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## DRIVETRAIN MONITORING SYSTEMS CAN PACK A HIDDEN PUNCH

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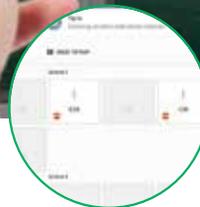
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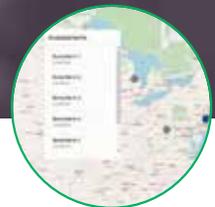
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## IN FOCUS

### DRIVETRAIN MONITORING SYSTEMS CAN PACK A HIDDEN PUNCH

*With their existing drivetrain monitoring systems, wind-farm owner-operators can now access insights on the health of turbine foundations.*

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*An industrial-grade corrosion inhibitor and cleaner prevents rust and electrolysis while improving electrical function in wind components. 16*

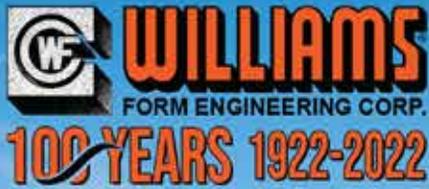
### PROFILE

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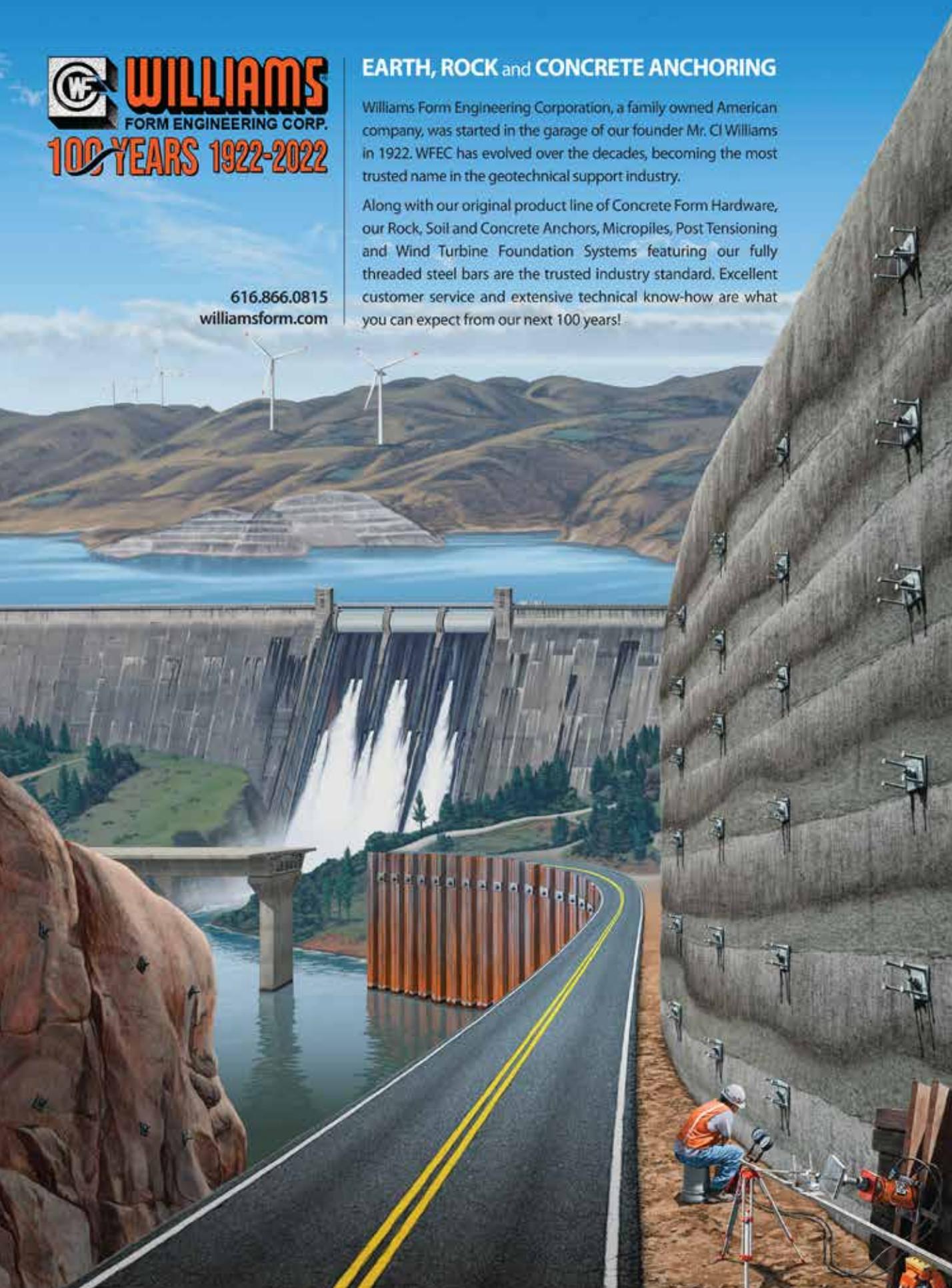


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## Be careful — COVID is still around!

Anyone who says COVID has run its course might want to do a quick double take — especially if you work for us. If you're reading this right now, that means that *Wind Systems* was able to put together another quality issue with almost half of its staff out sick with COVID-19.

Production week for us is a time for everyone to be “all-hands-on-deck,” and proved a little difficult to do when many of us were nowhere near those decks.

Our saving grace was our ability to be able to work from home. That was a bonus gifted to us by the OG lockdown in 2020. Even through all of that, most of us were somehow diligent enough to avoid getting the 21st century plague known as COVID, but we were lucky enough — if the word “lucky” applies — never to be stricken during the busiest part of our month. That is, until now.

Do I sound like I'm complaining? Well, probably, but our modest staff produces, in addition to *Wind Systems*, two more quality magazines for various industries each and every month. It's a fairly well-oiled machine, but when short-staffed, the month can definitely be a wild ride, to say the least.

But, as they say, we persevered, and I couldn't be prouder of my co-workers for stepping up and getting the job done, despite with some of them being under the weather and trapped at home.

That being said — and boy, does it feel good to get it off my chest — our August issue of *Wind Systems* has some interesting pieces for you to sink your teeth into.

Starting with our inFocus section, we take a closer look at turbine foundations with an article from ONYX Insights. In the piece, Ian Prowell and Ashley Crowther discuss how, with existing drivetrain monitoring systems, wind-farm owner-operators can now access insights on the health of turbine foundations.

In our Conversation feature, I had the pleasure of talking with David Urch, managing director of Armour Edge, and Lucas Llado, vice president — business development for Rope Partner. They discuss an innovative leading-edge protection for wind-turbine blades and Rope Partner's role in installing this potential gamechanger on existing, as well as new, blades.

And check out Crosswinds, as that article takes a look at how to inspire the next generation of wind-turbine technicians.

All that and more awaits your attention, so I hope you enjoy reading it as much as I stressed over putting it together.

Stay healthy, and, as always, thanks for reading!



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Operations Director

## What to make of recent SCOTUS EPA ruling

From ACP

There has been a lot of concern around the recent Supreme Court ruling in West Virginia v. EPA. Now that the dust has begun to settle, ACP would like to provide some deeper analysis.

Heather Zichal, ACP's CEO, expressed that ACP was "deeply disappointed" with the ruling. Here's why: The ruling severely limits the power Congress gave the Environmental Protection Agency (EPA) to respond to the most pressing challenge of our time — climate change.

With the Clean Air Act, Congress clearly charged EPA with addressing the catastrophic harms from carbon emissions, including through regulation of fossil fuel-fired power plants.

Today, those electricity-producing plants are responsible for about one quarter of the nation's greenhouse gas emissions. Curbing that output is a necessary part of any effective approach for addressing climate change.

Even though the stakes could not be higher for addressing climate change, the new limits the Supreme Court's decision puts on EPA's authority will impede the agency's ability to do that job.

Though no one can seriously dispute that operational improvements at the individual plant level will lead to only small emission reductions, the Court puts EPA in the box of being limited to that tool.

This ignores the fact that generation shifting — running heavily polluting resources less and less polluting resources more — is exactly what fossil fuel-fired plants already do to reduce their carbon emissions and is clearly the "best system" (as required under the Clean Air Act) to ensure such emissions reduction in the power sector.

Requiring EPA to turn a blind eye to this widely deployed, cost-effective, and readily available system for reducing emissions will certainly make it harder for EPA to identify a system of emission reduction for fossil-fuel fired power plants that meaningfully curbs carbon emissions.



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# DIRECTION

THE FUTURE OF WIND



renewables

EDP Renewables now has 10.6 GW secured out of its 20-GW target for 2021-2025. (Courtesy: EDP Renewables)

# U.K. awards contract to EDP Renewables' Ocean Winds project

The U.K. government has awarded Ocean Winds, the 50/50 offshore wind joint venture owned by EDP Renewables and ENGIE, a 15-year CFD (contract for differences) to sell the energy produced by 294 MW out of the 882 MW wind offshore project Moray West. The sale price will be £37.35 MW/h in 2012 prices.

The project is in the U.K., and it is expected to deliver its first power in 2024.

With this transaction, EDP Renewables now has 10.6 GW secured out of the 20-GW target for 2021-2025 recently announced in the company's Capital Markets Day. Additionally, EDP Renewables has now accomplished its target of about 1 GW of offshore capacity secured for 2021-2025.

**MORE INFO** [www.edpr.com/en](http://www.edpr.com/en)

## ONYX Insight: Offshore digitalization needs to ramp up

Owners and operators of offshore wind projects need to accelerate adoption of digitalization in a bid to head off the impact of soaring costs and supply chain challenges, according to ONYX Insight, a provider of data analytics and engineering expertise to the global wind industry.

Despite the first offshore wind turbine being installed more than 30 years ago, and there being more than 55 GW of offshore wind capacity worldwide, now just under 30 percent of U.K. offshore wind farms are implementing linked-up digital tools across their operation beyond relatively basic condition monitoring.

Turbine manufacturers face pressure to deliver against full order books while keeping prices low. They are responding to this challenge by developing newer, larger turbines with greater power density and more complicated designs.

The speed of turbine technology development means banks and investors do not typically finance the same turbine model twice, resulting in a limited track record and potentially greater risk exposure for offshore asset owners. At the same time, asset owners are under increasing pressure to make projects profitable in a competitive auction environment. Digitalization holds the key to de-risking new turbine technologies, keeping O&M costs low and unlocking new efficiencies in offshore wind.



Only 20 percent of top global offshore asset owners are making full use of digitalization, according to ONYX Insight. (Courtesy: ONYX Insight)

For offshore in particular, there are savings to be made in optimizing marine logistics. Crew hire, offshore cranes, and jack-up vessels, for example, all come at high costs. By using digitalization, owners and operators can rationalize vessel trips and construct collaborative maintenance zones where wind farms in close proximity synchronize O&M needs, sharing the cost burden.

Digitalization can enable the introduction of condition-based maintenance, targeting minor repairs — which are typically overlooked, but account for about half of scheduled O&M costs and have significant potential for optimization. Additional-

ly, by implementing coherent digital strategies early, operators can support life-extension strategies from Day 1, ensuring the offshore turbines of today keep performing optimally well into 2050.

“This is an exciting but challenging time for the offshore wind industry,” said Evgenia Golysheva, vice president of Strategy and Operations at ONYX Insight. “Huge demand for projects and a continual drive to lower the levelized cost of energy is squeezing turbine manufacturers, who are reporting enormous losses, limiting their ability to scale up and innovate. Given the precariousness of the macroeconomic situation, coupled with rocketing project demand all over the world, and the effect that this combination is having on supply chains, digitalization presents offshore wind operators and owners with a chance to empower their operations and increase efficiencies, independent of other industry stakeholders.”

**MORE INFO** [onyxinsight.com](http://onyxinsight.com)

## Exus to manage three wind farms in Pennsylvania

Exus Management Partners, an investment and asset management firm focused on the renewable energy sector, is partnering with commodities trader Vitol to manage three wind farms, totaling 244.4 MW, in Pennsylvania.

Exus will deliver full construction, energy, and asset management across the portfolio, applying latest wind technology to increase annual energy production and extend asset life. Exus has a detailed knowledge of the projects, having been involved in their original development and construction.

Vitol's agreement with Exus brings the partnership to almost 500 MW of combined wind assets in the U.S.,



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Vitol's agreement with Exus brings the partnership to almost 500 MW of combined wind assets in the U.S. (Courtesy: Exus Management Partners)

following the 240-MW Big Sky Wind farm repowering and management deal in Illinois, which began in 2021.

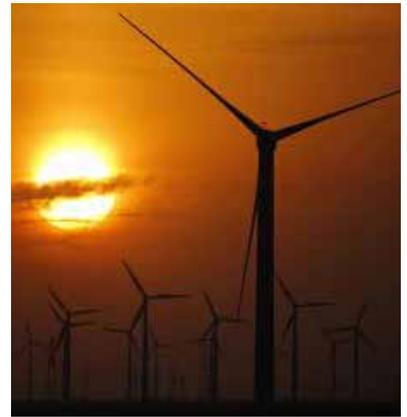
"Our ethos is to always deliver highest-grade work on or before deadline, and above expectation, and we are delighted to see our partnership with Vitol continue to mature within that framework. It's an exciting time within the industry, and we look forward to continuing to offer our support to Vitol, a significant player in the ambitious and energetic drive toward a cleaner future," said Dhaval Bhalodia, partner and head of Asset Management North America at Exus.

"Collaborating with Exus in the field of renewable asset management is a significant opportunity for both businesses. After successfully working together on our Big Sky project, we value the experience, expertise, and added value they are able to deliver across our renewables portfolio," said Andrew de Pass, Vitol Inc.'s head of renewables.

MORE INFO [www.exuspartners.com](http://www.exuspartners.com)

## Prepared U.S. wind operators can benefit from summer prices

U.S. wholesale power prices will rise as much as threefold during this summer's peak demand period due to high



Preventative maintenance, accurate weather forecasting and hedging of grid congestion will help wind farm owners optimize soaring power prices this summer. (Courtesy: Reuters)

gas prices and a switch away from coal-fired generation, the Energy Information Administration (EIA) warned in a note on June 16.

Extreme temperatures are becoming more likely and could lead to power shortages in the central and western U.S. as residents and businesses ramp up air-conditioning units, federal and state officials said. The Midcontinent Independent System Operator (MISO) is forecast to have 114.9 GW of available generation capacity, compared with a peak demand of 118.2 GW under a normal scenario and 125.2 GW under extreme hot temperatures, data from the federal grid regulator show.

Wind-farm operators that have completed preventative maintenance ahead of the summer will benefit most from volatile wholesale prices. Operators can then profit from selling into the wholesale market at high prices or avoid outages that force them to buy.

Power utility AEP has conducted preventative maintenance "to help ensure energy will be available to our customers and in the market," a spokesperson at AEP told Reuters Events. AEP operates more than 7 GW of wind and solar and almost of the capacity is sold through long-term contracts. ↗

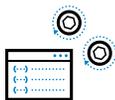
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FOUNDATIONS ▸ LUBRICATION & FILTRATION

# HOW DRIVETRAIN MONITORING SYSTEMS CAN PACK A HIDDEN PUNCH

With aging foundations, particularly in partial repowering scenarios, ongoing insight into foundation health is critical. (Courtesy: ONYX Insight)



*With their existing drivetrain monitoring systems, wind-farm owner-operators can now access insights on the health of turbine foundations.*

By IAN PROWELL and ASHLEY CROWTHER

**M**onitoring wind-turbine drivetrains is one of the most cost-effective tools operators have, enabling them to transform the way wind assets are run and slash operations and maintenance costs. When combined with real-world engineering knowledge and powerful predictive analytics, drivetrain data — specifically vibration — provides months of lead time for major component faults, making catastrophic failures a thing of the past.

But many wind-farm owners and operators are sitting on a new opportunity. With their existing drivetrain monitoring systems, they can now access insights on the health of turbine foundations. As investors increasingly seek to extract additional value from their existing assets, life extension and repowering conversations are gathering pace, placing scrutiny on traditional inspection methods.

Armed with high-quality data on foundation health, operators can make the best decision for the long-term profitability of the asset, ensuring each turbine generates clean energy for as long as possible, at the lowest cost.

## THE STATUS QUO

Foundation health assessments are often conducted via periodic inspections and measurements on a particular subset of the foundations. This limitation is driven by cost and, in the case of destructive testing, reducing the damage to the foundation and any risk of accidentally damaging primary components in critical regions of the foundation. However, there are some fundamental shortcomings with this approach.

Civil structures, such as wind-turbine foundations, exhibit natural variation in their dynamic characteristics. This can be more significant than variation caused by damage and can depend on temperature, groundwater conditions, load level, and other uncontrollable factors. Foundations are often a softening system (e.g., non-linear soil behavior, crack opening, etc.) where damage may only be evident under higher load levels not observed in short monitoring campaigns. The result is an unknown bias — more likely biased low — from short-term monitoring.

A second challenge with monitoring a subset of foundations is that dangerous damage will go undetected until se-

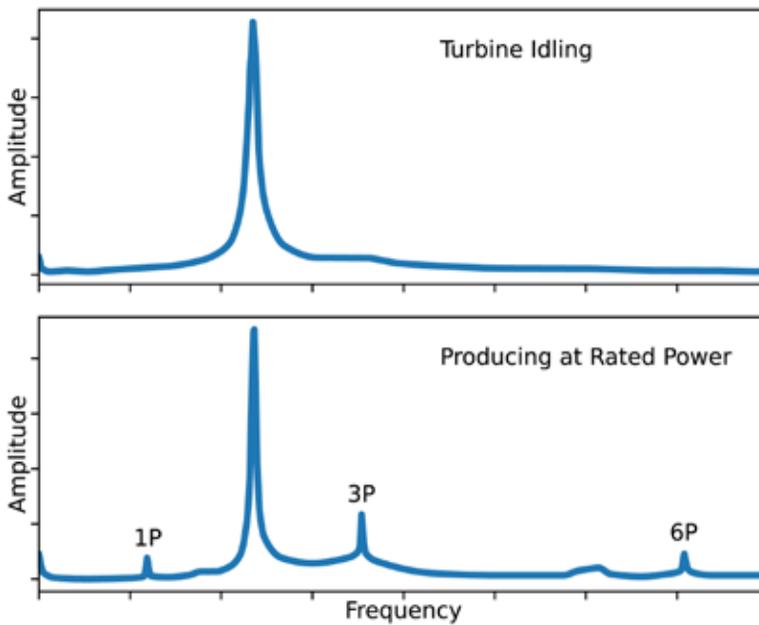


Figure 1: ecoCMS clear identification of system frequency while idling and operating.

rious incidents, such as a collapse, occur. There is no record of all foundations in a wind farm failing near simultaneously. Failure first happens on the outlier(s). This could be a foundation where the concrete was poorly placed, or materials did not match their design characteristics. It could also be a foundation that experienced excessive loading. Intelligent approaches exist to predict these outliers, but there is always the possibility of error in sample selection when using a subset. Further, most existing techniques depend heavily on expert opinion and qualitative findings.

### THINKING BEYOND A TILTMETER

With aging foundations, particularly in partial repowering scenarios, ongoing insight into foundation health is critical. In many situations, lenders or independent engineers will require regular foundation monitoring for life extension beyond the theoretical design life. Current theoretical calculations of design life are conservative, resulting in design lives that cannot support the desired operation timeframe of a project. This contradicts observation and detailed evaluation showing that many foundations perform acceptably far beyond the theoretical life.

MEMS accelerometers, such as those used in ONYX Insight's ecoCMS system, are extremely powerful for monitoring low frequencies, such as structural frequencies for wind turbines (Figure 1). Low-frequency capable CMS can deepen operators' understanding of foundation health. These CMS are often already installed on projects, and if not, the installation costs will be less than the cost of periodic foundation testing and inspections for a subset of the project's turbines.

Compared with the traditional approach, continuous observation of the entire population allows for:

- Statistical identification of outliers.
- Definition of alarm levels to initiate further action.
- Projections of when characteristics might exceed alarm levels.

Early detection and clear decision criteria are vital when dealing with foundations. Quantitative results allow operators to set decision criteria confidently, and projecting future conditions allows proactive action. Prediction of future statutes is essential to allow time for the design of possible foundation retrofits, construction contracting, and implementation, without significant project downtime or running turbines with the possibility of collapse.

### CASE STUDY: SOIL ANCHOR DEGRADATION AND REPAIR

ONYX Insight's ecoCMS is installed on more than 1,500 turbines belonging to a global supermajor. One of the wind farms experienced issues where the soil anchor bolts were loosening across the site. ONYX Insight was able to configure extended functionality for tower monitoring.

Over the course of the planned bolt tightening campaign, it was clearly demonstrated the system captured the change in foundation stiffness post-tightening – validating the effectiveness of the tightening program, and the analysis approach (See Figure 2). The site is now continuously monitored by ONYX for foundation health, providing peace of mind for the owner.

The need for tower and foundation monitoring is greater than ever. Partial repowering and lifetime extension have enabled towers and foundations with a planned service-life sometimes exceeding 40 years – and replacing this infrastructure is not economically feasible. Another alternative – foundation strengthening – is exceptionally costly, and the designs are site-specific. In this area, continuous monitoring provides significant value to owners. Using reliable data, asset owners can defer strengthening work and implement targeted retrofits strategically where data shows statistically significant differences in foundation behavior.

Extending the functionality of a drivetrain CMS to infer tower and foundation health is not a substitute for other techniques. However, intelligent analysis, experienced experts, and proper due diligence can transform a drivetrain CMS into a triage tool to decide if, when, and where to

deploy conventional techniques in a targeted, cost-effective manner. Fundamentally, this approach provides more certainty at a lower price point by enabling continuous complete project monitoring, capturing degradation that periodic snapshots will likely miss. ↗

**ABOUT THE AUTHORS**

Ian Prowell is the Principal Engineer – Structures with ONYX Insight. Ashley Crowther is Chief Commercial Officer with ONYX Insight.

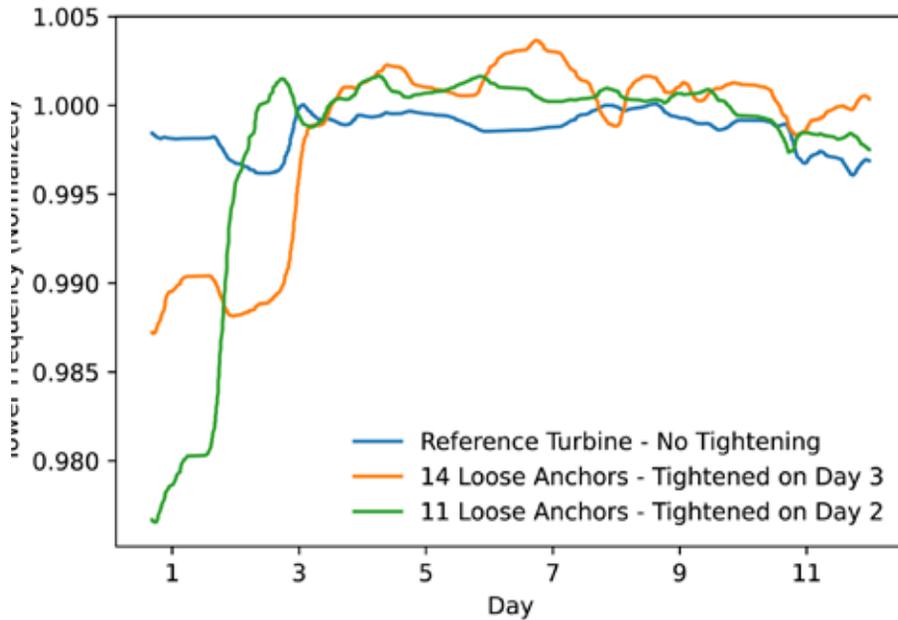


Figure 2: Clear evidence of soil anchor tightening.

27 ———— 30  
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# PROTECTING EQUIPMENT FROM HARSH ENVIRONMENTS

The internal components, electronics, and wiring of wind generators, rotor blades, and towers are susceptible to corrosion and electrolysis, which can compromise function and lifespan. (Courtesy: StrikeHold)

# An industrial-grade corrosion inhibitor and cleaner prevents rust and electrolysis while improving electrical function in wind-energy components.

By DEL WILLIAMS

Ensuring the long-term success of wind systems and the alternative energy sector will require protecting a wide variety of equipment from the elements in harsh outdoor settings while optimizing performance and minimizing required maintenance. For wind turbines of all sizes, critical components must be able to stand up to constant exposure to sun, rain, dew, humidity, wind, and dust for the life of the system.

The challenge is that many of the primary components of wind turbines, including the generator, rotor blades, and tower, are also susceptible to corrosion. In moving parts such as rotor blades, high friction due to rust can be particularly problematic, compromising energy generation and requiring excessive maintenance or even early replacement.

The internal components, electronics, and wiring of wind generators, rotor blades, and towers are susceptible to corrosion and electrolysis, which can compromise function and lifespan.

## ANTI-CORROSION PROTECTANT

In response, industry professionals are turning to a unique anti-corrosion protectant, cleaner, and lubricant called StrikeHold®. The spray was originally developed to preserve and maintain U.S. military weapons and heavy equipment for use in some of the harshest working conditions in the world.

Today when wind-turbine rotors or other moving components require dry lubrication, the compound is designed to be effective. As a lubricant, the fast-acting, penetrating compound cuts through rust and dirt, quickly getting into metal parts to reduce excessive friction. The lubricant contains synthetic-based additives that act like microscopic ball-bearings to minimize friction, facilitate maintenance, and improve operation. The compound also protects circuit boards, electrical circuits, and metal components in corrosive environments while improving electrical continuity and contacts. The spray not only protects the wide range of wind-system and renewable-energy equipment comprised of such components, but it extends its usable life and facilitates more efficient energy conversion as well.

## ELIMINATING HARSH EFFECTS

The use of StrikeHold has the potential to largely eliminate the effects of moisture, corrosion, and electrolysis in such equipment. The micro barrier that it forms on components is so complete that an electrical charge cannot be passed from the metal into water. It also improves electrical performance by cleaning and protecting contacts and internal parts, including circuitry and connections. The anti-corrosive protectant sprays on clear or applies wet and dries in place.

The protectant is designed to waterproof components and can even be used on equipment that is already wet in the field. Because it has a specific gravity greater than water, when applied to a wet surface it penetrates to the hard exterior, pushes water from the surface, and coats the area.

Since the cleaner has antistatic properties, dust, dirt, and grime do not adhere to it in the natural environment. Dust blown onto a treated surface blows off cleanly with wind or rain, leaving the coating intact.

## POTENTIAL APPLICATION

In one potential application, StrikeHold is being evaluated by a maintenance firm in rural Alaska whose platform facilitates smart servicing for wind, solar, battery energy storage systems (BESS), microgrids, and fleets of back-up diesels. The compound is being considered for a variety of potential applications.



The use of StrikeHold has the potential to largely eliminate the effects of moisture, corrosion, and electrolysis in wind-energy equipment. (Courtesy: StrikeHold)



In moving parts such as rotor blades, high friction due to rust can compromise energy generation and require excessive maintenance. (Courtesy: StrikeHold)

As the variety and quantity of sustainable wind- and renewable-energy equipment continues to proliferate in harsh outdoor settings, getting the most out of the technology will require superior operations and maintenance procedures that protect the investment and enhance output over the long haul. Maintenance managers who use easy-to-apply compounds that safeguard against corrosion and electrolysis will have an advantage in the field and marketplace. ↵

#### ABOUT THE AUTHOR

Del Williams is a technical writer based in Torrance, California. He writes about health, business, technology, and educational issues, and has an M.A. in English from C.S.U. Dominguez Hills. For more information on StrikeHold, go to [www.strikehold.com/pages/industrial](http://www.strikehold.com/pages/industrial).

▼ The spray not only protects the wide range of wind-system and renewable-energy equipment comprised of such components, but it extends its usable life and facilitates more efficient energy conversion as well. ▼

BUSINESS NETWORK FOR OFFSHORE WIND

# OSW GRID & TRANSMISSION SUMMIT

NOVEMBER 9-10, 2022 | CHARLESTON, SC

A large offshore wind turbine substation is illuminated at night, with a single wind turbine visible in the distance against a dark sky.

## CREATING A ROADMAP FOR A NEW RENEWABLE ENERGY GRID

Connecting 30 GW of wind energy to the electric grid is one of the biggest challenges (and supply chain opportunities) facing the U.S. offshore wind industry. Subsea cable installation, shared grid ownership, underwater mapping, cable landings, and shoreside substations are a few of the infrastructure requirements needed to realize the federal 2030 energy goal.

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A worker in a red hard hat and orange safety vest is using a blue Superbolt tool to work on a large, circular turbine component. The component is covered in numerous blue and silver bolts. The worker is standing on a blue metal platform.

PROFILE

NORD-LOCK GROUP

# A PARTNER IN SECURE BOLTED SOLUTIONS

Nord-Lock Group's Superbolt tool saves considerable time and labor with numerous Superbolt Multi-Jack Tensioners of the same size on a wind turbine. (Courtesy: Nord-Lock Group)

*As a global leader in the development of engineering and bolting technologies, Nord-Lock Group has provided its customers with high-quality, safe, and innovative bolting solutions for 40 years.*

By **KENNETH CARTER** ▸ Wind Systems editor

**T**aking care of the “nuts and bolts” in many businesses can be a metaphor for a lot of things, but for Nord-Lock Group, it’s the literal truth.

That’s because taking care of the nuts, bolts, and more that keep wind turbines standing tall and spinning is exactly what Nord-Lock Group has done for more than 10 years.

“Nord-Lock Group has tightened and secured billions of bolted connections in millions of applications all over the world,” said Sebastien Bruyas, strategic sales manager with Nord-Lock Group. “All our solutions are developed and manufactured in-house, ensuring they meet the highest standards in the industry. We are the first bolt-securing partner to offer a full life-cycle warranty across all its technologies.”

## **TAKING ON WIND**

With that experience, Nord-Lock Group took on what it could offer the wind-energy industry to supply products and services with a focus on life-cycle profitability, design, production, training, and installation support, according to Bruyas.

“We work closely with OEMs, wind-farms owners, installation and service companies, and with all their supply chains including distributor partners,” he said. “We provide them assembly solutions or accurate and efficient tools to install and secure critical bolted connections on blade bearings, main shaft, gearboxes, dampers, generators, yaw bearing, towers, MP-PT connections, anchorages, and more.”

As a member of the APQP4WIND association, Bruyas said Nord-Lock Group fulfills the wind-industry quality standard. “We are happy to support all our customers in their quality challenge,” he said.

## **KEEPING PEOPLE SAFE**

In order to maintain that quality, Bruyas said Nord-Lock Group’s mission is to safeguard human lives and customers’ investments.

“We believe that no one should have to question the integrity of the mechanical systems that play such a critical role in our way of life,” he said. “We are passionate about sharing our knowledge, insights, and expertise to ensure an optimal long-term solution to our customers’ challenges.”

In that vein, Nord-Lock Group’s core values include passion, speed, quality, and sustainability, according to Bruyas.

“These values are perfectly aligned with our perception of the wind industry,” he said. “We work with passionate customers searching for high-quality solutions to answer to the needs of a fast-growing, sustainable industry.”

## **TAKING CARE OF BIGGER TURBINES**

Part of that fast-growing industry is the ever-growing as-

sets used to harvest electricity from the wind, according to Bruyas.

“The wind industry has evolved into bigger machines and larger wind farms with a strong potential for offshore,” he said. “With these evolutions, we have seen a significant shift in demand. The need to secure the supply chain (cost, availability, and quality) is high on the agenda. To meet the demand, Nord-Lock Group is constantly investing in new manufacturing equipment to increase quality, capacity, and optimize cost. We have also opened new offices around the world to provide technical and commercial support locally to our customers.”

In the meantime, Bruyas said Nord-Lock Group has seen a strong demand for maintenance and operations optimization.

“Reducing the time of installation, control, maintenance, and services has always been our goal,” he said. “It is therefore natural that we have invested in Industry 4.0 products, and today, Nord-Lock Group offers a range of innovative products in the field of preload monitoring. Imagine today that our customers can check anywhere, anytime, to check if their bolts are tight, allowing them to speed up installation, reduce maintenance and downtime, and, most importantly, avoid major incidents on bolted connections.”

## **INNOVATION IS KEY**

Bruyas pointed out that Nord-Lock Group looks on its impressive array of innovative products with a sense of pride.

“Every innovative product we create is a great achievement for us,” he said. “We had been particularly proud of the enthusiastic feedback we received from the wind industry when the Superbolt™ Load-Sensing Tensioner (LST) and Load-Sensing Flexnut (LSF) remote control solutions were launched. Innovation is hard work and even when using the best methodology and process, you are never 100-percent sure of the market reaction. In this case, it was a ‘wahoo’ moment.”

Nord-Lock Group also has innovative solutions available for hydraulic tensioning applications. With its Intelligent Electric Pump, Boltight™ has taken its popular electric tensioning pump and added the ability to wirelessly control the tension pump. It gives its customers the ability to customize the pump’s operation and record data on the pressure cycles.

Once the joints are tightened, Nord-Lock Group can help its customers verify the joint is loaded properly with its ultrasonic measurement tool, Boltight Echometer Premier.

All that innovation that Nord-Lock Group is developing will only continue to enhance what its customers need and allows the company to be up to any challenge a customer may need solved, according to Bruyas.

“We are curious and always ready to help,” he said. “In



SeaTwirl's vertical axis turbine is fixed on an underwater gravity based structure and the full body rotates as one piece. (Courtesy: Nord-Lock Group)

the first place, actively listening to our clients is essential to identifying what the real need is before advising on what might be a good solution or approach. Our account managers, as well as our technical center, are there to help our clients qualify the project and build the business cases before making the right decision. We believe that we can really help our customers by creating a long-term relationship based on trust. And that's why it's so important to have the right understanding of their challenge from the start."

## PLAYING CRUCIAL ROLES

As a recent example, Nord-Lock Group played a crucial role in a project from SeaTwirl, a company that takes a different approach to offshore wind-power generation with a vertical axis turbine fixed on an underwater gravity-based structure



Nord-Lock Group has taken on a crucial role with the SeaTwirl prototypes, delivering both Nord-Lock wedge-locking washers and Superbolt multi-jackbolt tensioners. (Courtesy: Nord-Lock Group)

reaching under the surface. The full body then rotates as one piece. The vertical axis allows the wind turbine to rotate regardless of wind direction.

With a horizontal axis turbine, the asset has to be aimed to catch the wind. That kind of yaw mechanism is not needed in the SeaTwirl turbine.



The Superbolt Load-Sensing Tensioner & Load-Sensing Flexnut offer remote monitoring and a live reading of data — all with extreme accuracy. (Courtesy: Nord-Lock Group)

What Nord-Lock Group was able to do for the SeaTwirl prototypes was to deliver both Nord-Lock® wedge-locking washer and Superbolt tensioners. The Superbolts were able to achieve a high preload in the joints, which simplified the assembly process.

Superbolt tensioners can replace conventional nuts and bolts and can increase the lifespan of bolted joints, requiring only hand tools to tighten the joints. They are ideally used in the drivetrain, before and after the gearbox, at the housing, and footing screws, all of which are continuously subjected to great force.

Nord-Lock Group has also supplied critical tooling to hundreds of wind farms around the world with its Boltight hydraulic tensioning products. The company has engineered tooling for blade connections, drivetrain mounting, flanges, and anchorages on all major turbine makes and models.

#### 40 YEARS OF EXPERIENCE

Nord-Lock Group began in Sweden in 1982, where the original Nord-Lock wedge-locking technology that safely secures bolted joints was developed. Since then, the company's range of innovative bolting technologies and expertise

has grown to be the most comprehensive on the market, incorporating Superbolt mechanical tensioners, Boltight hydraulic tensioners, and Expander System® pivot pins.

That rich history of supplying quality products to the ever-growing wind industry will only push the company further as it looks to the future, according to Bruyas.

“This can be difficult to predict as our world is changing rapidly, and climate change must be our top priority,” he said. “In this context, the wind-power industry plays and will play a major role.”

Wind power in the renewable-energy mix will continue to be a big player, which will amplify the need for reliability, efficiency, and security, according to Bruyas. This means the industry will continue to see more smart solutions implemented such as remote-control technologies, robotic solutions, predictive models, and more.

“Our strategy is to play a major role and shape this evolution in order to be a trusted partner for our customers,” he said. “We are well positioned, and our journey has only just begun. Our future in the wind industry is exciting and promising.”

**MORE INFO** [nord-lock.com](http://nord-lock.com)



## David Urch

Managing Director ▸ Armour Edge



## Lucas Llado

Vice President — Business Development ▸ Rope Partner

*“With different technologies coming out for leading edge protection, the Armour Edge solution is performing well and can offer unique value to our clients.”*

### ▸ Rope Partner recently partnered with Edge Solutions. How did that partnership come about?

**Urch:** We were looking for partners in the U.S. a couple of years ago. We had some initial conversations with Eric Stanfield, CEO at Rope Partner. They were really constructive, and he had some insightful comments around our product, which we respected and actually implemented during some trials we were concurrently running in Europe

COVID was kind of an interruption to us coming to the U.S. to meet with Eric, Lucas, and the team. But as soon as we were able to, we got on a plane and came out to a conference in Austin, Texas, where we had a chance to meet in person. I think there, we really kind of hit it off, and we were able to cement those early conversations. We were able to get across the design enhancements we'd made and instill some confidence that we had a lot of momentum and traction with sales in Europe and that this could be a product that Rope Partner could introduce successfully to its customer base in the U.S.

We really like Rope Partner. They're a leading company in their field. They have very high attention to detail, to quality, and training. These are all things that resonate with us, and they have fantastic contacts at the Tier-1 customer level. They offered us everything we wanted to accelerate our expansion into the U.S. market.

**Llado:** It makes sense to us as one more valuable product in our toolbox. With different technologies coming out for leading edge protection, the Armour Edge solution is performing well and can offer unique value to our clients. There is a big opportunity here in the U.S. wind market, so we wanted to partner up with Armour Edge and help bring this product to market.

### ▸ What is Armour Edge, and what can it do for the life of turbine blades?

**Urch:** Armour Edge is a hard-shell, leading-edge protection product for wind-turbine blades. It's going to protect your turbine blades from erosion resulting from rain or crop dust or sand. This erosion affects the aerodynamics, and, therefore, the power output and can eventually lead to blade failure if not treated.

Our founder came up with a novel approach to this issue of leading-edge erosion and created Armour Edge. It's unique because we make Armour Edge to fit each particular blade type. It's a custom solution. It's unique because it's incredibly durable.

We had a lifetime prediction report from an independent laboratory giving us a 53-year lifetime estimate. Also, we believe it's unique because it has very beneficial aerodynamic properties. If you're saving even half the 1 percent of annual energy production on a wind farm over 20 years, that's a huge amount of money.

A version of this length is being fitted on an offshore wind farm right now in Germany. This material is designed specifically to go on wind turbines.

We also have our own custom adhesive that is also part of the solution. The adhesive has a very strong bond, as you would expect, but it also maintains very good elongation or flexibility, so it can work in that dynamic environment. Because we are essentially recreating the leading edge of the blade with that hard surface, it results in excellent aerodynamic performance. Various reports show that we have less than half a percent of impact on the annual energy production. If you think an average level of erosion on a blade might cause 1 to 5 percent of AEP loss, and if we give

around half a percent of loss compared to a virgin blade, that's a big uplift.

I think one of the key aspects about Armour Edge is, and why I think Rope Partner finds it so appealing, is because we can install Armour Edge really efficiently. There's no extra downtime compared to other solutions. In fact, we're almost quicker than other solutions and more cost effective. When you look at blade erosion, we categorize it in different ways. If it's quite minimal erosion, it might be category one; if it's really high and severe erosion, it might be category five. For category one to three erosion, we can apply Armour Edge directly on top of that erosion without doing any significant blade preparation or repair.

That's a really big saving in terms of turbine downtime and in terms of labor. We can also apply Armour Edge on top of failing leading-edge protection. If you had some tape, for example, that failed after a certain amount of time, you would normally have to stop your turbines and have this cycle of repeated intervention (remove old tape, apply new tape) — that's costly. You put new tape on, then come back in a few years. We can actually apply Armour Edge straight on top of that tape without stripping it and without repairing the blade, so you're saving time, and then you're getting a solution that should last the remaining life of the wind farm.

We might not extend overall life of the turbine, but we're going to make the economics of running it much more attractive during its life.

And when you go offshore, which is our current experience in Europe, if you can save person hours offshore, that's a massive health and safety benefit, as well as a cost benefit.

#### ► What is Rope Partner's role in incorporating the Armour Edge technology into the existing wind farms?

**Llado:** It's twofold. On the commercial side, we are the point of the spear in connecting with our extended U.S. customer base, which we have successfully built over our 21-year history. Then on the actual installation side, we're the exclusive third-party installers of the product in the U.S. It's how we've set up the agreement. We are performing pilot installs with customers this year and will then move to a larger scale roll-out both onshore and offshore.

**Urch:** I think also one of the big facilitation aspects that Rope Partner brings is their new location in Denver, which offers a state-of-the-art space for trainings. That's going to be the focal point for all our training in the U.S. It is imperative that all technicians are trained to a high standard, so we get a very good level of installation.

**Llado:** The benefit of having our facility centrally located, not only for just storage of the product when necessary, but also, of course, as David indicated, the training is a good arrangement for our partnership.

#### ► Is Armour Edge only used for offshore turbines or can it help extend the life of all turbines?

**Urch:** It can work on all turbines. And it just so happens that we have had our first customers all in the offshore environment. But, of course, all turbines experience some kind of erosion. Definitely the onshore market is a huge opportunity for us as well.

**Llado:** It's applicable to any turbine. The offshore turbines just typically have the highest erosion environment, which is the extreme of this spectrum. But then, of course, this product is also very beneficial for onshore application. There's a lot of leading-edge protection being applied on onshore turbines globally and the product makes sense for both markets, offshore and onshore.

#### ► What has been the response from wind-farm owner-operators in the Baltic and North Seas that are using this new technology on their assets?

**Urch:** I think the initial response is positive in that they've ordered more. For me, that's the biggest validation of the product. Your first customers take your product; they put it in the harshest environment, and they come back to you a year or two years later, and say, "You know what? This stuff's good. We'd like more." For me, that's the overwhelming thing.

In terms of the detail, it's also not just that the owner-operator likes it, it's that the technicians who installed it like it. They like working with it.

It's an easy-to-install product. It's intuitive, and you get a good job of it. That's really good.

#### ► How long has Armour Edge been available?

**Urch:** The first product went on in summer 2020, so we've been installed for two years now.

#### ► How will Armour Edge be useful in the U.S. offshore market?

**Urch:** I think because the U.S. offshore market's nascent, there is an opportunity down the line so that we could retrofit, in say five-years' time or three-years' time when those wind farms are coming off warranty and getting erosion problems. That would be the kind of classic way that we've approached the market in Europe.

But what is happening more and more, and particularly here in Scotland where there's a lot of offshore wind being developed, is that developers are under massive pressure to demonstrate in their business plans that they're going to address leading edge erosion up front.

If we can say to these guys, "Look, if you actually design us in from the outset and you fit us before the blades go into service, you're going to save a lot in terms of annual energy production because we're preventing the erosion and thus assisting the aerodynamic benefits.

But also: How much are we going to save you in terms of repeated intervention to put an LEP on every three to seven years? How much are we going to save you in terms of worker risk offshore, and how do you score that in your matrix for the whole project?" Those are the really interest-

ing discussions that we're starting to get into now.

We haven't gotten factory fitted yet on a turbine, but I think that's the next logical step for us. And I think that's another way we could make a really big impact on the U.S. offshore market now, rather than in three to five years' time, when the erosion's already happening.

► **It would seem to be advantageous to install Armour Edge at the beginning of service, correct?**

**Urch:** Definitely. We're really looking hard at that right now, and obviously Rope Partner can be our partner for facilitating that in the U.S. as well. Some of the operators offshore in the U.S. are the same as in the U.K. or Europe. There's a real nice synergy there and a crossover. I think we can make a really big impact in offshore U.S. wind.

► **What inroads have been made in making sure the U.S. offshore market is aware of this product and its positive impact to wind-farm assets?**

**Urch:** From our side, this is kind of early days for that. We're focused really on getting reference sites onshore in the U.S. because I think everybody's kind of like, "I see you doing that in Europe, but I want to see it in my backyard to

know I can really touch it, feel it, see it, and get comfortable with it." That's our prime focus right now. But as I said at the Blades USA conference in Austin, we're already connecting with people who are building offshore.

**Llado:** That's more of a mid-term strategy, as all these new projects come online in the next five years. We have several years of offshore experience and are well positioned to grow with this market.

**Urch:** I think you'll see a big step up in our marketing activity in the next six months or so. As we evolve as a business, that'll be another major focus for us going forward. That should all help with awareness.

► **Is there anything else you would like to add that we didn't talk about?**

**Llado:** We're very excited about this partnership. While we continue installing various LEP products in the market, we believe that Armour Edge brings an innovative and valuable solution to the U.S. wind industry, and we are happy to be presenting this product to our customers. ✌

**MORE INFO** [www.RopePartner.com](http://www.RopePartner.com)  
[armouredge.com](http://armouredge.com)



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JDR Cable Systems' new facility is the first stage of JDR's plans to expand its product portfolio to support the growing global renewable energy market, (Courtesy: JDR Cable Systems)

## ► CONSTRUCTION

### JDR gets grant for subsea cable facility

JDR Cable Systems, a subsea cable and umbilical supplier and servicer, reached final agreement under the U.K. government's Offshore Wind Manufacturing Scheme (OWMIS) on financial support for its subsea cable manufacturing facility in Cambois, near Blyth, Northumberland.

JDR is now on track to start construction this summer with opening planned in 2024. The new £130 million U.K. Export Finance (UKEF) Export Development Guarantee is set to create 171 local jobs on completion, while

safeguarding 270 jobs at existing JDR facilities.

"Our offshore wind sector is a major industrial success story that delivers cheaper energy for consumers and high-quality manufacturing jobs across the U.K. Investments such as this from JDR, with government backing, are exactly the kind which our British Energy Security Strategy will attract, while reducing our exposure to volatile global gas prices," said Kwasi Kwarteng, U.K. Business and Energy Secretary.

"Now more than ever it's critical to push forward with the U.K.'s offshore energy ambitions, and we are delighted to take this major step forward in delivering the new site at Blyth," said Tomasz Nowak, JDR CEO.

"JDR's investment in Blyth shows

how attractive the U.K.'s renewable energy sector is, supporting jobs, growing the economy, and leveling up the U.K.," said Minister for Investment Gerry Grimstone.

**MORE INFO** [www.jdr cables.com](http://www.jdr cables.com)

## ► CONSTRUCTION

### Siemens Gamesa to supply 75 MW to South Korea farm

Siemens Gamesa will supply 75 MW its SG 5.0-145 turbine for Gunwi, South Korea's third-largest wind farm, to developer SK D&D.

Following its expected commission-



South Korea is among the first Asian countries to commit to achieve carbon neutrality by 2050. (Courtesy: Siemens Gamesa)

ing in 2024, the 75-MW Gunwi wind farm will generate enough electricity to power 64,000 local households, forming part of the country's efforts to reduce reliance on fossil fuels and boost the target of renewable energy generation to 20 percent in the electricity mix by 2030.

Located in Gunwi-gun, Kyongsangbuk-do province, the Gunwi wind farm will feature the SG 5.0-145, one of the most powerful turbines available in the local market, to best use the wind resources from a mountainous area. To optimize the wind-farm performance, Siemens Gamesa also signed a long-term service agreement of 20 years to provide operation and maintenance services.

Operating as a subsidiary of South Korea's leading conglomerate SK Group, SK D&D has been increasing its investment in the renewables market to fulfill its ESG commitments, including forging a partnership with Siemens Gamesa since 2014 to develop two wind power projects totaling 84 MW.

South Korea is among the first Asian countries to commit to achieve carbon neutrality by 2050, with plans announced to develop wind energy, both onshore and offshore, in a bid to reduce its reliance on fossil fuels for power generation while cutting carbon emissions.

By the end of 2021, the country had wind installations of approximately 1.7 GW, with the share of wind power less than 1 percent of total electricity generation.

Expanding across Asia Pacific, Sie-

mens Gamesa has installed more than 11 GW of onshore turbines in China, Pakistan, Japan, South Korea, Vietnam, Indonesia, the Philippines, Thailand, Australia, and New Zealand.

**MORE INFO** [www.siemensgamesa.com/en-int](http://www.siemensgamesa.com/en-int)

## CONSTRUCTION

### Fisher, Graig unveil Ulstein Twin X-Stern concept

James Fisher and Sons, a provider of specialist products and services to the energy, marine and defense industries, and Graig Shipping PLC, U.K. shipowner, unveiled the Ulstein Twin X-Stern, a service operation vessel (SOV) design concept. The SOV will support the

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The SOV will support the U.K.'s target of 50 GW of offshore wind-energy generation by 2030 as part of its net zero strategy. (Courtesy: James Fisher Renewables)

U.K.'s target of 50 GW of offshore wind energy generation by 2030 as part of its net zero strategy.

The concept is the result of collaboration by the Diamond Consortium, a collaboration between James Fisher and Graig with support from DNV and design partner Ulstein Design Solutions.

Placing sustainability at the fore, the Diamond SOV concept will address the supply chain chasm threatening to stymie offshore wind progress with a scalable, modular solution that can be achieved through high-volume series construction to meet developer time and budgetary constraints. With a reduced-energy consumption and increased maneuverability, the vessel will help developers lower scope 3 emissions in the construction of offshore wind farms.

James Fisher has been facilitating the U.K.'s energy system transition through innovation in vessel design, technology, and propulsion systems throughout its 175-year history.

"The philosophy behind the Diamond SOV has been successfully applied to other vessel segments for many years: developing a specification that meets a market need while allowing for a high degree of customization and configuration for individual owners and developers. We chose to go with Ulstein due to their history of successful innovative designs and believe the Twin X-Stern to be the best choice

for service operations of offshore wind farms," said Jim Hey, group business development director at Fisher.

"Building SOVs in series volumes achieves significant economies of scale and delivers a design that can be built in multiple yards simultaneously. Considering the anticipated market demand for SOVs in the U.K. and beyond by the end of the decade, this exciting new concept places the U.K. at the center of enabling global offshore wind ambitions," Hey said.

"We have successfully partnered over many years with DNV on the Graig-led Diamond business model, and we are now applying this proven, scalable strategy to the global offshore wind markets with a particular focus on U.K. waters, helping to meet the challenging environmental goals in front of us," said Graig Shipping PLC CEO Hugh Williams.

**MORE INFO** [jamesfisherrenewables.com](http://jamesfisherrenewables.com)

## INNOVATION

### Ventus Group gets DNV certification

Ventus Engineering GmbH, supplier of end-to-end optimization solutions within the type approval envelope for excellence in wind-turbine performance, has been certified from DNV according to the standard DNV-SE-0439-2021-10 Certification of Condition Monitoring for Wind Turbines, for its Dynamic Relative Blade Pitch angle Misalignment (DRBPM) inspec-



Ventus Group's DNV certification comes as the company is experiencing a period of fast expansion on a global scale. (Courtesy: Ventus Group)



Russelectric offers customized Switchgear Simulators for renewable energy facilities and microgrids. (Courtesy: Russelectric)

tion service.

This innovative technology consists of a high-speed camera coupled with onsite image processing software that accurately and efficiently measures relative blade-pitch angle misalignment while the turbine is still in operation.

Just one degree of relative blade pitch angle misalignment between two blades could result in a 2-percent loss of power production and additional loads.

The cutting-edge Dynamic Blade Pitch Angle Measurement performed while the wind turbines are in operation enables Ventus to accurately see the relative blade pitch misalignment, and then, blade pitch angles can be adjusted to be within  $\pm 0.30$  as required on the affected wind turbines.

Ventus offers this service on wind turbines for both onshore and offshore.

The DNV evaluation assessed and finally certified the overall method and procedure performed by Ventus for the accurate calculation of relative blade pitch angle misalignment between the wind-turbine blades with a review of the respective documentation material and field demonstration.

The DNV certification comes as Ventus Group experiences a period of fast expansion on a global scale. Headquartered in Austria, the company has a well-established presence in Europe and the U.K. In 2021, the company also entered the Indian market for the first time.

“The certification from DNV is a

unique technological benchmark for the industry,” said Ventus Group CTO Poul-Anker Lübker. “It means our customers can put their trust in our top-level analysis methods and documented results.”

**MORE INFO** [www.ventus.group](http://www.ventus.group)

## INNOVATION

# Russelectric announces Switchgear Simulators

Russelectric, a manufacturer of power control systems and automatic transfer switches, announced the availability of Switchgear Simulators designed to train personnel on automatic and manual operation of Russelectric switchgear for renewable energy facilities and microgrids.

Customized to mimic the opera-

tion of the customer’s Russelectric switchgear/system, Russelectric simulators are ideal for familiarizing workers on the system and its operation and for accurately diagnosing a wide range of utility, generator, and breaker problems.

The simulator can also be used to assess the impact of changes to PLC setpoints such as kW values and time delays.

Using the simulators enables operators to evaluate an almost limitless number of responses to failure scenarios and use the information to develop and validate site operating and emergency procedures.

Russelectric Switchgear Simulators are available in two versions: The Training Simulator allows personnel to train on the automatic operation of Russelectric Switchgear, while the Advanced Training Simulator allows personnel to train on both manual and automatic operations.

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The new module enables blade experts to make informed decisions for maintenance and repairs. (Courtesy: Sulzer Schmid)

controls and interlock circuits, the simulator PLC accurately mimics full manual controls, enabling personnel to train in the comfort and safety of an office environment.

**MORE INFO** [www.russelectric.com/products/simulators](http://www.russelectric.com/products/simulators)

## ► INNOVATION

### Sulzer Schmid launches 3DX blade damage monitor

Sulzer Schmid, a Swiss company pioneering UAV technology for wind rotor blade inspection, recently announced the launch of its latest 3DX Damage Progression module designed to track damages and monitor how they develop over time. By comparing the evolution of blade damages from one inspection campaign to another, the new module enables blade experts to

make informed decisions for maintenance and repairs.

The new 3DX Damage Progression module allows users to compare damages that have been recorded during previous inspections with new inspection data. The progression of damage is displayed in a time series of recorded inspections, so that it can be easily evaluated. In this way, leading-edge erosion, for example, can be closely monitored and its evolution tracked in a so-called “damage chain.”

“We are constantly innovating to increase the degree of automation for rotor-blade inspections, and that’s what makes our new Damage Progression module possible in the first place,” said Tom Sulzer, Sulzer Schmid co-founder and CEO. “When inspections are carried out in a routine and automated fashion the data generated becomes a veritable treasure. With advanced analytics and machine learning the data can generate important insights and trend analysis, which can be used to optimize repair campaigns and

maintenance strategy. As more and more data are collected, we learn how problems develop over time and lay the foundation for predictive maintenance. The benefits are huge, resulting in substantial cost savings and better overall performance.”

The inspection data is used to identify, localize, measure, and classify damages. This means that, for each subsequent inspection, it is always possible to find the exact location and history of any damage, review, and evaluate its evolution. Knowing how damages develop over time allows blade experts to determine which damages need to be repaired when. This makes the planning of repair campaigns more efficient, saving downtime, and optimizing blade repair budgets.

This additional module is available on the proprietary browser-based 3DX™ Blade Platform, which integrates all the inspection information in one place, providing an overview of the blade health of the entire fleet of wind turbines.

**MORE INFO** [www.sulzerschmid.ch](http://www.sulzerschmid.ch)

## ► INNOVATION

### Ventus establishes wind turbine entity in Canada

Ventus Group has formed Ventus Wind Services (Canada) Inc., registered in Ontario and operating to supply Ventus’ optimization solutions in wind-turbine performance throughout North America.

“Ventus Wind Services (Canada) Inc. has been established to conclude our first project in the country, with one of the world’s major utilities and a global player in the renewable energy sector,” said Ventus Group CTO Poul-Anker Lübker. “Ventus Group intends to be an important player in the North American wind-turbine optimization and condition monitoring market, with our existing products



Operational since June 2019, the Beatrice Offshore Wind Farm is about 13 kilometers from the Caithness coast and has a rated capacity of 588 MW. (Courtesy: Rovco)

and services as well as with our novel and award winning TripleCMAS Rotor Monitoring and alarm system when it is introduced into the global market later in the year.”

Over the last 18 months, Ventus Group has been preparing for rapid growth internationally, including the successful completion of ISO 9001 and 45901 certifications for the business. The company also has been awarded DNV certification for its flagship Relative Dynamic Blade Pitch Angle Measurement.

**MORE INFO** [ventus.group](http://ventus.group)

## ► MAINTENANCE

### B & K Vibro names new CEO

Brüel & Kjær Vibro (B&K Vibro), an independent supplier of condition monitoring solutions for rotating machinery, recently named Volker Polonyi as its new CEO and president. Most recently at B&K Vibro’s parent company, NSK, Polonyi was director



**New B&K Vibro CEO Volker Polonyi has 35 years of experience in bearing and linear technology.** (Courtesy: B & K Vibro)

Polonyi brings with him 35 years of experience in bearing and linear technology, having also served as NSK’s managing director for industrial bearing sales, sector manager for wind power technology, and head of application development.

“In his many years with NSK, Volker has successfully developed and executed commercial and digital strategies that create customer value through technology.

The expertise that he brings from NSK, coupled with his industry knowledge and leadership skills, are exactly the right combination to drive the con-

dition monitoring business of B&K Vibro to the next level. His appointment marks an exciting milestone for B&K Vibro,” said Dai Kodama, NSK’s chief integration officer.

“There are clear synergies between B&K Vibro and NSK, with a huge degree of shared talent and knowledge, and we have been working together successfully to deliver exciting, innovative business and engineering solutions,” Polonyi said. “As CEO and president of B&K Vibro, I am looking forward to working with our customers, colleagues, and partners to expand our business, capture new markets, and drive long-term growth.”

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**MORE INFO** [www.bkvibro.com](http://www.bkvibro.com)

## ► MAINTENANCE

### Rovco begins 3-year contract for Beatrice offshore wind farm

For a third year, Rovco, a provider of offshore subsea and survey solutions, has been awarded a contract to carry out work on the Beatrice offshore wind

farm, Scotland's second-largest operational offshore wind farm.

The project will be delivered by Rovco's U.K.-based team and will involve survey work on all inter-array cable and subsea jacket locations across Beatrice. The survey work provides a focused approach to the monitoring and reporting of asset and critical infrastructure conditions, delivering insights that enable the planning of potential preventative maintenance and remedial works.

The project will use the Glomar Worker DPH vessel, equipped as standard with a Work-class ROV, SubSLAM X2 and associated survey tooling suite, along with PanGeo Subsea's 3D Sub-Bottom Imager™ to perform cable depth of burial assessments. The delivery of the project, managed from Rovco's operational base in Scotland, will support further full-time employment opportunities across the local region.

Having worked on more than 50 percent of operational wind farms in U.K. waters, remaining incumbent at Beatrice strengthens Rovco's continued expansion. The business' growth is further supported by the recently announced completion of a £15.2 million Series B funding round into the business.

"We are thrilled to have been awarded the year-three scope of work for Beatrice Offshore Wind Farm Ltd, under this prestigious framework agreement. The team at Beatrice are early adopters of technology that helps drive efficiencies and smarter ways of collating and presenting valuable data.

Delivering the highest quality insight available on the market, we ensure that the Beatrice team have the necessary information to fully inform their ongoing operations and maintenance planning and decision making," said Simon Miller, Rovco managing director.

"Crucially, our offshore setup and technology selection enables us to operate whilst the wind farm is still operational and producing energy. In addition to our own team of experts, we are pleased to be leveraging local supply chain partners and talent, en-

suring the successful, safe and timely completion of the work on Beatrice," Miller said.

"We are delighted to have Rovco back on site again to continue their long-running relationship with the Beatrice Wind Farm. Rovco consistently provides high quality data which allows for our teams to gain a detailed insight into long term integrity management requirements, enabling us to optimize through-life operational costs. Alongside Rovco's approach to innovation, their safety culture continues to align with our core values – with complex works completed efficiently and with a strong safety focus," said Matthew Henderson, Beatrice Offshore Wind Farm's subsea and structural engineering manager.

**MORE INFO** [www.rovco.com](http://www.rovco.com)

## ► MAINTENANCE

### Firetrace opens India, China facilities

Firetrace International, a provider of fire suppression technology across 35 countries on five continents, has opened facilities in India and China, bringing its fire safety support to those expanding renewable energy markets.

China is targeting 1,200 GW of wind and solar energy by the end of 2030, with a current capacity of 687 GW at the end of 2021, according to Bloomberg New Energy Finance.

India is targeting 500 GW of non-fossil power generation by the end of the decade with having 152.9 GW of renewable capacity installed in February 2022, generating the fourth-largest wind sector globally, Bloomberg NEF estimates.

Firetrace's expansion means owners and operators will have improved access to the company's fire suppression technology, which stands to protect assets, communities, and investments if or when fire occurs in renewable energy assets.



Firetrace systems contain specialized gas or powder, designed for putting out fires, called suppression agents. (Courtesy: Firetrace)

Fires, which for the wind sector, result in total destruction of a turbine 90 percent of the time, can cost up to \$9 million in the most serious cases.

Firetrace's new facility in India, which will also act as a fill station for fire suppression systems already installed in renewable plant infrastructure, is close to four national highways, the IGI Airport, and New Delhi.

The office will consist of a management team with 25-combined years of fire industry experience; 50-plus engineers; and 10 sales, technical, administration, and finance team members.

The Chinese hub is co-located in a facility with eight other companies all under Halma plc, Firetrace's parent company. Their presence will enable Firetrace's clients in the region to take advantage of engineering resources, supply chain, manufacturing, warehousing, distribution, and talent management to enable economies of scale.

While rare, fires not only harm asset operators financially, but they also harm the reputation and public opinion of the wind industry. And, as the sector continues its rapid growth, India, China, and their surrounding territories aren't immune to these risks.

Operators need to look to fire-suppression systems, supported by in-country experts and local supply points like these new facilities in India and China, to stop this damage in its tracks if the renewable energy sector is to continue to grow at the current rate.

"We are delighted to have opened



With this order, Sacramento's collective Solano Wind Project will have a total capacity of about 300 MW. (Courtesy: Vestas)

facilities in India and China, which are staffed with proven industry experts and years of experience. We are well placed to work with stakeholders as the wind industry in both regions rapidly scale up, to mitigate against the risk fire poses to wind turbines," said Firetrace global sales manager Angela Krcmar.

**MORE INFO** [www.firetrace.com](http://www.firetrace.com)

## ▀ MANUFACTURING

### Vestas gets repower order from Sacramento

Vestas has received an 86-MW order from Sacramento Municipal Utility District (SMUD) to repower the Solano Wind Project Phase 4 wind farm in California. The order consists of 19 V150-4.5 MW wind turbines, which will replace the site's current legacy V47-660 kW wind turbines. With this order, the collective Solano Wind Project will have a total capacity of about 300 MW.

"Repowering wind turbines is an ef-

ficient solution to extend the life of a wind project, and we're thrilled SMUD is partnering with Vestas once again on the Solano 4 project phase and utilizing our proven 4-MW platform technology to bring renewable energy to the greater Sacramento area," said Laura Beane, president of Vestas North America.

"SMUD has long partnered with Vestas, a world leader in sustainable technologies, to produce wind-power generation at the Solano Wind Farm," said Chief Zero Carbon Officer Lora Anguay. "The retooling and expansion of the Solano Wind Farm will further boost SMUD's clean-energy mix with proven clean energy technologies and is a step forward in our vision of eliminating all carbon emissions from the region's power supply by 2030."

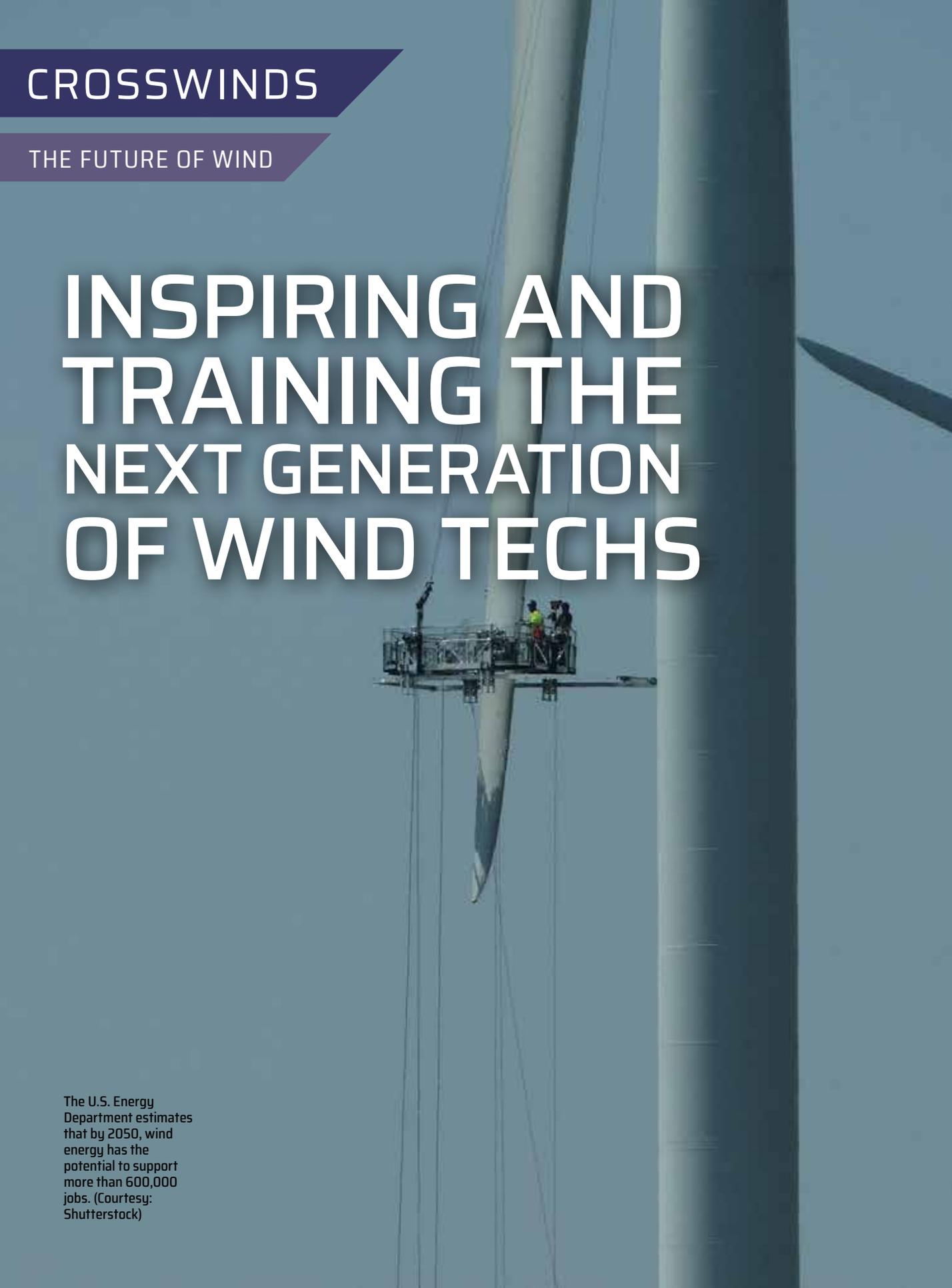
The order includes a full Engineering Procurement Construction (EPC) contract. Vestas will provide a full solution with delivery, installation, and commissioning of the turbines.

"Partnering with SMUD each step of the way on this project solidifies the trust and collaboration between Vestas and SMUD, and we look forward to showcasing our end-to-end capabilities as we repower the Solano 4 project," said Ramit Bajaj, senior vice president of Construction & Operations for Vestas North America.

The order also includes a 10-year Active Output Management 5000 (AOM 5000) service agreement, designed to ensure optimized performance of the asset. To further strengthen the partnership with SMUD and ensure the successful operations of the collective Solano Wind Project, Vestas also extended its multi-year service agreements for the Solano 2 and Solano 3 project phases at the same site.

Turbine delivery for Solano 4 begins in the fourth quarter of 2023 with commissioning scheduled for the second quarter of 2024. ✈

**MORE INFO** [www.vestas.com](http://www.vestas.com)



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THE FUTURE OF WIND

# INSPIRING AND TRAINING THE NEXT GENERATION OF WIND TECHS

The U.S. Energy Department estimates that by 2050, wind energy has the potential to support more than 600,000 jobs. (Courtesy: Shutterstock)

*Great opportunities exist to those who pursue a career in the skilled trades, but special skills and training are needed to keep high-tech equipment, such as wind turbines, operational.*

By EARL BAILEY

**W**ind power is here, and it is here to stay. As a testament to that, the U.S. Wind Turbine Database estimates there are more than 70,000 wind turbines operating in the United States, Puerto Rico, and Guam. Collectively, they provide about 7 percent of the country's electricity. This figure is expected to increase as well.

One of the country's largest wind-energy developments, the 999-MW Traverse Wind Energy Center in Oklahoma, began operation in early 2022. This continues the trend of the United States embracing wind energy, as approximately 3,000 new turbines have been added annually to the nation's infrastructure since 2005.

That is a lot of wind turbines — and each one needs to be maintained. A challenge facing the industry is ensuring enough technicians are fully trained to keep them operational.

## TECHNICAL EDUCATION

The best path to properly training technicians is through technical education. Although the wind-power industry is still in its relative infancy in the United States, some technical schools and community colleges now offer wind-power-specific education for traditional students and adult learners to study turbine design and control systems.

To support this, the wind-power industry must address some specific challenges when it comes to tools and tool management — that is where suppliers fit into the equation.

Some suppliers have invested heavily in technical education to develop product-specific user certifications for tools, equipment, and asset management in a number of industries, including wind power. These training modules, which technical schools and colleges can seamlessly incorporate into their existing wind-energy courses, teach aspiring technicians the proper way to use tools and equipment specific to wind energy, allowing them to be more productive in the field.

To help facilitate these certifications, suppliers have joined forces with the National Coalition of Certification Centers (NC3), a network of education providers and corporations that support advances and validate new and emerging technology skills in a number of industries.

But these programs cannot provide their intended benefit without people who are interested in a career in skilled trades.

There is such great potential for people to get their foot in the door and start their career in the skilled trades because of the industry's demand for reliable, well-trained employees. If you are not afraid of heights, wind can be a landing place for many individuals.

## 600,000 JOBS BY 2050

The U.S. Energy Department estimates that by 2050, wind energy has the potential to support more than 600,000 jobs. There are similar estimates across other industries as well, including aviation, manufacturing, and others.

Good opportunities are available to people in these industries who are trained. But how best do we close this skills gap?

Part of the issue is that skilled and technical labor has an image crisis. Many probably think a career in skilled trades involves a job working in noisy, dirty surroundings that garners little respect and attention. Those stereotypes may be hampering the recruiting efforts of people into the skilled trades and could hinder growth of the wind-power industry.

We need to start by inspiring students. In as little as two years, a person can receive a technical degree and start working in a meaningful job that offers career advancement and make a decent living doing so. There is a bright future in the growing wind and renewable energy industries; it is a compelling story that needs to be better told in high schools across the country.

The reality today is that many individuals think of a traditional four-year college as a first option; a career in a skilled labor field is not top of mind for them or their parents. Simply put, skilled labor should not be viewed as a second-place option or consolation career path. What students need to know is that gaining skills and working in the wind- and renewable-energy industries is a career that is highly technical and skilled and requires a great deal of training and knowledge. What students need to know is that a technical degree can often provide a much quicker path to employment, is often less expensive than a bachelor's degree, and comes with reasonable assurance that a job will likely be waiting for them following course completion — and that job may be building or maintaining massive wind turbines.

## THE SUPPLIERS' ROLE IN TRAINING

The role suppliers are playing in technical education is providing conformity and an across-the-board standard for the partnering technical schools to present in-depth instruction on tool use, as well as theory and application.

For wind energy, the most applicable certification courses include torque, multimeter, and tools at height (tethered tools).

A thorough understanding of torque is extremely important in wind energy as turbines have more than 600 fasteners, all of which require proper torque. Torque certification dives deep into how to identify bolt grades, clamping force, thread pitch, and the dynamics of what happens when applying torque to a fastener. It also includes mechan-



The role suppliers are playing in technical education is providing conformity and an across-the-board standard for the partnering technical schools to present in-depth instruction on tool use, as well as theory and application. (Courtesy: Snap-on)

ical and electronic torque instruments, hands-on training, safety, and calibration equations.

Multimeters are one of the most important tools used by wind technicians due to the sophisticated electrical and electronic components and monitoring systems in turbines. This certification teaches the proper way to use every function of a multimeter. And since many maintenance jobs within the energy sector take technicians off the ground, learning about different tethering devices and how to best use them to ensure tool security is the basis of the tools-at-height certification.

It cannot be emphasized enough that great opportunities exist to those who pursue a career in the skilled trades. But people simply cannot walk in off the street and get one of these jobs; special skills and training are needed to keep high-tech equipment, such as wind turbines, operational. With the help of contributions from suppliers, technicians of tomorrow are poised to realize their dreams by being



Since many maintenance jobs within the energy sector take technicians off the ground, learning about how to best ensure tool security is the basis of the tools-at-height certification. (Courtesy: Snap-on)

provided with the best tools to succeed in conjunction with our partnership with technical schools. Working together, I am confident we will see our efforts make a positive impact with future technicians in the industry. ✌

#### ABOUT THE AUTHOR

Earl Bailey is the National Education Partnerships Coordinator for Snap-on Industrial. He can be reached at 405-410-9929; earl.p.bailey@snapon.com. For more information on tooling certifications call 877-740-1900, or go to [www.snapon.com/Industrial-Certification](http://www.snapon.com/Industrial-Certification).



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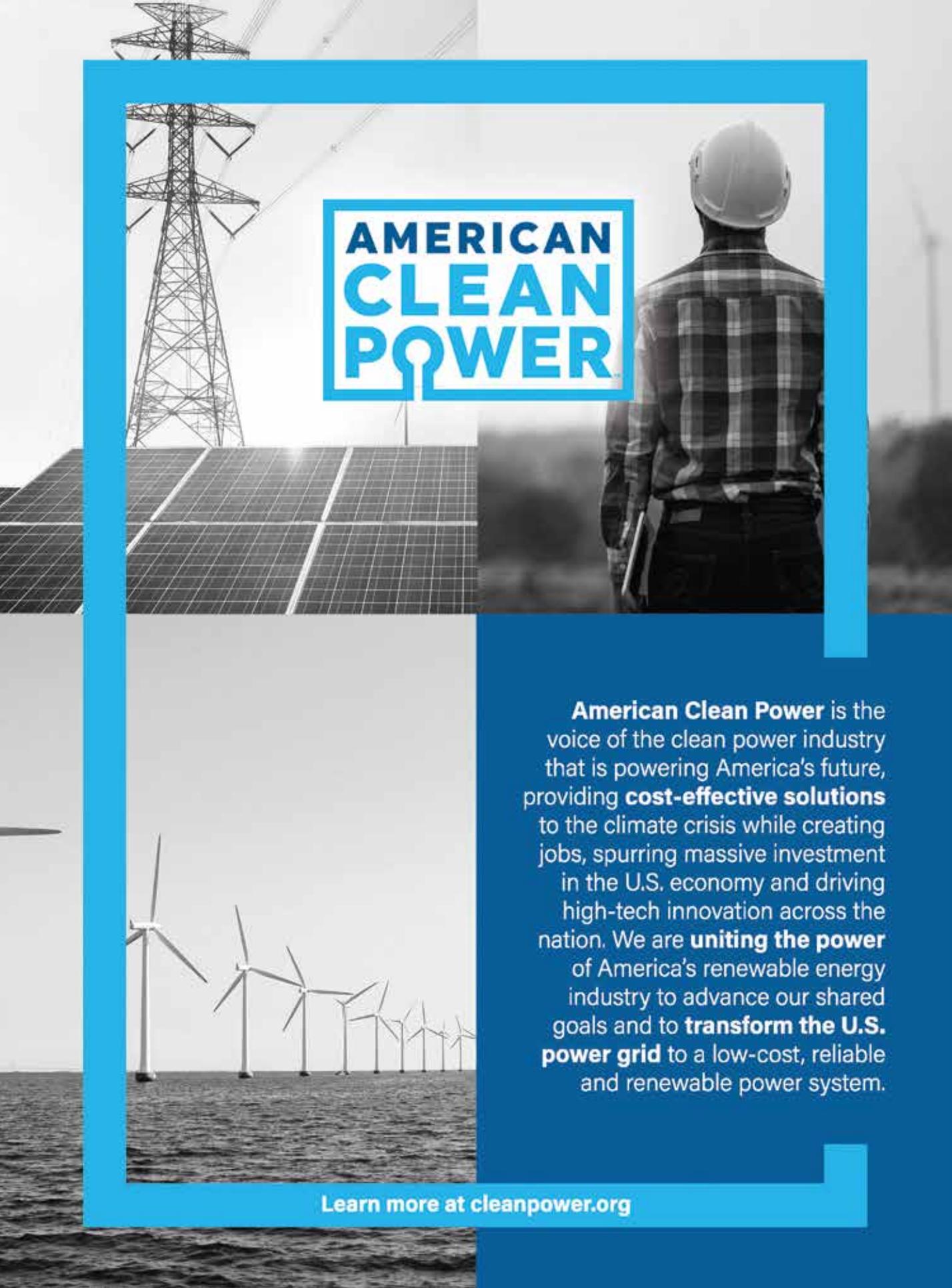
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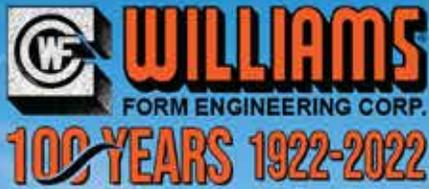
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