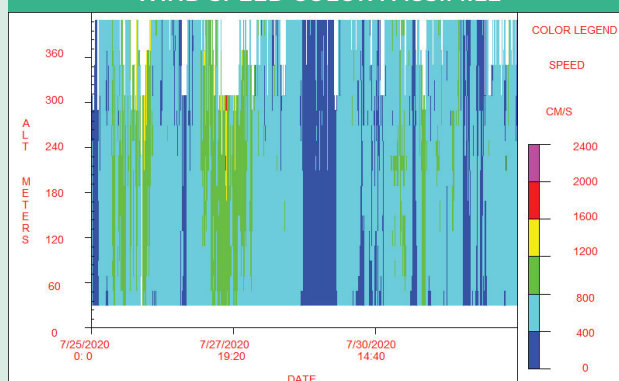
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WindESCo successfully installed its Swarm technology across Longroad Energy's Milford I & II wind plants in Utah. (Courtesy: WindESCo)

INNOVATION

WindESCo installs industry-first wake steering

WindESCo, a pioneer in improving asset performance and reliability for wind-turbine stakeholders, recently announced the installation of its Swarm technology across Longroad Energy's Milford I & II wind plants in Utah, featuring a combined capacity of 306 MW. The commissioning of Swarm at Milford marks the wind industry's first full-scale implementation of commercial wake steering and collective control technology.

Wakes at wind farms create substantial turbulence and curtailment, reducing plant output by up to 20 percent, according to a study published in Wind Energy Science. As wind-energy installments have grown in turbine size and scale over the last several years, this problem has been exacerbated. Wakes are of particular concern to the growing number of offshore wind plants planned around the world, in-

cluding along the Atlantic and Pacific coasts of the U.S.

Swarm, the industry's first commercial solution for collective control of wind turbines, works by combining advanced analytics, model-in-the-loop control, and Industrial Internet of Things (IIOT) to accomplish +3 percent increase in annual energy production (AEP) via wake steering and additional collective control applications developed by WindESCo.

Swarm reduces curtailment, optimizes low wind resource, and protects against extreme conditions that have become increasingly common due to climate change, thereby increasing asset life.

The Milford I&II Swarm installation was completed in December 2022 on 165 turbines, consisting of a mix of GE 1.5-MW and Clipper 2.5-MW machines. With both sites operational for more than a decade, WindESCo and Longroad's collaboration supported the plants' repowering, which also included rotor, blade, and controller upgrades for many turbines.

"It's no secret that as assets age they have a natural tendency to experience

certain losses in efficiency," said Jeremy Law, Longroad Energy's head of asset management. "But that doesn't have to be the end of the story. We are committed to looking at innovative solutions that not only mitigate production loss, but actually reverse that direction of travel. We selected Swarm at Milford I & II because we are comfortable that WindESCo will deliver that expected AEP gain."

"While many research teams have modeled and written about the potential for improving wind-plant performance through wake steering, never before has a large-scale commercial test of such technology been completed," said Mo Dua, WindESCo founder and CEO.

"We are so proud of the years of work that went into bringing this solution to the market. The commissioning of Swarm at Milford demonstrates that large-scale wake steering is possible as a retrofit solution for older assets, while also proving feasibility for Swarm to support the expanding global fleet of wind turbines offshore.."

MORE INFO www.windesco.com



A heavy-duty pontoon system has been installed at the Neart na Gaoith wind farm in Scotland. (Courtesy: Inland and Coastal Marina Systems)

▀ MAINTENANCE

ICMS installs pontoon system in Scottish offshore wind farm

Supporting Scotland's growing offshore energy sector, Inland and Coastal Marina Systems (ICMS) recently installed a heavy-duty pontoon system in Eyemouth Harbour as part of the new operations and maintenance (O&M) base for the Neart na Gaoith Offshore Windfarm.

The pontoon system comprises a 58 meter by 4 meter pontoon and a 27 meter by 4 meter pontoon, both with 1 meter freeboard to match that of the vessels, creating a quality berthing facility for crew transfer vessels (CTVs) serving the new windfarm, which is situated 15.5 kilometers off the coast of Fife.

With a capacity for displacement vessels up to 140 metric tons, both pontoons are connected to the shore via 28 meter by 1.5 meter access bridges and are topped with GRP decking suitable for commercial application, offering excellent anti-slip properties. "We installed NNG's new pontoons in

the busy harbor basin, on the marine side, during the build phase of the O&M building, which meant working closely with multiple contractors to ensure the project was completed safely and on time," said Calum MacDougall, engineering sales manager at ICMS.

Illumination from high-level lighting further ensures safe working conditions for workers and CTV crews year-round during the commissioning and ongoing maintenance phases of the Neart na Gaoith Offshore Windfarm.

"We've been delighted to be involved with a project that will bring long lasting benefits to the local community, businesses and the economy," MacDougall said.

MORE INFO inlandandcoastal.com

▀ MAINTENANCE

ONYX Insight launches windy season campaign

ONYX Insight, provider of predictive maintenance solutions, has launched

Get Ready for the Windy Season, a campaign to inspire operators to take a three-step predictive maintenance approach to ensure their wind-turbine fleets are optimized for the windy season and reduce unexpected downtime during the winter.

In the U.S. and Europe, April-September is when the wind is less consistent and has a reduced speed. This is the time for wind owner-operators to do the groundwork and to complete as much maintenance and repairs as possible, ensuring turbines are primed for when the wind is more intense, and profitability is greatest.

Time spent offline during the windy season can have significant impacts. For example, more than 58 percent of wind-farm operational expenditure can be attributed to operation and maintenance costs, 65 percent of which are unplanned.

ONYX Insight works proactively with wind-farm owner-operators using a combination of predictive maintenance solutions such as advanced analytics, data, and engineering, encouraging them to implement a three-step process in a bid to streamline their operations and avoid unplanned stoppages during high wind times.



In the U.S. and Europe, April-September is time for wind owner-operators to do the groundwork and to complete as much maintenance and repairs as possible. (Courtesy: ONYX Insight)

► **Step One:** Getting wind asset data in order is the first step on the journey to peak performance. Aging wind sites may not have CMS systems, or ones that enable them to make better decisions or put in place a predictive maintenance strategy. It allows asset managers to access and interpret this data, improving real-world performance.

► **Step Two:** Prioritize urgent issues. Using solid data and analysis, owner-operators can detect the most serious damage, fix it, and extend the life of turbine assets.

► **Step Three:** Get your turbines fit for the future. Operators should get ahead of the game by ensuring their turbines are fit for the future thanks to a simplified engineering approach to maintenance rather than a nominal, scheduled or reactive approach that can potentially miss issues.

ONYX Insight is a market leader in providing CMS, with the company collecting data directly from more than 14,000 turbines across 30 countries across the globe.

“With a greater onus being placed on renewable energies, we want to ensure wind operators are well equipped to meet growing demand for clean power head-on,” said Bruce Hall, Onyx Insight CEO. “A key part of this is help-



If the South Korea project materializes, Vestas will supply and install 40 units of the V236-15.0 MW turbine. (Image features the 90-3.0 MW turbine at a wind farm in Sprogø, Denmark.) (Courtesy: Vestas)

ing them to reduce asset downtime, as well as maintenance costs.” “Not only can early intervention prevent extended periods of turbine downtime, but it can also extend the lifespan of assets,” said Evgenia Golysheva, Onyx Insight VP of strategy and marketing.

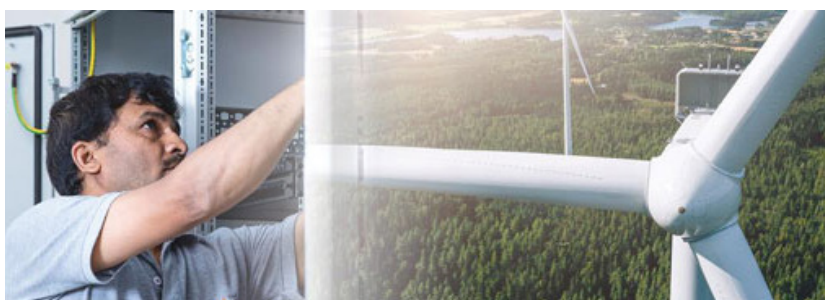
By working with wind-farm operators, we can help them to effectively fix their turbines while the sun is shining. By doing so, it helps ensure we all benefit as much as possible from the enormous generating potential of wind power.”

MORE INFO onyxinsight.com

MANUFACTURING

Vestas to supply South Korea offshore wind project

Vestas has signed a preferred supplier agreement with Korea South-East Power Company (KOEN) for the 600 MW Wando Geumil offshore wind project in Wando-Gun, South Jeolla Province, South Korea. If the project materializes, Vestas will supply and install 40 units of the V236-15.0 MW turbine. Vestas will also deliver 20 years of operation



RecyclableBlade technology will be installed on 44 of Sofia's 100 SG 14-222 DD offshore wind turbines. (Courtesy: Siemens Gamesa)

MANUFACTURING

Vestas completes converter, controls sale to KK Wind

KK Wind will exclusively supply converters and control panels to Vestas. (Courtesy: KK Wind)

and maintenance service for the wind farm when operational.

"We are honored to have been selected as preferred turbine supplier by KOEN for the Wando Geumil offshore wind project and the trust that the customer placed in Vestas," said Purvin Patel, president of Vestas Asia Pacific. "Aiming to become a leader in offshore wind, Vestas is committed to support decarbonization of the country as well as the Asia Pacific region, in close partnership with our customers."

"We are so excited to take part in this project, which will be the first collaboration for us with KOEN," said Srdan Cenic, country manager of Vestas Korea and vice president, head of sales offshore of Vestas Asia Pacific. "Through the project, KOEN and Ves-

tas will work together to unleash the potential of offshore wind in the west coast of the country and contribute to South Korea's goal of generating 20 percent of its energy from renewable sources by 2030.

KOEN is a power-generation company newly started on April 2, 2001, according to the South Korean government policy for restructuring the power generation industry. The company operates five power generation facilities with a total capacity of 10,324 MW. Delivery of the turbines will be expected to begin in the fourth quarter of 2025, with commercial operation scheduled for the third quarter of 2026.

MORE INFO www.vestas.com/en

The sale of Vestas' converters and controls business has been completed and marks the transfer of Vestas' three converters and controls factories to KK Wind Solutions. About 600 of Vestas' experienced and skilled colleagues will join KK.

"I'm very excited about the next chapter of our partnership with KK Wind Solutions, and I look forward to growing and maturing the wind-energy supply chain together," said Tommy Rahbek Nielsen, executive vice president and COO at Vestas.

"I would also like to extend my deepest appreciation to our dedicated and skilled colleagues, who will join KK. You have done an outstanding job, and I know you will continue doing so together with your new colleagues at KK."

“Our people are our most important and valuable asset,” said Mauricio Quintana, chief executive officer, KK Wind Solutions. “Their expertise and dedication are vital in accelerating the green energy transition, and we are excited to welcome our new colleagues whose skills and know-how will help us further develop the industry’s supply chain.”

Vestas looks for partners that help scale renewables efficiently in the long-term. As part of the partnership between Vestas and KK, KK will exclusively supply converters and control panels to Vestas, and the partnership will further advance with co-development of future Vestas converters.

KK Wind Solutions and Vestas have agreed on several transactional service agreements to ensure business continuity, knowledge transfer, and stable operations throughout the integration period.

MORE INFO www.kkwindsolutions.com

MANUFACTURING

Siemens Gamesa’s RecyclableBlade set for U.K. wind project

Siemens Gamesa’s RecyclableBlade has been selected by RWE for 44 SG 14-222 DD offshore wind turbines to be installed at the Sofia offshore wind-power project off the east coast of the U.K.

“Our industry-leading RecyclableBlade technology is now delivering even greater circularity of resources,” said Marc Becker, CEO of Siemens Gamesa’s offshore business.

“When we began working with RWE on the Kaskasi project, we knew that we had taken the first major steps toward delivering a decisive change to the wind sector. Having the opportunity to produce and install 132 RecyclableBlades for the Sofia project is a remarkable achievement. It fully demonstrates the joint focus between

our companies to develop and deliver even greater levels of sustainability for renewable power generation globally.” In 2022, RWE became the first commercial, large-scale offshore developer to install Siemens Gamesa’s fully RecyclableBlade, with a number of blades being used in the Kaskasi offshore wind-power project 35 kilometers north of the island of Heligoland in the German North Sea. The Sofia project will use RecyclableBlades measuring 108 meters long, representing the first deployment of that variant.

Siemens Gamesa’s RecyclableBlade technology enables the reclamation of the blade’s components at the end of the product’s lifespan: the resin, fiberglass, and wood, among others, are separated using a mild acid solution.

The blades will be manufactured at Siemens Gamesa’s Hull factory, which built the first RecyclableBlades for the Kaskasi offshore wind power project. ↴

MORE INFO siemensgamesa.com



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A low-angle photograph of an offshore wind farm under construction. The image shows a complex network of yellow steel beams and white support structures against a clear blue sky. In the foreground, several large black cables with orange stripes are visible, some coiled and others running vertically. The perspective is looking up at the structure, emphasizing its scale.

CROSSWINDS

THE FUTURE OF WIND

EARLY UNION ENGAGEMENT KEY TO OFFSHORE WORKFORCE SUCCESS

JDR has been subcontracted to supply 130 miles of inter-array cables. (Courtesy: JDR)

As an emerging industry likely to endure for decades, the offshore wind workforce will require an experienced core of people to work up and down the eastern (and eventually western) seaboard.

By BRIAN DAVIS and ADAM BARNES

The Inflation Reduction Act, which was signed into law in August 2022, is set to create tens of thousands of new clean-energy jobs by 2030. Labor unions have been broadly supportive of the act, which is hoped to underpin “labor standards that will promote family-sustaining union jobs.” As one of the largest new industries to come along in decades, unions are understandably enthusiastic about the job opportunities presented by offshore wind. Equally committed to delivering high-quality workmanship supported by proactive training, the offshore wind industry can be confident in the provision of union members with the right foundational knowledge to execute on projects.

However, recent analysis from Reuters indicates that over three quarters of the clean-energy manufacturing facilities that have been announced since the signing of the act are in states with anti-union laws. While opting to locate facilities in an anti-union state might reduce the initial cost of hiring, companies run the risk of missing out on the most highly skilled (unionized) workforce for the job. Early and proactive union engagement will be vital for ensuring companies establishing operations in the U.S. unlock the opportunities presented by union partnerships.

SETTING A STRONG PRECEDENT FOR UNION LABOR

As the United States’ first commercial-scale offshore wind project, all eyes are on the delivery of Vineyard Wind, which has set a strong precedent for the use of union labor on future offshore wind projects in U.S. coastal waters. Through a project labor agreement, the site is expected to create a total of 500 union jobs during its construction. Key to the success in reaching the agreement has been the proactive approach taken by the project’s developer and service companies to align with local stakeholders and unions to establish strong, long-term relationships.

JDR, which has been subcontracted to supply 130 miles of inter-array cables, has been working closely with the Southeastern Massachusetts branch of the International Brotherhood of Electrical Workers (IBEW Local 223) to identify opportunities for union members within the cable contract. While European technicians will set the industry in the right direction, the union partnership will ensure the necessary subsea and technical training is delivered to create a skilled local workforce for ongoing maintenance at Vineyard Wind and for future project construction.

LIFE OFFSHORE

One important element of this service company/union relationship has been early and open engagement to share information. While many union workers are technically capable of entering the offshore wind industry, for most, being off-

shore will be a completely new experience. From the need to remain calm in a survival situation to working 12-hour shifts and living in a confined space, a critical success factor will be attracting the right personality types to train for the roles becoming available. While having the right technical skills and certification is a requirement, people skills, teamwork, and professionalism is also vital. Unions, with their direct line to hundreds of thousands of qualified individuals, provide a fast-tracked route to meet candidates, disseminate educative materials, and host industry events.

Union partnerships are also well placed to support the involvement of underrepresented groups to ensure local plans are considered and create local labor opportunities for these groups. Roundtables are an excellent way to create engagement and address possible barriers for workers interested in joining the industry. Some insights from the JDR-IBEW Local 223 partnership include questions around the privacy and practicalities of using the restroom when on the offshore turbine worksite, whether there is designated female-only bunks onboard, and what processes are in place for raising and addressing HR concerns.

These conversations highlight the need for service companies to consider whether project execution can be adapted to make offshore wind a more attractive environment in which to work. Equally, a strong commitment exists within local stakeholders in Massachusetts and in the U.S. more broadly to ensure that offshore wind is a benefit to diversity, equity, and inclusion (DEI). As such, service companies interested in growing their business in this emerging market will need to create opportunities to enhance DEI if they are to be successful in the long-term.

Having completed significant outreach within the local electrical community, IBEW Local 223 and JDR have now moved on to facilitating visits to the fabrication yard where Vineyard Wind’s cable transition pieces are being fabricated. As part of the mock-up trial, union members apply their previous knowledge and offshore wind-specific training to ensure the project will be executed successfully once offshore.

A FOCUS ON LONG-TERM OPPORTUNITIES

The final piece in ensuring successful union engagement is the need to balance short term and long-term goals. At present, while the U.S. has an exciting pipeline of projects, the first few projects are only just beginning to break ground. Understandably, there is an eagerness to create as many short-term jobs as possible to capitalize on these first few projects.

But as an emerging industry that is likely to endure for decades, in the long term it requires an experienced core of people to work up and down the eastern (and eventually western) seaboard. This requires a shift in focus from

As one of the largest new industries to come along in decades, unions are understandably enthusiastic about the job opportunities presented by offshore wind. (Courtesy: Shutterstock)

project-to-project work to a longer-term, industrywide vision, which brings together states, trades and companies around the same mission.

Through proactive union engagement, the offshore wind industry will create lifelong, family-sustaining jobs for tens of thousands of people, all while enhancing diversity, equity and inclusion and supporting the energy transition. ✌

ABOUT THE AUTHORS

Brian Davis is General Manager and Adam Barnes is Service Manager with JDR.



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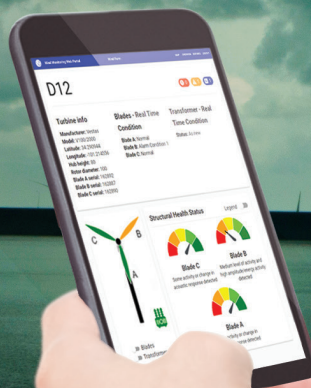
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